Journal of Systematic Palaeontology **4** (1): 1–108
doi:10.1017/S1477201905001689 Printed in the United Kingdom
Issued 3 March 2006

Corals of the K/T-boundary: Scleractinian corals of the suborders Astrocoeniina, Faviina, Rhipidogyrina and Amphiastraeina

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SYNOPSIS This taxonomic review of the scleractinian corals of the Maastrichtian and Paleocene period focuses on the scleractinian suborders Astrocoeniina, Faviina, Rhipidogyrina and Amphiastraeina. This, the first extensive compilation of coral species of the K/T (Cretaceous/Tertiary) boundary, deals with more than 2500 records of 550 nominal taxa. In addition to the re-examination and re-evaluation of described forms, this study also includes the first description of the largest Maastrichtian coral assemblage known (consisting of about 4000 specimens from Jamaica), as well as new material from the Campanian–Maastrichtian of Argentina, Lower Maastrichtian of Mexico (Cerralvo), and the Paleocene of Austria (Kambühel–Kalke). A diagnosis is provided for each species, as well as for each higher-level taxonomic category and issues concerning taxonomic assignment are discussed in detail. The descriptions are accompanied by illustrations of representatives of each species and, in many cases, include illustrations of type or original material. Also included is the first comprehensive overview of the stratigraphical and geographical ranges of each taxon. In the four suborders evaluated in this paper, 123 valid species can be reliably documented as occurring in the Maastrichtian and/or the Paleocene. The largest number of species is in the suborders Faviina and Astrocoeniina. In the Faviina 62 valid species are known from the Maastrichtian, of which 35 (56.5%) crossed the K/T-boundary, while in the Paleocene 14 new species appeared. In the Astrocoeniina 18 valid species occurred in the Maastrichtian, eight of which (44.4%) crossed the K/T-boundary and 16 new species appeared in the Paleocene. Only eight species of Rhipidogyrina and five species of Amphiastraeina occurred in the Maastrichtian and although two amphiastraeinid made it into the Paleocene, only one of the rhipidogyrinids crossed the K/T-boundary. No new species of Amphiastraeina appeared in the Paleocene. According to this revision on the genus level 44 out of the 65 genera crossed the K/T-boundary, which is 67.7% (12 genera went extinct, 9 genera have their first occurrence in the Paleocene). In comparison to previous estimates this result (generic extinction of around 32%) represents the best estimation for scleractinian corals at present and corresponds to recently reported results of other macroinvertebrate groups after taxonomic revision (e.g. echinoids).

KEY WORDS Maastrichtian, Paleocene, K-T, taxonomy, stratigraphical and geographical distribution

Contents

INTRODUCTION

Many Cretaceous–Tertiary (K/T) boundary localities are known worldwide but palaeontological information for any one locality is often limited to only a few groups of organisms (Kiessling & Claeys 2001). Many authors dealing with macrofossils of the Late Cretaceous focused on ammonoids (e.g. Ward & Kennedy 1993; Kennedy 1995), echinoids (e.g. Kier 1972; Smith 1995; Smith *et al.* 1999; Smith & Jeffery 2000), inoceramids (e.g. Morris 1995; MacLeod *et al.* 1996), or rudists and rudist-coral assemblages. In the latter case, the dominance of rudists is emphasised and coral occurrence towards the K/T-boundary is considered to be in a state of decline (e.g. Kauffman 1973; Kauffman & Johnson 1988; Ross & Skelton 1993; Voigt *et al.* 1999). Regarding the Early Tertiary time period, the focus of many studies has been primarily on the investigation of phytoplankton and zooplankton faunas (e.g. Drobne *et al.* 1988; Bryan 1991; Kienel 1994; Moussavian & Vecsei 1995; Hollis 1997; Schlagintweit *et al.* 2003).

Although Maastrichtian and/or Lower Tertiary corals have been reported from numerous localities worldwide, the vast majority of these papers document only very small faunas of no more than 10 taxa (e.g. Vaughan 1920, Paleocene of the USA, 6 taxa; Marini 1942, Maastrichtian of Libya, 6 taxa; Myers 1968, Maastrichtian of Mexico, 6 taxa; Wolleben 1977, Maastrichtian of Mexico, a single taxon; Bernecker & Weidlich 1990, Paleocene of Denmark, 3 taxa;

Metwally 1996, Maastrichtian of Oman, 10 taxa), or only list corals without giving any further taxonomical information (e.g. Bataller 1937*b*, Maastrichtian of Spain; Barthel & Herrmann-Degen 1981, Paleocene of Egypt; Matteucci *et al.* 1982, Maastrichtian of Italy; Carbone *et al.* 1993, Upper Paleocene–Lower Eocene of Somalia). It is not known to what extent the small number of taxa reported for these localities is a reflection of depauperate faunas or is simply due to the fact that collecting corals was not the primary goal of these studies.

Publications containing taxonomic documentation of large scleractinian coral faunas of the K/T-boundary are rare and most of these deal with the fauna of a single geological period (Duncan 1880, Paleocene of Pakistan, 59 taxa; Alloiteau 1958, Maastrichtian of Madagascar, 23 taxa; Schuster 1996, Paleocene of Egypt, 31 taxa; Baron-Szabo 2000, Maastrichtian of the UAE/Oman border region, 43 taxa). The only major paper describing and comparing coral faunas across the K/T-boundary was that of Kuzmicheva (1987, Maastrichtian/Paleocene from Russia, Ukraine, Turkmenistan and Kazakhstan, 69 taxa). The present paper utilises the data provided by these earlier studies, as well as new data on the Maastrichtian corals of Jamaica, Campanian–Maastrichtian of Argentina and the Paleocene corals of Austria (Kambühel–Kalke) to provide an overview of the changes that occurred in the scleractinian coral fauna at the K/T-boundary. In order to do this, around 2500 references of over 550 nominal coral taxa described for this period had to be re-evaluated. Because of the large amount of information to be presented, the study has been divided into two parts. This first part focuses on the scleractinian suborders Astrocoeniina, Faviina, Rhipidogyrina and Amphiastraeina and deals with 123 valid taxa. The second part will cover the remaining suborders Dendrophylliina, Fungiina, Microsolenina, Caryophylliina and Stylinina.

Preliminary chronostratigraphical and geographical implications

In the Faviina 62 valid species are known from the Maastrichtian, of which 35 (56.5%) crossed the K/T-boundary and 14 new species appeared in the Paleocene. In the Astrocoeniina 18 valid species occurred in the Maastrichtian, eight of which (44.4%) crossed the K/T-boundary and 16 new species appeared in the Paleocene. Only eight species of Rhipidogyrina and five species of Amphiastraeina occurred in the Maastrichtian and although two amphiastraeinid made it into the Paleocene, only one of the rhipidogyrinids crossed the K/T-boundary. No new species of Amphiastraeina appeared in the Paleocene. Species of the suborders Faviina, Astrocoeniina, Amphiastraeina and Rhipidogyrina which did not cross the K/T-boundary or which first appeared in the Paleocene show similar features in that their geographical and stratigraphical distribution is rather limited. Taxa that occurred last in the Maastrichtian (46 species) show only close affinities to Upper Cretaceous coral assemblages of European regions and the Western Atlantic area but hardly correspond to Lower Cretaceous coral associations (see Tables 1 and 2). Of the 46 species only four have been reported from Lower Cretaceous strata (= 8.7%). Forms that first appeared in the Paleocene (30 species) show greatest affinities to European and Asian assemblages of the Lower Tertiary but have not been reported from younger strata (see Tables 1 and 2). Only four taxa that crossed the K/T boundary occur in the Upper Tertiary. These observations are limited by the fact that they pertain to four suborders. The remaining suborders Dendrophylliina, Fungiina, Microsolenina, Caryophylliina and Stylinina will be dealt with in a later paper. Furthermore, the suborders discussed in this paper are dominated by colonial forms whereas some of the other suborders (e.g. Caryophylliina) are characterised by solitary taxa. These differences might have contributed to different distributional patterns and survivorship across the K/T-boundary.

The suborders Faviina (49 genera), Astrocoeniina (11 genera), Amphiastraeina (1 genus) and Rhipidogyrina (4 genera) are represented by 65 genera at the K/T-boundary. In contrast to the extinction/survivorship pattern of the species, the survivorship estimation for the genus level requires a different approach. Based on the currently available data several genera are represented by only one species at the K/T-boundary, some of which became extinct by the end of the Maastrichtian. However, from the palaeontological record it is known that some of these genera re-occurred in strata younger than the Paleocene and are therefore not reported in the current paper which focuses solely on scleractinian corals of the Maastrichtian–Paleocene period. Therefore, the genera that re-appeared in post-Paleocene strata are not being considered as having gone extinct. These genera include: *Hydnophora* (e.g. *H. variabilis* [Duncan], Eocene of the Caribbean; *H. excesa* [Pallas], Recent, Indian Ocean), *Liptodendron* (*L. grossi* Eliášová, 1991, Eocene of the Czech Republic), *Mesomorpha* (e.g. *M. taramelli* d'Achiardi, 1875, Eocene of Italy), *Dichocoenia* (e.g. *D. orcata* Lamarck, 1816, Recent, Indo-Pacific), *Phyllocoenia* (e.g. *P. radiata* [Michelin] Tertiary of Italy) and *Barysmilia* (*B. aenigma* [Budd], Eocene of Panama, originally described as *?Dichocoenia aenigma* Budd, 1992 *in* Budd *et al.* (1992); but grouped with *Barysmilia* following re-investigation of the holotype USNM 87870). As a result of the current revision of taxa of the suborders Faviina, Astrocoeniina, Amphiastraeina and Rhipidogyrina, 44 out of the 65 genera crossed the K/T-boundary, which is 67.7% (12 genera went extinct, 9 genera have their first occurrence in the Paleocene). In comparison to previous estimates by e.g. Rosen & Turnšek (1989) and Rosen (2000) who gave a total generic extinction of around 60%, this result (generic extinction of around 32%) represents the best estimation for scleractinian corals at present and corresponds to recently reported results for other macroinvertebrate groups after taxonomic revision (e.g. for echinoids, see Smith & Jeffery 2000). As discussed above for the species level, the generic observations are also limited by the fact that they pertain to four suborders.

MATERIAL AND METHODS

The illustrated specimens are housed in the type collections of the following institutions: **BMNH**, The Natural History Museum, London, UK (formerly British Museum (Natural History)); **BSP**, Geologisches Institut, Universität Karlsruhe, Germany; **CO**, New Zealand Geological Survey, Wellington, New Zealand; **GBA**, Geologische Bundesanstalt, Vienna, Austria; **IPB**, Geologisch-Paläontologisches Institut der Rheinischen Friedrich-Wilhelms Universität, Bonn, Germany; **MCZ**, Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA; **MNHN**, Institut de Paléontologie du Museum d'Histoire Naturelle

Table 1 Geographical distribution of Maastrichtian/Paleocene coral species.

	Lower Cretaceous			Upper Cretaceous												Lower Tertiary												Upper Tertiary				
Species	North America	Central Europe	South-Eastern Europe	Central America	South America	Western Atlantic	Mediterranean (Europe)	Central Europe	Eastern Europe	South-Eastern Europe	Middle East	Eastern Africa	Central-South Asia	South-Eastern Pacific	Antarctica	Central America	South America	Western Atlantic	Eastern Atlantic	Mediterranean (Europe)	Mediterranean (Africa)	Central Europe	Eastern Europe	South-Eastern Europe	Eastern Africa	Central-South Asia	South-Eastern Pacific	Antarctica	Central America	South America	Eastern Atlantic	Eastern Africa	Central-South Asia
Astrocoenia blanfordi Duncan, 1880																										X							
A. gibbosa Duncan, 1880																										X							
A. ramosa minor Duncan, 1880																										X							
A. spongilla Oppenheim, 1901*b*																					X				X								
Stephanocoenia tricoronata G, 1930																										X	X						
Stylocoenia maxima Duncan, 1880																											X						
S. montium (Oppenheim, 1912)																				X		X		X	X								
S. neutra Barta-Calmus, 1973																				X		X			X								
S. ranikoti Duncan, 1880																					X				X	?	X						
S. vicaryi d'Archiac & H., 1853																											X						
Actinastrea bastidensis All., 1954							X	X			X																						
A. subdecaphylla (Opp., 1930)								X				X	X																				
A. elongata Alloiteau, 1954								X			X		X								X												
A. exigua Alloiteau, 1954						X		X						?																			
A. geminata (Goldfuss, 1826)						X		X	X				?									X											
A. hexacnema (Quenstedt, 1881)								X														X											
A. hexaphylla (Quenstedt, 1881)						X		X																X									
A. ramosa (Sowerby, 1832)			X				X	X		X	X		?											X									
Columactinastraea anthonii L, 2003								X																									
C. fallax (Umbgrove, 1925)								X																									
C. pygmaea (Felix, 1903*b*)							X	X		X	X																						
C. torallolensis (Reig Oriol, 1989)							X				X																						
Holocoenia indica Stoliczka, 1873													X																				
H. madagascariensis (All. 1958)												X																					
H. parvula (Stoliczka, 1873)													X																				
Stylophora garumnica Vidal, 1921						X	X											X															
S. octophylla (Felix, 1906)						X			X		X																						
Madracis johnwellsi F. & L., 1974				X		X							X			X																	
Madracis vaughani Wells, 1941																X	X				X												
Acropora sp.																						X											
Astreopora auvertiaca (Mich., 1844)																				X		X		X									
A. hexaphylla Felix, 1906						X			X													X											
A. esperanzae Fr. & Langen, 1974						X										X				X													
Dendracis sp.																									X								
Favia gregoryi Wells, 1935				X		X												X															
F. somalensis Gregory, 1900																									X								
Dictuophyllia conferticostata (V.)				X		X							X					X															

Table 1 Continued.

Species	Lower Cretaceous			Upper Cretaceous											Lower Tertiary												Upper Tertiary				
	North America	Central Europe	South-Eastern Europe	Central America	South America	Western Atlantic	Mediterranean (Europe)	Central Europe	Eastern Europe	South-Eastern Europe	Middle East	Eastern Africa	Central-South Asia	South-Eastern Pacific	Antarctica	Central America	South America	Western Atlantic	Eastern Atlantic	Mediterranean (Europe)	Mediterranean (Africa)	Central Europe	Eastern Europe	South-Eastern Europe	Eastern Africa	Central-South Asia	South-Eastern Pacific	Antarctica	Central America	South America	Eastern Atlantic	Eastern Africa	Central-South Asia
D. reticulata(Goldfuss, 1826)							X	X					X																			
(?) *Dictuophyllia batalleri* (R., '87)							X																									
Hydnophora styriaca (Mich. 1847)	X	X	X				X	X																								
Monticulastraea insignis D., 1880											X																				X	X
Antiguastrea cellulosa (D., 1863)				X		X										X		X					X						X			
Haldonia schindewolfi (W., 1934*a*)						X																										
Goniastrea insignis (Duncan, 1880)						X																			X							
G. tenera Traub, 1938											?											X										
Colpophyllia reagani Durham, 1942				X		X												X														
Manicina hydnophoroidea (D., 1880)																					X				X							
Cladocora barkii (Duncan, 1880)																							X		?	X						
C. gracilis (d'Orbigny, 1850)						X	?	X		X									X		X	X										
C. jamaicaensis Vaughan, 1899				X		X													X	X	X							X				
Liptodendron nefiana (Opp., 1930)						X		X														?										
Phacellocoenia bazerquei All. & T.																						X										
Mycetophyllia multistellata R, 1864						X														X				X								
Trachyphyllia granti (d'A. & H., 1853)																										X						
Trachyphyllia sawkinsi (V., 1926)						X										X	X													X		
?*Isastrea angulosa* (Goldfuss, 1826)								X														?										
Placocoenia macropht. (G, 1826)							X	X																								
Placocoenia major Felix, 1903*a*			X	X				X																								
Paraplacocoenia rotula (G., 1826)						X	X	X	X	X	X									X	?	X										
Neocoenia lepida (Reuss, 1854)			X					X	X	X	X																					
Astrogyra edwardsi (Reuss, 1854)							X	X	X		X		X																			
(?) *Taxogyra zuberi* (Felix, 1906)									X																							
Columnocoenia arnaudi (All., 1957)								X	X														X									
C. katzi (Kuzmicheva, 1975)																							X									
Montlivaltia atlantica (Mort. 1829)						X												X								X						
M. angusticostata Umbgrove, 1925								X			X																					
Trochosmilia cristata (D., 1880)																										X						
T. faujasi M Edw & H, 1848								X					X													X						
Meandrastraea antiqua (R., 1854)							?	X					X																			
Placosmilia bojnicensis All., 1949																						X	X									
P. sinuosa (Reuss, 1854)								X		X	X																					
Elasmophyllia gigantea d'A., 1875						X		X												X		X										
Peplosmilia latona (Felix, 1903*a*)								X														X										
Calamophylliopsis marini (B., 1936)							X															X										
(?) *C. vidali* (Bataller, 1956)							X																									
C. simonyi (Reuss, 1854)							?	X			X											X										

Columastraea dubia Alloiteau, 1958				X				X	X																	
C. striata (Goldfuss, 1826)				X	X	X	X																			
Stephanaxophyllia bicoronata (G.)					X	X		X														X				
Haimesastrea conferta Vaug. 1900		X											X	X	X				X		X					
Rhizangia padricensis Turnšek, 1998																	X				X					
R. sedgwicki Reuss, 1854			X		X	X																				
Astrangia ?cretacea (Böl., 1870)	X		X																						?	
A. expansa Vaughan, 1900													X		X											
Oculina becki (Nielsen, 1922)																			X						X	
O. conferta M Edw & H, 1850															X				X		X					
O. smithi Vaughan, 1900															X											
Bantamia condocostata Sq., 1958											?													X		
Mesomorpha mammillata (R, 1854)					X			X																		
Aulosmilia aspera (Sowerby, 1832)			X	X	X			X										X								
A. cuneiformis (M Edw & H, 1848)			X	X	X		X	X	X	?									X							
Phragmosmilia lineata (G., 1826)				X	X	X		X																		
Phyllosmilia cf. *didymophila* (Fel)				X	X			X																		
Diploctenium cordatum G., 1827					X			?											?							
D. ferrumequinum Reuss, 1854				X	X		X												X							
D. plumum Goldfuss, 1827					X																					
D. lunatum (Bruguière, 1792)				X	X	X		X																		
Flabellosmilia cf. *bisinuatum* (Rss)					X	X				X									X							
(?) *F. vaughani* (Steph., 1916)				X								X														
Pachygyra krameri Oppen., 1930				X	X																					
P. princeps Reuss, 1854			X	X	X												X									
P. savii d'Achiardi, 1866																	X	X	X			?				
Glenarea cretacea Počta, 1887					X			X								X										
Rennensismilia inflexa (R., 1854)				X	X	X	X	X	X	X																
R. complanata (Goldfuss, 1826)					X	X	X								X								X			
Tortoflabellum cf. *marwicki* Squi.			X																							X
Dichocoenia anomalos (W, 1934*a*)			X																							
Phyllocoenia cribraria (M., 1840)				X	X																					
Reussicoenia edwardsi (R, 1854)			X	X	X		X			X																
Provinciastrea morav. maz. C, 1954					X	X																				
Barysmilia iberica B.-Szabo, 1998				X				X																		
B. irregularis (Reuss, 1854)			X	?	X			X																		
B. trechmanni (Wells, 1934*a*)	X		X																							
Orbignygyra latisinuata (F., 1903*a*)			X		X			X																		
O. tenella (Goldfuss, 1826)				X	X	X	X	X	X																	
Psilogyra felixi Oppenheim, 1930			X		X																					
P. telleri Felix, 1903*a*			X		X																					
Phytogyra sp.			X																							
Heterocoenia bacellaris (G., 1826)	X			X	X														X							
H. dendroides Reuss, 1854				X	X																					
H. gracilis (Quenstedt, 1881)					X															X						
H. grandis Reuss, 1854				X	X		X			X																
H. minima d'Orbigny, 1850					X																					

Arctica, Denmark (Greenland); **Antarctica,** Seymour Island; **Central America,** Costa Rica, Mexico, Panama; **Central Europe,** Austria, Czech Republic, Denmark (Fakse), England, France, Germany, The Netherlands; **Central–South Asia,** Armenia, Georgia (in Caucasus), India, Pakistan, Tibet; **Eastern Africa,** Madagascar, Somalia; **Eastern Atlantic,** Senegal; **Eastern Europe,** Bulgaria, Hungary, Romania, Slovakia, Ukraine; **North America,** Texas and Washington (USA); **Mediterranean (Africa),** Egypt; **Mediterranean (Europe),** Italy, Portugal, Spain; **Middle East,** Lebanon, Oman Mountains, Saudi Arabia, Turkey, UAE/Oman border region; **South America,** Argentina, Colombia, Peru, Trinidad; **South–Eastern Europe,** Bosnia, Croatia, Greece, Serbia, Slovenia, Yugoslavia; **South-Eastern Pacific,** New Zealand; **Western Atlantic (including Caribbean, south-eastern and eastern USA),** Alabama (USA), Antigua, Cuba, Georgia (USA), Jamaica, Mississippi (USA), New Jersey (USA), Puerto Rico.

Table 2 Stratigraphical distribution of Maastrichtian/Paleocene coral species.

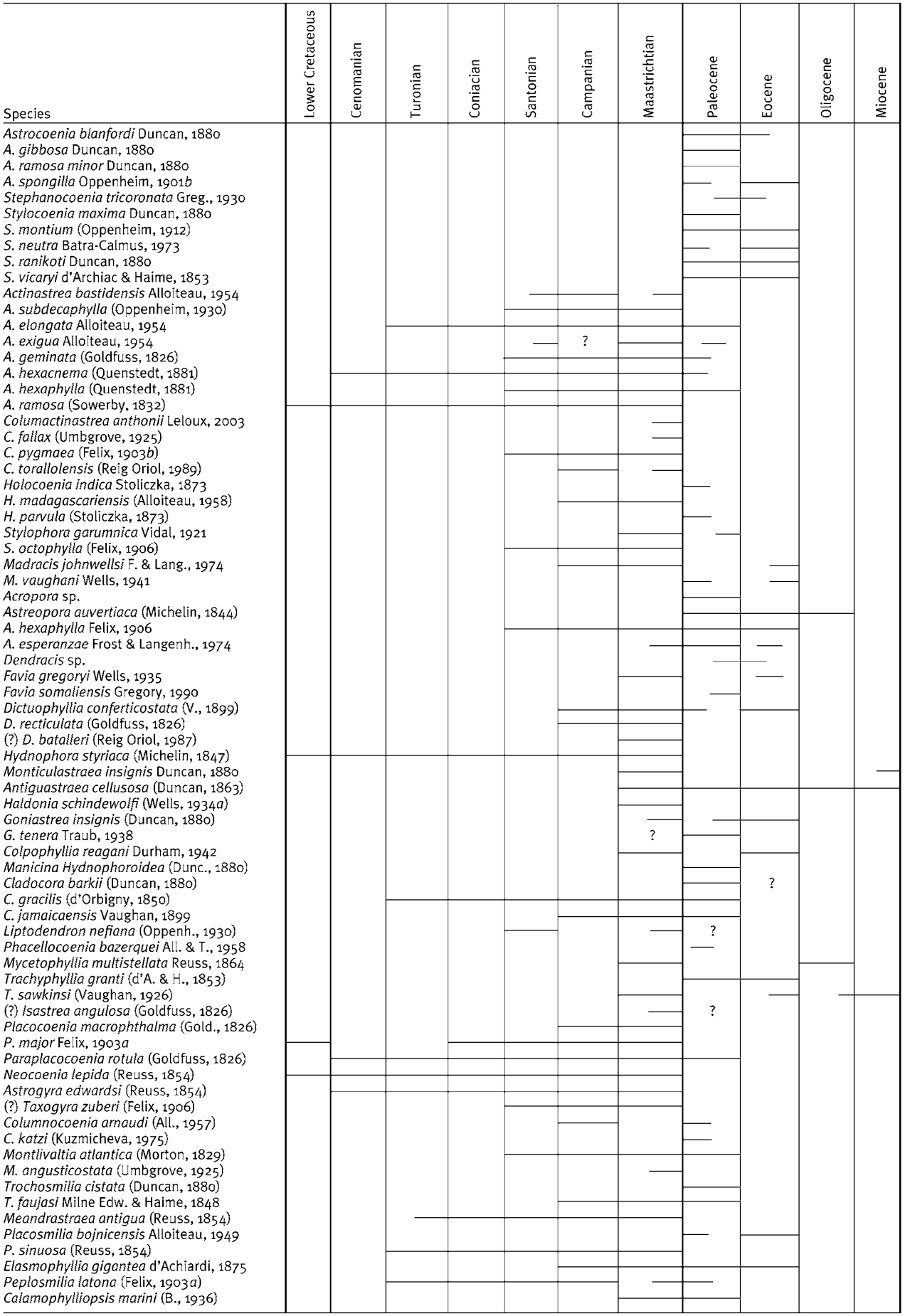
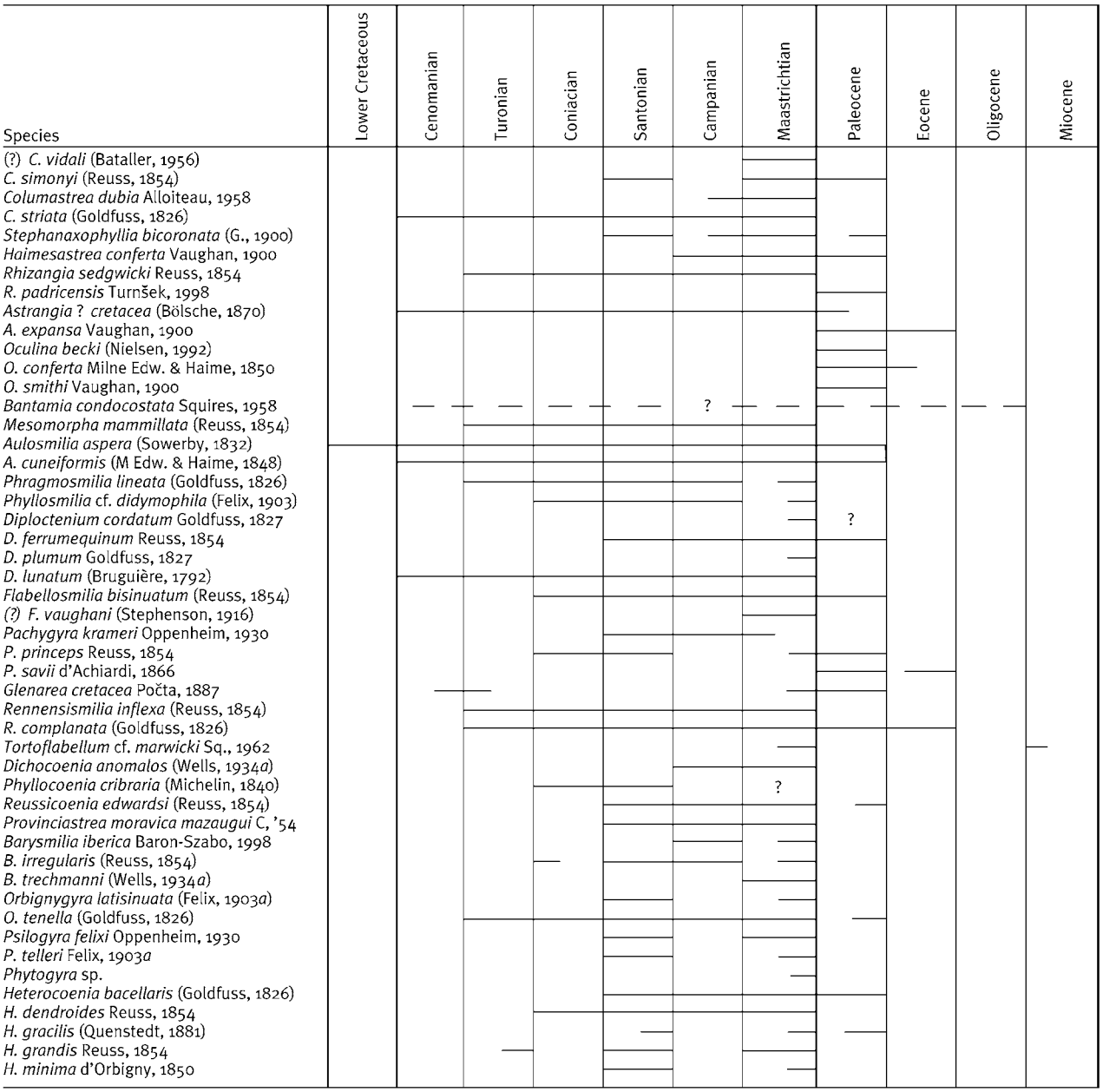


Table 2 Continued.



de Paris, France; **MPUR**, Museo di Paleontologia, Università di Roma, Italy; **NHMW**, Naturhistorisches Museum, Vienna, Austria; **NMNH**, National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (formerly USNM); **NMNZ**, National Museum of New Zealand, Wellington, New Zealand; **PMB**, Natural History Museum Beograd, Serbia (formerly Yugoslavia); **PMU**, Paleontologiska Museet, Uppsala, Sweden; **RMNH**, Nationaal Natuurhistorisch Museum, Leiden, Netherlands (formerly Rijksmuseum van Natuurlijke Historie); **SAZU**, Slovenska akademija znanosti in umetnosti, Ljubljana, Slovenia; **SMF**, Forschungsinstitut Senckenberg, Senckenberg Museum, Frankfurt, Germany; **UANL**, Universidad Autónoma de Nuevo León; **USNM**, now **NMNH**.

In addition to the re-examination and re-evaluation of described forms, this study also includes the first assessment of the largest Maastrichtian coral assemblage (consisting of about 4000 specimens from Jamaica, known as the 'Coates collection'), as well as new material from the Campanian–Maastrichtian of Argentina, Lower Maastrichtian of Mexico (Cerralvo), and the Paleocene of Austria (Kambühel–Kalke). In most cases thin sections (cross and longitudinal cuts) were used to identify the new coral material. To get a comprehensive overview and to examine type material to verify identifications collections at the following Institutions or Museums were consulted: **Paris** (NMHN, collections of Alloiteau, Arnaud, Basse & Menard, Besaire, Bührer, Chevalier, Collignon, de Fromentel, Jacob, Michelin, Milne Edwards & Haime, d'Orbigny, Tissier, Thomas and Villette); **Rome** (MPUR, collections of d'Angelis d'Ossat and Michelotti); **Pisa** (Paleontological Museum, collection of d'Achiardi); **Frankfurt** (SMF, collection of Esper); **London** (BMNH, collections of Blagrove, Duncan, Felix, Gregory, Heneken, Kühn, Latham, Oppenheim and Trechmann); **Leiden** (RMNH, collection of Umbgrove); **Washington, DC** (NMNH, collections of Budd, Cairns,

Dana, Hoffmeister, Nomland, Sokolov, Squires, Squires & Demetrion, Stephenson, Vaughan, Wade, Weisbord and Wells); **Wellington, NZ** (CO, collection of Squires); **Ljubljana** (SAZU, collection of Turnšek); **Vienna** (GBA and NHMW, collections of Beauvais, Felix, Kühn and Reuss); **Bonn** (IPB, collections of Goldfuss and Roemer); **Cambridge, MA.** (MCZ, collection of Vaughan); **Uppsala** (PMU, collections of Cleve, Cleve & Molander and Goers). Descriptions were supplemented by digital scans of published material.

The Maastrichtian material from Jamaica was collected between the years 1966 and 1972 by A. Coates, J. Jackson and E. Kauffman. The Campanian–Maastrichtian material from Argentina and Lower Maastrichtian corals from Mexico were sampled by W. Stinnesbeck and colleagues; the Paleocene corals of Austria were made available to me by H. Lobitzer and F. Schlagintweit.

In addition to the examination of the above mentioned material, more than 2500 species records were studied. The data and information retrieved from this procedure resulted in the synonymy lists presented. For a further explanation on which ideas the synonymies were based on, see Remarks sections for e.g. *Madracis johnwellsi* Frost & Langenheim, *Stylophora garumnica* Vidal and *Placosmilia sinuosa* (Reuss).

SYSTEMATIC PALAEONTOLOGY

The classification system used in this work for assigning and arranging genera is the one created by Baron-Szabo (2002), which was based on a combination of several different proposed classifications, including those of Vaughan & Wells (1943), Alloiteau (1952*a*, 1957) and Wells (1956). In addition, microstructural features as proposed by these authors are given for each family. When other concepts are adopted, supplementary remarks are included. Further information on microstructure is incorporated in each generic diagnosis if it differs from the family character. For different and additional microstructural concepts see e.g. Beauvais (1981, modified classification according to microstructure), Gill (1981, synapticulae and related microstructural features), Roniewicz (1982, synapticulae and related microstructural features; 1996, septal and thecal microstructure), Morycowa & Roniewicz (1995, modified classification according to microstructure), and Stolarski & Roniewicz (2001, discussion of microstructural and microarchitectural characters).

Abbreviations for the dimensions used in the text are as follows: **d**, corallite diameter; **dl**, diameter of lumen; **d (max)**, maximum diameter of corallite; **d (min)**, minimum diameter of corallite; **c-c**, distance between centres of corallites; **c-c (wall)**, width of calicinal series; **s**, number of septa; **s/mm**, density of septa; **diss/mm**, density of dissepiments; **h**, height of corallum.

Taxonomic terms and abbreviations: **v**, material studied by the author; **(v)**, material documented by very good and expressive photographs; **publication date in italics**, taxon only mentioned without any description or illustration; *, first description of taxon to which the assignment of specimen refers.

Order **SCLERACTINIA** Bourne, 1900

DIAGNOSIS. Solitary or colonial Zoantharia with calcareous external skeleton secreted by the ectodermal body layer, consisting essentially of radial partitions or septa, which are intermesenterial in position and formed within upward infoldings of the basal part of the polyp column wall and attendant supporting structures: basal plate, epitheca, dissepiments, synapticulae and mural structures; septa developed in ontogeny following pattern of mesenteries, additional septa after first six being inserted in all six primary mesenterial exocoeles in successive cycles of six, 12, 24, 48 and so on, in dorsoventral order.

Suborder **ASTROCOENIINA** Vaughan & Wells, 1943

DIAGNOSIS. Colonial, rarely solitary. Septa composed of relatively few (up to 6 or 8) simple or compound trabeculae, appearing as simple rudimentary spines to solid laminae, usually beaded, rarely smooth on margins.Sclerodermites regularly continuous or irregularly diverging along axis of trabeculae. Polyps small, rarely with more than 12 tentacles in a ring, with smooth stomodaea.

Family **ASTROCOENIIDAE** Koby, 1890

DIAGNOSIS. Colonial; hermatypic; phaceloid to cerioid by extracalicinal budding; corallite walls septothecal (except *Pinacophyllum*); septa exsert (except *Pinacophyllum*), composed of one series of simple trabecular spines projecting inward and upward from the wall, those of lower cycles fusing in the septal plane to form nearly smooth- or beaded-marginated laminae; columella absent or styliform and continuous; endothecal dissepiments tabular; exothecal dissepiments tabular when developed. Septal microstructure rather fibrose peripherally with small calcification centres of less than 10 μm in diameter form dark axial lines.

Genus ***ASTROCOENIA*** Milne Edwards & Haime, 1848*a*

TYPE SPECIES. *Astrea numisma* Defrance, 1826, Bartonian of France (Faudon, Hautes-Alpes) (designation by Milne Edwards & Haime 1848*a*).

DIAGNOSIS. Colonial, cerioid to subcerioid; gemmation extracalicinal; costosepta compact, finely granulate laterally, confluent to subconfluent, generally in two cycles; columella styliform; pali absent; endothecal dissepiments abundant peripherally; wall septothecal, compact.

REMARKS. The separation of the genera *Actinastrea* and *Astrocoenia* is based on the model presented by Alloiteau (1954: 17ff.) and later modified by Barta-Calmus (1973: 207), according to which the main differences are due to the septal and thecal developments (rather confluent septa and absence of pali, septal renflements and thecal pores in *Astrocoenia*; generally non-confluent septa, presence of septal renflements, and thecal pores in *Actinastrea*). In addition, the presence of pali can be observed in the syntypes of the type species of *Actinastrea*.

Astrocoenia blanfordi Duncan, 1880 (Fig. 1)

*1880 *Astrocoenia Blanfordi, Duncan*; Duncan: 41, pl. 15, figs 1–5.

1925 *Astrocoenia Blanfordi* Duncan 1880; Felix: pars 28, p. 240.

1930 *Astrocoenia Blanfordi*, Duncan, 1880; Gregory: 94, pl 12, fig. 14.

Figure 1 *Astrocoenia blanfordi* Duncan, 1880 (based on the illustration of *Astrocoenia* aff. *decaphylla* [Michelin, 1847] *in* Schuster [1996: pl. 12, fig. 4]), Paleocene of Egypt, upper surface of colony, ×1.5.

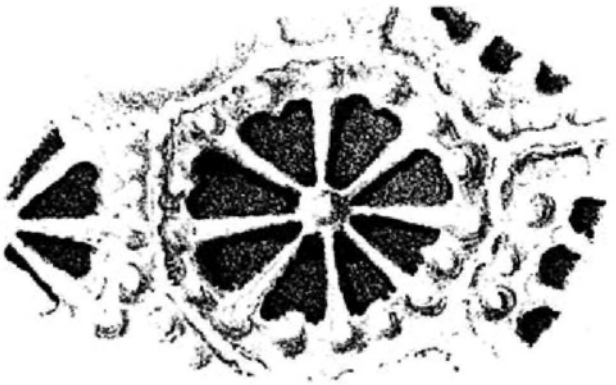


Figure 2 Sketch of *Astrocoenia gibbosa* Duncan, 1880, as figured in Duncan (1880), Paleocene of Pakistan, upper surface cross view of corallites, ×25.

(v)1996 *Astrocoenia* aff. *decaphylla* (Michelin, 1847); Schuster: 69, pl. 12, fig. 4.

DIMENSIONS. d (max) = 3–5 mm; s = 10 (+s).

DESCRIPTION. Massive, cerioid, subcerioid in places; costosepta arranged in one cycle in 10 systems, extending to the axial region; small number of S2 present or absent.

TYPE LOCALITY OF SPECIES. Paleocene of Pakistan (Jhirk, Sind).

DISTRIBUTION. Paleocene of Pakistan and Egypt, Lower Eocene of India.

Astrocoenia gibbosa Duncan, 1880 (Fig. 2)

*1880 *Astrocoenia gibbosa*, *Duncan*; Duncan: 43, pl. 12, figs 7–10.
1925 *Astrocoenia gibbosa* Duncan 1880; Felix: pars 28, p. 241.

DIMENSIONS. d (max) = 1.5–2.2 mm, juveniles around 1 mm or smaller, late adult stages up to around 2.5 mm; s = 8–16 (8s1 + 8s2).

DESCRIPTION. Massive, cerioid; costosepta arranged in one to two cycles in eight systems; S1 reach the axial region; S2 half the length of S1 or rudimentary.

TYPE LOCALITY OF SPECIES. Paleocene of Pakistan (Jhirk, Sind).

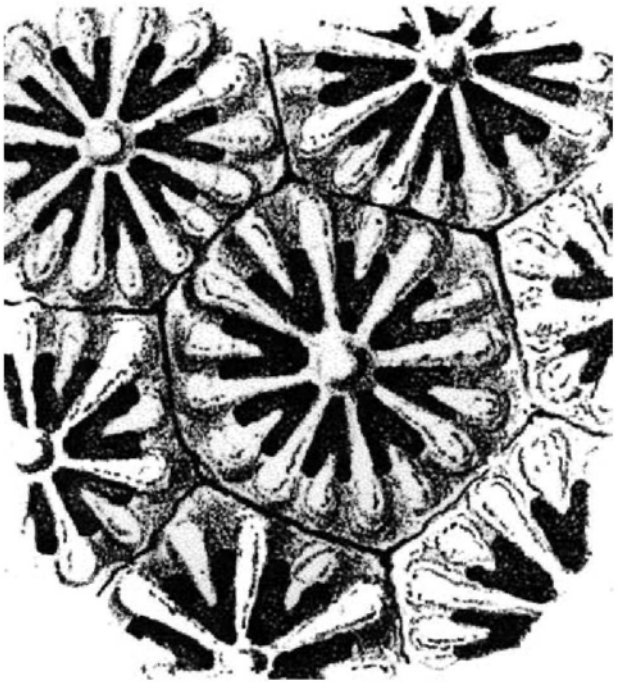


Figure 3 Sketch of *Astrocoenia ramosa minor* Duncan, 1880, as figured in Duncan (1880), Paleocene of Pakistan, upper surface cross view of corallites, ×40.

DISTRIBUTION. Paleocene of Pakistan.

Astrocoenia ramosa minor, Duncan 1880 (Fig. 3)

1880 *Astrocoenia nana*, Reuss; Duncan: 42, pl. 15, figs 10–11.
*1880 *Astrocoenia ramosa*, *Sowerby*, variety *minor*; Duncan: 43, pl. 12, figs 11–12.
1925 *Astrocoenia ramosa* Sow., var. *minor* Duncan 1880; Felix: pars 28, p. 243.

DIMENSIONS. d (max) = 1.2–1.3 mm; s = 8–16 (8s1 + 8s2).

DESCRIPTION. Massive to subramose, cerioid to subcerioid; corallites separated by dark furrows; costosepta arranged in two complete or nearly complete cycles in eight systems; S1 reach the axial region; S2 half the length of S1 or rudimentary; costae equal; columella large (about one-eights of the corallite diameter).

TYPE LOCALITY OF SPECIES. Paleocene of Pakistan (Jhirk, Sind).

DISTRIBUTION. Paleocene of Pakistan.

Astrocoenia spongilla Oppenheim, 1901*b* (Fig. 4)

*1901*b* *Astrocoenia spongilla* n. sp. Oppenheim: 223, pl. 12, figs 4–4a.
1925 *Astrocoenia spongilla* Oppenheim 1901; Felix: pars 28, p. 244 (older synonyms cited therein).
(v)1996 *Astrocoenia spongilla* Oppenheim, 1901; Schuster: 68, pl. 12, figs 1–3.

DIMENSIONS. d (max) = 1–2 mm, in late adult stages up to around 2.5 mm; d (min) = 1–1.5 mm; c-c = 1–1.8 mm; s = 10–20.

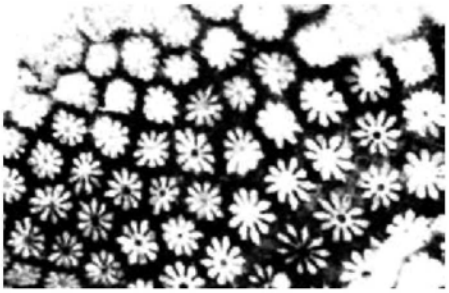


Figure 4 *Astrocoenia spongilla* Oppenheim, 1901*b*, based on the illustration in Schuster (1996: pl. 12, fig. 2), Danian of Egypt, upper surface cross view of corallites, ×3.

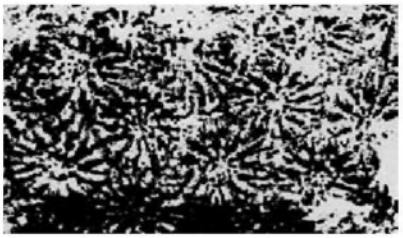


Figure 5 *Stephanocoenia tricoronata* Gregory, 1930, based on the illustration of the type in Gregory (1930), Upper Paleocene of Somalia, upper surface of colony, ×4.

DESCRIPTION. Massive to subramose, cerioid to subcerioid; costosepta arranged in two complete or nearly complete cycles in 10 systems; S1 reach the axial region; S2 rudimentary in length.

TYPE LOCALITY OF SPECIES. Eocene of Bosnia.

DISTRIBUTION. Danian of Egypt, Eocene of Bosnia.

Genus ***STEPHANOCOENIA*** Milne Edwards & Haime, 1848*a*

TYPE SPECIES. *Astrea intersepta* Lamarck, 1816 (non *Madrepora intersepta* Esper, 1795), designation by Milne Edwards & Haime, 1848*a*, from the Recent, Caribbean.

DIAGNOSIS. Colonial, massive, plocoid to cerioid; gemmation extracalicinal; costosepta usually 24 in number arranged in three cycles in six systems, compact, non-confluent, finely dentated laterally and marginally; costae short, equal; one crown of 12 pali (or a multiple of 6) before first two cycles; columella styliform; endothecal and exothecal dissepiments tabulate with uniform spacing; wall septothecal to parathecal. According to Alloiteau (1952*a*: 627) septal microstructure consists of simple trabeculae arranged in two diverging systems.

REMARKS. An emended diagnosis of the genus *Stephanocoenia* was given by Foster (1987).

Stephanocoenia tricoronata, Gregory 1930 (Fig. 5)

*1930 *Stephanocoenia tricoronata* n. sp. Gregory: 112, pl. 15, fig. 5a, pl. 16, fig. 1.
1993 *Stephanocoenia tricoronata* Gregory, 1930; Carbone *et al.*: 227, figs 11 d-e.

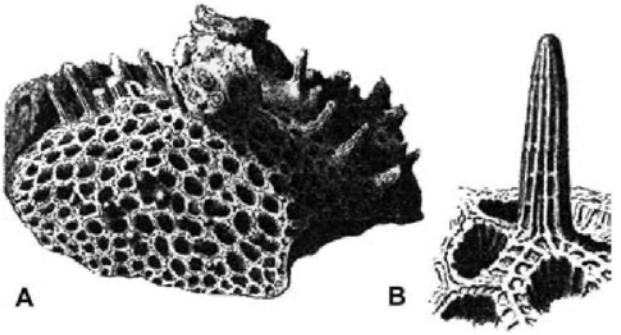


Figure 6 Sketch of *Stylocoenia maxima* Duncan, 1880, as figured in Duncan (1880), Paleocene of Pakistan. **A**, upper surface cross view of corallites, ×1; **B**, close-up, ×2.5.

DIMENSIONS. d (lumen) = 3–4 mm, juveniles around 2–2.5 mm; c-c = 3–4.5 mm; s = 24–34.

DESCRIPTION. Colonial, massive, subcerioid; gemmation extracalicinal; costosepta compact, non-confluent, finely dentated laterally and marginally, arranged in three complete cycles in six systems; in the majority of the corallites the beginning of a fourth cycle is present; costae short; one crown of ?pali before first two cycles present; columella ?styliform to ?sublamellar; wall septothecal to parathecal.

REMARKS. By its general appearance (septa seem to be rather fenestrate than paliform, costae fused with the ones of neighbouring corallites at an angle and trabecular extensions of axial ends of septa seem to form a net-like columella) the specimen assigned to *Stephanocoenia tricoronata* by Gregory (1930) shows close similarities to the fungiid genus *Diploastrea*. Even Gregory himself discussed the close resemblance of his species with fungiid forms (e.g. *Goniarea*). However, because neither the type could be studied nor was sufficient information given in Gregory (1930), the original assignment is tentatively kept. The specimen from the Upper Paleocene–Lower Eocene of Somalia assigned to this species by Carbone *et al.* (1993) shows the same fungiid-like characters.

TYPE LOCALITY OF SPECIES. Lower Eocene of India.

DISTRIBUTION. Upper Paleocene–Lower Eocene of Somalia, Lower Eocene of India.

Genus ***STYLOCOENIA*** Milne Edwards & Haime, 1849*b*

TYPE SPECIES. *Astrea emarciata* Lamarck, 1816, Eocene of France (designation by Milne Edwards & Haime 1849*b*).

DIAGNOSIS. Colonial, ramose, massive or incrusting, cerioid; columniform projections arise at junctions of adjacent corallites; gemmation extracalicinal; costosepta compact, thin, laminar, acute dentations laterally; columella styliform; endothecal dissepiments tabular; wall septothecal.

Stylocoenia maxima Duncan, 1880 (Fig. 6)

*1880 *Stylocoenia maxima* Duncan: 30–32, pl. 12, figs 1–6.
?1880 *Astrocoenia cellulata* Duncan: 42, pl. 14, fig. 7.
1925 *Stylocoenia maxima* Duncan 1880; Felix: pars 28, p. 248.

DIMENSIONS. d (max) = 2–5 mm; d (min) = 1.2–4 mm; s = 10 + s.

DESCRIPTION. Massive to globular, cerioid corallum; corallites irregularly polygonal to rounded in outline; costosepta, ten of which are equal and reach the corallite centre, are thin, wide apart, arranged in one complete and the beginning of a second cycle in 10 systems; styliform columella small; columniform projections that arise at junctions of adjacent corallites are up to around 12 mm in height.

TYPE LOCALITY OF SPECIES. Paleocene of Pakistan (Jhirk, Sind).

DISTRIBUTION. Paleocene of Pakistan.

Stylocoenia montium (Oppenheim, 1912) (Pl. 1, fig. 7)

*1912 *Stylophora montium* n. sp. Oppenheim: 132, pl. 14, figs 14–14a.
1925 *Stylophora montium* Oppenheim 1912; Felix: pars 28, p. 234.
1975 *Stylocoenia montium* (Oppenheim, 1912); Kuzmicheva: 18, pl. 1, fig. 4.
1987 *Stylocoenia montium* (Oppenheim, 1912); Kuzmicheva: 113, pl. 18, figs 3 a-d.
v1988 *Stylocoenia montium* (Oppenheim, 1912); Drobne *et al.*: 184, pl. 29, figs 1–3.
(v)1996 Hexakoralle, Morphotyp 13; Tragelehn: 198, pl. 62, fig. 2.
1997 *Stylocoenia montium* (Oppenheim, 1912); Vecsei & Moussavian: 129, pl. 35, fig. 5.
v1998 *Stylocoenia montium* (Oppenheim, 1912); Turnšek & Drobne: 134, pl. 2, fig. 1.

DIMENSIONS. d = 1.5–2.2 mm, juvenile around 1.2 mm; s = 6–12.

DESCRIPTION. Massive to massive-folios, cerioid corallum; corallites slightly rounded to polygonal in outline; costosepta arranged in one to two complete cycles in six systems; S1 reach corallite centre, fusing with the columella; S2 very short or reduced.

TYPE LOCALITY OF SPECIES. Eocene of Bosnia.

DISTRIBUTION. Danian of Italy (Maiella Platform), Slovenia (Adriatic Platform) and Ukraine, Paleocene of Austria, Eocene of Bosnia.

Stylocoenia neutra Barta-Calmus, 1973 (Pl. 1, fig. 8)

(v)*1973 *Stylocoenia neutra* n. sp. Barta-Calmus: 200–202, pl. 10, figs 10–13.
1997 *Stylocoenia neutra* Barta-Calmus, 1973; Vecsei & Moussavian: 131, pl. 36, fig. 2.
v1998 *Stylocoenia neutra* Barta-Calmus, 1973; Turnšek & Drobne: 134, pl. 2, figs 2–5.

DIMENSIONS. d = 1–1.7 mm; s = 12.

DESCRIPTION. Massive to massive-folios, cerioid corallum; corallites polygonal in outline; costosepta arranged in two complete cycles in six systems.

TYPE LOCALITY OF SPECIES. Eocene of France.

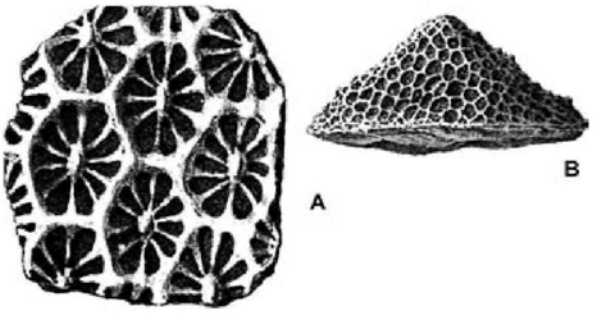


Figure 7 *Stylocoenia ranikoti* Duncan, 1880 as figured in Duncan (1880), Paleocene of Pakistan, Paleocene of Pakistan. **A**, close-up, ×3; **B**, upper surface of colony, ×0.8.

DISTRIBUTION. Danian of Italy (Maiella Platform) and Slovenia (Adriatic Platform), Eocene of France.

Stylocoenia ranikoti Duncan, 1880 (Fig. 7)

*1880 *Stylocoenia Ranikoti* Duncan: 33, pl. 15, figs 6–9.
1908 *Stylocoenia epithecata* n. sp. Oppenheim: 322, pl. 11, figs 6–6a.
1925 *Stylocoenia Ranikoti* Duncan 1880; Felix: pars 28, p. 249.
1930 *Astrocoenia (Platastrocoenia) ranikoti* (Duncan), 1880; Gregory: 90, pl. 13, fig. 4.
?*1993* *Stylocoenia ranikoti* Duncan, 1880; Carbone *et al.*: 227.
(v)1996 *Stylocoenia epithecata* Oppenheim, 1908; Schuster: 71, pl. 13, figs 3 a–d.

DIMENSIONS. d (max) = 3–5 mm; d (min) = 2–4 mm; s = 10.

DESCRIPTION. Massive to folios, cerioid corallum; corallites irregularly polygonal in outline; costosepta, 10 of which reach the corallite centre, are arranged in unclear cycles; styliform columella well-developed, prominent.

TYPE LOCALITY OF SPECIES. Paleocene of Pakistan (Jhirk, Sind).

DISTRIBUTION. Paleocene of ?Somalia and Pakistan, Lower Eocene of India, Eocene of Bosnia and Egypt.

Stylocoenia vicaryi d'Archiac & Haime, 1853 (Fig. 8)

v*1853 *Stylocoenia Vicaryi* d'Archiac & Haime: 189, pl. 12, fig. 4.
1857 *Stylocoenia Vicaryi*; Milne Edwards: vol. 2, p. 253.
1861 *Stylocoenia Vicaryi*; de Fromentel: 204.
1880 *Stylocoenia Vicaryi*, Haime; Duncan: 32, pl. 13, figs 4–7.
1925 *Stylocoenia Vicaryi* J. Haime 1852 *in* Bellardi, 1852; Felix: pars 28, p. 251 (older synonyms cited therein).

DIMENSIONS. d = 1.4–2 mm, juveniles around 1.2 mm, corallites in late adult stages slightly over 2 mm; s = 24.

DESCRIPTION. Massive to semiglobular, cerioid corallum; corallites polygonal in outline; costosepta arranged in three complete cycles in six systems; S1 reach the corallite centre, S2 and S3 alternate.

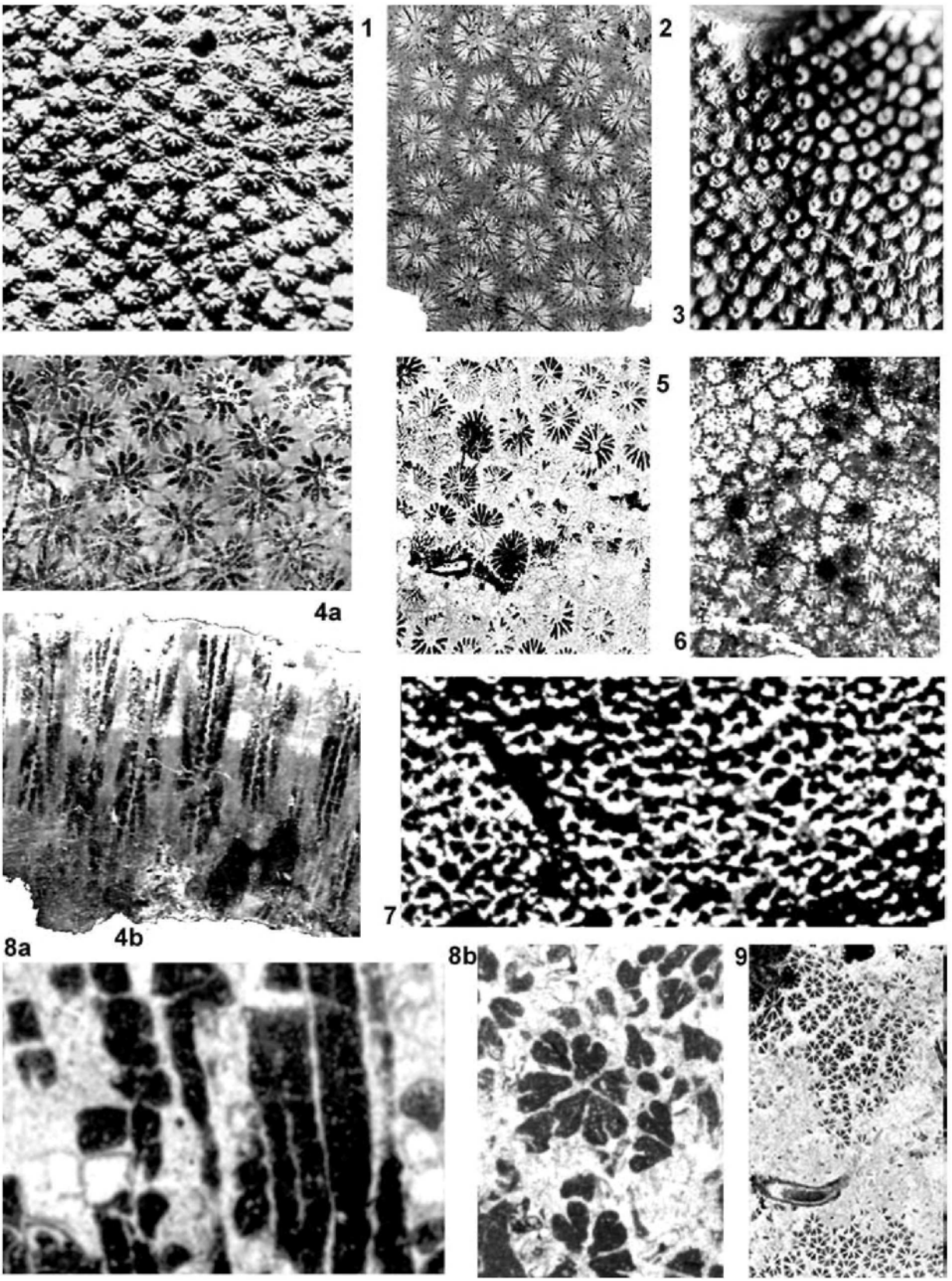


Plate 1 **Figs 1, 3** *Actinastrea geminata* (Goldfuss, 1826), Upper Maastrichtian of the Netherlands. **1**, IPB Goldfuss coll. 233c, syntype, upper surface, ×2.5; **3**, IPB Goldfuss coll. 233b, syntype, cast of specimen, upper surface, ×5. **Fig. 2** *Actinastrea bastidensis* Alloiteau, 1954, cross thin section, BMNH, AZ 639, Upper Maastrichtian of the UAE/Oman border region, ×5. **Fig. 4** *Actinastrea hexaphylla* (Quenstedt, 1881); **4a**, cross thin section, Coates coll. NMNH, no. J-66-7, Upper Maastrichtian of Jamaica, ×7; **4b**, longitudinal thin section, Coates coll. no. J-66-7, Upper Maastrichtian of Jamaica, ×10. **Fig. 5** *Actinastrea elongata* Alloiteau, 1954, cross thin section, BMNH, AZ 905, Middle–Upper Maastrichtian of the

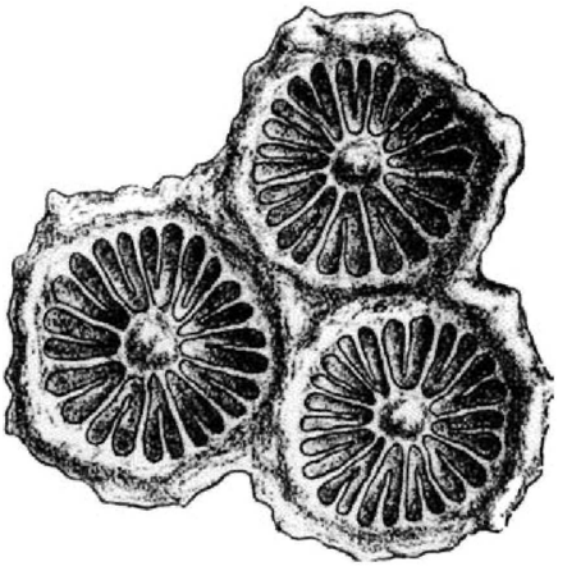


Figure 8 Sketch of *Stylocoenia vicaryi* d'Archiac & Haime, 1853, as figured in Duncan (1880), Paleocene of Pakistan, upper surface cross view of corallites, ×20.

TYPE LOCALITY OF SPECIES. Eocene of Pakistan (Hyderabad).

DISTRIBUTION. Paleocene-Eocene of Pakistan.

Family **ACTINASTREIDAE** Alloiteau, 1952*a*

DIAGNOSIS. Colonial. Gemmation predominantly extracalicinal, occasionally intracalicinal. Corallites united by their septothecal wall or separated by a rudimentary peritheca. Wall generally compact or with a small number of lacunes (pores). Septa compact, beaded marginally, composed of a series of simple trabeculae, varying in diameter (up to 150 μm). Columella styliform, pali present or not. Endotheca sparsely developed, vesicular.

Genus ***ACTINASTREA*** d'Orbigny, 1849

TYPE SPECIES. *Astrea geminata* Goldfuss, 1826 (= *A. goldfussii* d'Orbigny, 1850), Maastrichtian of the Netherlands (Maastricht).

DIAGNOSIS. Corallum colonial, massive, cerioid to subcerioid. Gemmation extra- and intracalicinal. Corallum may be covered by a holotheca. Corallites small and prismatic in outline, directly united by their walls. Columella styliform. Synapticulae present, peripherally. Endothecal dissepiments sparse. Septa compact, generally non-confluent, radially or bilaterally arranged. Septal flanks covered by spiniform granulae. Renflements and pali present. Wall septothecal with pores (lacunes).

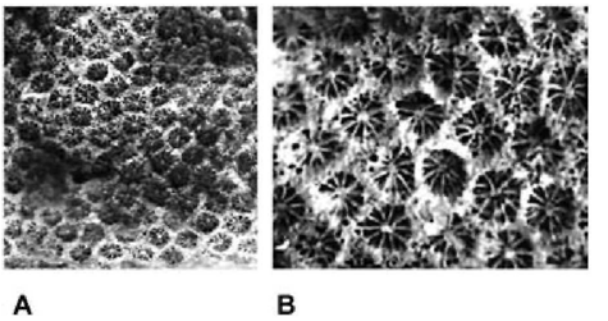


Figure 9 *Actinastrea subdecaphylla* (Oppenheim, 1930) (holotype of *Actinastrea menabensis* Alloiteau, 1958, NMHN, Mo5004), Campanian–Maastrichtian of Madagascar. **A**, upper surface of colony, ×1; **B**, close-up, ×2.

Actinastrea bastidensis Alloiteau, 1954 (Pl. 1, fig. 2)

v*1954 *Actinastrea bastidensis* nov. sp. Alloiteau: 84–87, pl. 3, fig. 4, pl. 10, fig. 4.
v1998 *Actinastrea bastidensis* Alloiteau, 1954; Baron-Szabo: 129, pl. 1, fig. 5.
2000b *Actinastrea bastidensis*, Alloiteau 1954; Löser: 6.
v2000 *Actinastrea bastidensis* Alloiteau, 1954; Baron-Szabo: 95, pl. 1, fig. 2.
v2002 *Actinastrea bastidensis* Alloiteau, 1954; Baron-Szabo: 21, pl. 1, figs 2, 6.

DIMENSIONS. d = 1.5–2.2 mm, juvenile around 1.2 mm; c-c = 1.5–2.2 mm; s = 24 (+s4).

DESCRIPTION. Massive to dome-shaped, or knobby, cerioid corallum; calices directly united by their walls; gemmation mainly extracalicinal; costosepta non-confluent or subconfluent, arranged in three cycles in six systems, radially and bilaterally.

TYPE LOCALITY OF SPECIES. Upper Santonian of France (Corbières).

DISTRIBUTION. Upper Santonian of France (Corbières), Campanian of Spain (Catalonia), Upper Maastrichtian of the UAE/Oman border region (Simsima Formation, Jebel Faiyah).

Actinastrea subdecaphylla (Oppenheim, 1930) (Fig. 9)

v*1930 *Astrocoenia subdecaphylla* n. sp. Oppenheim: 460, pl. 15, figs 9–9b. [topotypes studied].
1939 *Actinastrea subdecaphylla* Oppenh.; Alloiteau: 4.
1942 *Astrocoenia decaphylla* M. Edw. et. H. (Mich. sp.); Maccagno: 790, pl. 1, fig. 2.
v1954 *Actinastrea bellomontensis* nov. sp.; Alloiteau: 39, pl. 1, figs 3–4, pl. 7, fig. 2.

UAE/Oman border region, ×2.5. **Fig. 6** *Actinastrea exigua* Alloiteau, 1954, Coates coll. NMNH, no. 510, Upper Maastrichtian of Jamaica, ×5. **Fig. 7** *Stylocoenia montium* (Oppenheim, 1912), cross view, as for figures in Kuzmicheva (1975: 18, pl. 1, fig. 4a), Danian of Ukraine, ×5. **Fig. 8** *Stylocoenia neutra* Barta-Calmus, 1973, SAZU DvW-29, **8a**, longitudinal thin section, Paleocene of Slovenia, ×8; **8b**, cross thin section, ×5 (courtesy D. Turnšek). **Fig. 9** *Actinastrea ramosa* (Sowerby, 1832), cross thin section, BMNH, AZ 365, Middle–Upper Maastrichtian of the UAE/Oman border region, ×1.5.

1954 *Actinastrea subdecaphylla* Oppenh. 1930; Alloiteau: 45, pl. 2, fig. 7, pl. 7, fig. 6.
v1958 *Actinastrea menabensis* nov. sp.; Alloiteau: 183, pl. 15, figs 7–8, pl. 28, fig. 2, pl. 30, fig. 6.
1982 *Actinastrea subdecaphylla* (Oppenheim) 1930; Beauvais: vol. 1, p. 13.
(v)1994 *Actinastrea subdecaphylla* (Oppenheim); Liao & Xia: 87, pl. 10, figs 1–3, pl. 11, figs 1–2, pl. 17, figs 5–8.
?1997*a* *Columactinastrea ingens* n. sp.; Reig Oriol, p. 13, pl. 2, fig. 2.
2000b *Actinastrea subdecaphylla* (Oppenheim 1930); Löser: 7.
?*2000b* *Actinastrea ingens*, Reig Oriol 1997; Löser: 20.
2001 *Actinastrea subdecaphylla* (Oppenheim 1930); Löser & Liao: 666.
?2003 *Columactinastrea ingens* Reig Oriol, 1997; Leloux: 191, text-fig. 2.

DIMENSIONS. d (max) = 2–4 mm; d (min) = 2.2– 2.6 mm; c-c = 2.5–3.8 mm; s = 20 (10s1 + 10s2).

DESCRIPTION. Cerioid colony; corallites prismatic; costosepta compact, arranged bilaterally, in two cycles in 10 systems, alternating in length and thickness, laterally richly granulated; in juvenile corallites septa arranged in five systems.

TYPE LOCALITY OF SPECIES. Santonian of Austria (Edelbachgraben, Gosau Group).

DISTRIBUTION. Santonian of Austria (Edelbachgraben, Gosau Group), Upper Santonian–Campanian of France, Campanian–Maastrichtian of Madagascar and Tibet (Gamba County, Zongshan), Maastrichtian of Somalia and ?Spain (Toralla).

Actinastrea elongata Alloiteau, 1954 (Pl. 1, fig. 5)

1873 *Astrocoenia decaphylla* Michelin; Stoliczka: 28, pl. 5, figs 5–6.
v*1954 *Actinastrea elongata* nov. sp.; Alloiteau: 41, pl. 1, fig. 10, pl. 7, fig. 4.
pars1996 *Astrocoenia kurkurensis* n. sp.; Schuster: 70, pl. 13, fig. 2a (non pl. 12, figs 5a–b, pl. 13, figs 1a–b and 2b).
2000b *Actinastrea elongata*, Alloiteau 1954; Löser: 6.
v2000 *Actinastrea elongata* Alloiteau, 1954; Baron-Szabo: 96, pl. 1, fig. 6.
v2002 *Actinastrea elongata* Alloiteau, 1954; Baron-Szabo: 21, pl. 2, fig. 6, pl. 3, figs 1, 5.
v2003 *Actinastrea elongata* Alloiteau, 1954; Baron-Szabo: 115, pl. 1, fig. 5.

DIMENSIONS. d (max) = 2.2–3 mm; d (min) = 1.2–2.2 mm; c-c = 1.5–3 mm; s = 20 (10s1 + 10s2).

DESCRIPTION. Cerioid colony; corallites polygonal or slightly rounded in outline; costosepta straight, developed in two complete cycles in 10 systems, alternating in length and thickness; well-developed columella styliform or substyliform.

REMARKS. Schuster (1996) based the species *Astrocoenia kurkurensis* on specimens that seem to belong to different taxa. In having pali, a corallite diameter ranging around 2.5–3 mm and a septal development of two cycles in 10 systems, the specimen D6261 (see Schuster, 1996: pl. 13, fig. 2a) closely corresponds to *Actinastrea elongata* Alloiteau. Specimens D6259 (=holotype of the species *kurkurensis*), D6260 and D6262 (see Schuster, 1996: pl. 12, figs 5 a–b, pl. 13, figs 1 a–b and 2 b) however, show septal developments of two to three cycles in six systems, lack pali, and have distinctly tabular endothecal dissepiments, the latter two features of which are characteristic of the genus *Stylocoenia* and possibly representing a new species. Therefore, these specimens are excluded from the synonymy list above.

TYPE LOCALITY OF SPECIES. Upper Santonian of France (Corbières).

DISTRIBUTION. Turonian–Maastrichtian of India (Trichinopoly and Arrialoor Groups), Santonian of Austria (Gosau Group), Upper Santonian of France, Middle–Upper Maastrichtian of the UAE/Oman border region (Qahlah Formation, Lofthusia beds, Jebel Huwayyah), Paleocene of Egypt.

Actinastrea exigua Alloiteau, 1954 (Pl. 1, fig. 6)

?1873 *Astrocoenia pumila* Stoliczka: 28, pl. 4, fig. 7.
?1936 *Astrocoenia pumila* Stoliczka; Alloiteau: 16.
v*1954 *Actinastrea exigua* nov. sp. Alloiteau: 82, pl. 1, fig. 2, pl. 10, fig. 3.
(v)1975 *Astrocoenia minor* Wu, sp. nov.; Wu: 100, pl. 10, figs 7–11.
?1992 *Columactinastraea parvistella* n. sp.; Reig Oriol: 32, pl. 7, figs 2–3.
v1998 *Actinastrea exigua* Alloiteau, 1954; Baron-Szabo: 129, pl. 4, fig. 3.
2000b *Actinastrea exigua*, Alloiteau 1954; Löser: 6.
v2002 *Actinastrea exigua* Alloiteau, 1954; Baron-Szabo: 21, pl. 1, fig. 5.
?2003 *Columactinastrea parvistella* Reig Oriol, 1992; Leloux: 192, text-fig. 2.

DIMENSIONS. d = 0.6–1 mm; c-c = 0.8–1 mm; s = 12 (6s1 + 6s2).

DESCRIPTION. Corallum massive, knobby, cerioid; calices very small (rarely 1 mm in diameter), polygonal or rounded-polygonal, with fused walls; gemmation mainly extracalicinal; costosepta non-confluent or subconfluent, developed in two cycles in six systems, regularly alternating in length and thickness; S1 reach about one third the diameter of the calice.

TYPE LOCALITY OF SPECIES. Upper Santonian of France (Provence).

DISTRIBUTION. Upper Santonian of France, Campanian of ?Spain, Upper Senonian of ?Madagascar, Maastrichtian of Jamaica (this paper) and ?India (Arrialoor Group), Montian of Tibet.

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 306(=Central Inlier); 308; 468d-I; 470a-I; 470a-II; 492d-I; 510; 515f; 515g; 518; J-66-31-3a (=Ducketts Land Settlement); 548p (=Rio Minho); J-71–13n-II; J-71–13w2; J-71–13q3 (=Vaughnsfield); J-72–5Af; J-72–5Ag (=Marchmont Inlier); J-66-31-3a (=Westmoreland Parish).

Actinastrea geminata (Goldfuss, 1826) (Pl. 1, figs 1, 3)

v*1826 *Astrea geminata*, nobis; Goldfuss: 69, pl. 23, figs 8a–f.
1850 *Actinastrea Godfussii*; d'Orbigny: vol. 2, pp. 277.
1851*b* *Astrocoenia ? Goldfussi*; Milne Edwards & Haime: 65.
1857 *Stylina faujasi*; Milne Edwards: vol. 2, pp. 243.
1857 *Astrocoenia ? Goldfussi*; Milne Edwards: vol. 2, pp. 261.
1881 *Astrea geminata*: Quenstedt: 852, pl. 176, figs 45s, x
1881 *Astrea goldfussi*: Quenstedt: 853, pl. 176, figs 46x, y
1881 *Astrea Faujasii*: Quenstedt: 853, pl. 176, figs 47, 47x, 48, 48y.
1903*b* *Astrocoenia* aff. *hexaphylla* Quenstedt sp.; Felix, p. 571.
1906 *Astrocoenia hexaphylloides* sp. nov; Felix: 50, pl. 3, figs 1–1a.
1911 *Astrocoenia hexaphylloides* Felix; Trauth: 72, pl. 3, fig. 5.
1914 *Astrocoenia Goldfussi* d'Orbigny sp. 1850; Felix: pars 7, pp. 234.
1914 *Astrocoenia hexaphylloides* Felix 1906; Felix: pars 7, pp. 235.
1925 *Astrocoenia Goldfussi* d'Orb (*Astrocoenia hexaphylloides* Felix); Umbgrove: 118, pl. 8, fig. 2.
1925 *Astrocoenia Faujasi* Quenst.; Umbgrove: 119.
v1954 *Actinastrea bellomontensis* nov. sp. var. *petrocoriensis* nov. var.; Alloiteau: 41, pl. 1, figs 1, 5, 11–12, pl. 7, fig. 3.
v1954 *Actinastrea petrocoriensis* nov. sp.; Alloiteau: 81, pl. 5, fig. 1, pl. 10, fig. 2.
?1987 *Actinastrea decaphylla* (Michelin, 1846); Meyer: pl. 5, fig. 5.
1999 *Actinastrea goldfussi*; Leloux: 193, fig. 2.
2000b *Actinastrea bellomontensis petrocoriensis* Alloiteau 1954; Löser: 6.
2000b *Actinastrea faujasi* (Milne-Edwards 1957); Löser: 6.
2000b *Actinastrea geminata* (Goldfuss 1826); Löser: 6.
2000b *Actinastrea goldfussi*, d'Orbigny 1850; Löser: 6.
2000b *Actinastrea hexaphylloides* (Felix 1906); Löser: 6.
2000b *Actinastrea petrocoriensis*, Alloiteau 1954; Löser: 6.
2002 *Actinastrea bellomontensis petrocoriensis* Alloiteau, 1954; Baron-Szabo: 21.
2002 *Actinastrea faujasi* (Milne Edwards, 1957); Baron-Szabo: 21.
v2002 *Actinastrea geminata* (Goldfuss, 1826); Baron-Szabo: 20, pl. 1, figs 1, 4.
2002 *Actinastrea goldfussi* d'Orbigny, 1850; Baron-Szabo: 21.
2002 *Actinastrea hexaphylloides* (Felix, 1906); Baron-Szabo: 21.
2002 *Actinastrea petrocoriensis* Alloiteau, 1954; Baron-Szabo: 21.

DIMENSIONS. d (max) = 1.3–2 mm; d (min) = 1–1.3 mm; c-c = 1.3–1.8 mm; s = 12–16 (6s1 + 6s2 or 7s1 + 7s2 or 8s1 + 8s2).

Figure 10 *Actinastraea hexacnema* (Quenstedt, 1881), based on the illustration of *Actinastrea ? hexaphylloides* Felix, 1906 *in* Alloiteau & Tissier (1958), Danian of France, upper surface of colony, ×12.

DESCRIPTION. Massive, cerioid–subcerioid colony; gemmation predominantly extracalicinal, intracalicinal in places; septal development in two cycles in six, seven, or eight systems; styliform columella well-developed.

REMARKS. d'Orbigny (1850) grouped the specimens of *Astrea geminata* according to whether their septal development was in six or eight systems; creating for the latter the name *Actinastrea goldfussi* (due to a typing error it is '*godfussi*'). However, re-examination of the type series revealed that corallites with septal developments in six, seven, and eight systems are present in the same specimen. Considering this range of variation, the taxon *Actinastrea geminata* should therefore not be divided into different species on the basis of this character.

Alloiteau (1954) stated that *Actinastrea petrocoriensis* was characterised by a corallite diameter of d (max) = 1.5 mm and 16 septa in four systems. However, re-examination of the type material of *Actinastrea petrocoriensis* revealed that the calicinal diameter can reach up to 2 mm and the septal arrangement in the corallites corresponds to various irregularly developed systems ((?4-) 6–8 systems) according to their budding stage.

TYPE LOCALITY OF SPECIES. Maastrichtian of the Netherlands (St. Pietersberg).

DISTRIBUTION. Senonian of Ukraine, Campanian of France, Maastrichtian–Danian of the Netherlands, ?Danian of France (Vigny).

Actinastrea hexacnema (Quenstedt, 1881) (Fig. 10)

*1881 *Astrea hexacnema*; Quenstedt: 899, pl. 178, figs 24o, s, x.
1881 *Astrea hexacnema nodulosa*; Quenstedt: 899, pl. 178, figs 25–26.
(v)1958 *Actinastrea ? hexaphylloides* Felix sp. 1906; Alloiteau & Tissier: 257, pl. 3, figs 4 a–b.
1982 *Actinastraea hexacnema* (Quenstedt) 1881; Beauvais: vol. 1, p. 22, pl. 1, figs 2a–b.
2000b *Actinastrea hexacnema* (Quenstedt, 1881); Löser: 6.
2002 *Actinastrea hexacnema* (Quenstedt, 1881); Baron-Szabo: 21.

DIMENSIONS. d (lumen) = 1.2–1.8 mm; d = 1.6–2.2 mm; c-c = 1.3–2.2 mm; s = 12 (6s1 + 6s2).

DESCRIPTION. Massive to subramose, cerioid-subcerioid colony; costosepta arranged in two complete cycles in six systems, radially or bilaterally.

TYPE LOCATION OF SPECIES. Upper Cretaceous of Germany (Hallthurm).

DISTRIBUTION. Upper Cretaceous of Germany (Hallthurm), Turonian–Campanian of Austria (Gosau Group), Danian of France (Petites Pyreneans).

Actinastrea hexaphylla (Quenstedt, 1881) (Pl. 1, fig. 4)

*1881 *Astrea hexaphylla*; Quenstedt: 898, pl. 178, fig. 23.
1911 *Astrocoenia* cf. *hexaphylla* (Quenstedt); Trauth: 74.
1914 *Astrocoenia hexaphylla* Quenstedt sp 1881; Felix: pars 7, p. 235.
1982 *Actinastrea hexaphylla* (Quenstedt) 1881; Beauvais: vol. 1, p. 21, pl. 1, figs 3a–b, pl. 2, fig. 1.
v1998 *Astrocoenia bistellata* (Catullo, 1856); Turnšek & Drobne: 134, pl. 1, figs 1–6.
2000b *Actinastrea hexaphylla* (Quenstedt, 1881); Löser: 6.
2002 *Actinastrea hexaphylla* (Quenstedt, 1881); Baron-Szabo: 21.

DIMENSIONS. d = 1–1.5 mm, juvenile 0.8 mm; c-c = 1.2–1.8, rarely up to 2 mm; s = 12 (6s1 + 6s2).

DESCRIPTION. Massive, cerioid–subcerioid corallum; calices directly united by their walls, polygonal in outline; gemmation mainly extracalicinal; costosepta non-confluent or subconfluent, arranged in two cycles in six systems, radially and bilaterally, alternating in length and thickness; columella styliform or substyliform.

REMARKS. The specimens from the Paleocene of Slovenia assigned to *Astrocoenia bistellata* (Catullo, 1856) in Turnšek & Drobne (1998) seem to have both 'renflements' (= special bilateral septal granulation) and lacunes (thecal pores), thus closely agreeing with the genus *Actinastrea*.

TYPE LOCALITY OF SPECIES. Senonian of Austria (Gosau Group at Bad Reichenhall).

DISTRIBUTION. Senonian of Austria (Gosau Group) and the Czech Republic, Maastrichtian of Jamaica (this paper), Paleocene of Italy and Slovenia.

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos. 379a; J-66-7; J-71-4e; J-71-102a (=Jerusalem Mountain Inlier [*Titanosarcolites*-limestone]), 465-III; 470b-I; 475c-I; 515a; 515e; 526f-II; 526g (=Ducketts Land Settlement); J-71–34b (=Rio Minho); J-72–5Ac; J-72–5Ae (=Marchmont Inlier).

Actinastrea ramosa (Sowerby, 1832) (Pl. 1, fig. 9)

v*1832 *Astrea ramose*; Sowerby *in* Sedgwick & Murchison: 417, pl. 37, fig. 9. [topotypes studied].
1847 *Astrea octolamellosa* n.; Michelin: 302, pl. 72, fig. 2.
1847 *Astrea ramose*; Michelin: 303, pl. 72, fig. 4.
1849*b* *Astrocoenia ramose*; Milne Edwards & Haime: 4th ser., vol. 11, p. 298.
1850 *Enallocoenia ramose*; d'Orbigny: vol. 2, p. 205.
?1854 *Astrocoenia reticulata* Milne Edwards & Haime; Reuss: 95, pl. 14, figs 13.
1854 *Astrocoenia ramosa*; Milne Edwards & Haime; Reuss: 96, pl. 8, figs 10.
1854 *Astrocoenia tuberculata m.*; Reuss: 96, pl. 8, figs 11–12.
1857 *Astrocoenia reticulata*; Milne Edwards: vol. 2, p. 256.
1857 *Astrocoenia ramose*; Milne Edwards: vol. 2, p. 257.
1861 *Astrocoenia ramose*; de Fromentel: 233.
1881 *Astrea tuberculata*; Quenstedt: 895, pl. 178, fig. 15.
1881 *Astrea reticulata* Goldfuss; Quenstedt: 894, pl. 178, figs 13–14.
1884 *Astrocoenia ramose*; de Fromentel: 531, pl. 141, fig. 1.
1887 *Enallastrea ramose*; de Fromentel: 610, pl. 142, fig. 1, pl. 143, fig. 4, pl. 181, fig. 2.
1898 *Astrocoenia ramosa* M. Edw. et H. (Sow. sp.); Felix: 249, pl. 11, figs 2a–b.
1903*a* *Astrocoenia ramosa* Milne Edwards et J. Haime (Sowerby sp.); Felix: 312, text-figs 56–57.
1914 *Astrocoenia ramosa* Sowerby sp. 1832; Felix: pars 7, p. 235.
1930 *Astrocoenia ramosa* Michelin; Oppenheim: 461, pl. 31, figs 9–10.
1936 *Astrocoenia ramosa* Sowerby sp. 1832; Hackemesser: 69.
?1937*b* *Astrocoenia ramosa* Michelin sp. 1847; Bataller: 309.
1954 *Actinastrea Sowerbyi* nom. nov.; Alloiteau: 55, pl. 4, fig. 5, pl. 8, fig. 4.
1954 *Actinastrea tuberculata* Reuss 1854 sp.; Alloiteau: 57, pl. 4, fig. 8, pl. 8, fig. 5.
?1954 *Astrocoenia ramosa* (Sowerby) 1832; Kolosváry: 110, pl. 12, figs 15–16, pl. 13, figs 1–4.
?1956 *Astrocoenia ramosa* (Michelin); Bendukidze: 114.
(v)1978 *Actinastrea ramosa* (Michelin 1846); Turnšek & Polšak, p. 145, 166, pl. 1, figs 1–3.
(v)1980 *Actinastrea* sp. 1; Vidal: 25, pl. 10, fig. 3.
?1982 *Actinastrea octolamellosa* (Michelin); Matteucci *et al.*: 81, tab. 1.
1982 *Actinastrea octolamellosa* (Michelin) 1848; Beauvais: vol. 1, p. 15.
1982 *Actinastrea ramosa* (Michelin) 1847; Beauvais: vol. 1, p. 16.
non1982 *Actinastrea sowerbyi* Alloiteau 1954; Beauvais: vol. 1, p. 16.
1989 *Actinastrea ramosa* (Michelin 1847); Löser: 96, text-fig. 1
(v)1994 *Actinastrea ramosa* (Michelin); Turnšek: 9, pl. 1, figs 5–6.
1998 *Actinastrea ramosa* (Michelin 1846); Löser: 79, pl. 1, fig. 1.
2000*a* *Actinastrea ramosa* (Sowerby 1832); Löser: 73.
2000b *Actinastrea octolamellosa* (Michelin 1847); Löser: 6.
2000b *Actinastrea ramosa* (Sowerby 1832); Löser: 7.
2000b *Actinastrea ramosa* (Sowerby sensu Michelin 1847); Löser: 7.
2000b *Actinastrea tuberculata* (Reuss 1854); Löser: 7.

2000b *Actinastrea sowerbyi* Alloiteau 1954; Löser: 7.
v2000 *Actinastrea ramosa* (Michelin, 1847); Baron-Szabo: 95, pl. 1, fig. 3.
2002 *Actinastrea octolamellosa* (Michelin, 1847); Baron-Szabo: 21.
v2002 *Actinastrea ramosa* (Michelin, 1847); Baron-Szabo: 21, pl. 3, fig. 3.
2002 *Actinastrea ramosa* (Sowerby, 1832); Baron-Szabo: 21.
2002 *Actinastrea tuberculata* (Reuss, 1854); Baron-Szabo: 21.

DIMENSIONS. d = 1–1.5 mm, juvenile corallites are around 0.7 mm; c-c = 0.9–1.5 mm; s (adult) = 16 (8s1 + 8s2), s (juvenile) = 10 (5s1 + 5s2) – 12 (6s1 + 6s2).

DESCRIPTION. Massive, cerioid–subcerioid colony; gemmation intra- and extracalicinal; costosepta non-confluent or subconfluent, arranged in two cycles in eight regular or irregular systems; septal development in five or six systems is present in juvenile corallites; S1 extend to, and may fuse with, the columella; S2 distinctly thinner, reaching about half the length of the oldest ones.

REMARKS. The validity of the forms *Actinastrea (Astrea) ramosa* (Sowerby, 1832) and *Actinastrea (Astrea) ramosa* (Michelin, 1847) has been much discussed (Alloiteau 1954; Beauvais 1982; Löser 1998, 2000*a*). Alloiteau (1954) stated that because the form mentioned by Sowerby (in Sedgwick & Murchison 1832) was not accompanied by a sufficient description it was invalid and he therefore renamed it (=*Actinastrea sowerbyi* Alloiteau, 1954), giving the form described by Michelin (1847) priority. However, as previously pointed out by Löser (1998, 2000*a*), according to the International Committee for Zological Nomenclature (ICZN) the validity of taxa created before 1931 is not affected by the presence or absence of a description. Therefore, the taxon *Actinastrea ramosa* (Sowerby, 1832) is valid and has priority over Michelin's species which is here considered a junior synonym.

The forms in the synonymy list above are all characterised by a corallite diameter of generally 1–1.3 mm (juveniles around 0.7; adults sometimes up to 1.5 mm) and a septal arrangement in adult corallites of 16 septa in eight systems.

TYPE LOCALITY OF SPECIES. Turonian–Campanian of Austria (Gosau Group, Upper Austria).

DISTRIBUTION. Cretaceous of Greece, Upper Cenomanian of Germany (Saxony), Turonian–Campanian of Austria (Gosau Group), Senonian of ?Georgia (in Caucasia) and ?Hungary, Coniacian–Campanian of Austria (Gosau Group), Santonian–Campanian of Slovenia, Coniacian–Senonian of southern France (Corbières, Var), Santonian and ?Maastrichtian of northern Spain (Catalonia), Santonian–Maastrichtian of ?Italy (Sicily), Campanian of Turkey, Middle–Upper Maastrichtian of the UAE/Oman border region.

Genus ***COLUMACTINASTREA*** Alloiteau, 1952*a*

TYPE SPECIES. *Columactinastrea rennensis* Alloiteau, 1952*a*, Upper Santonian of France (Aude).

DIAGNOSIS. Colonial. Massive, cerioid–subcerioid, subplocoid in places. Gemmation extracalicinal. Corallites irregularly polygonal in outline, directly united by their walls. Costosepta compact. Septal margins finely granulated. Columella styliform. Pali before septa of first cycle complete, pali before second cycle septa complete, incomplete or absent. Endothecal dissepiments thin, vesicular or subtabulate. Wall septothecal.

Columactinastraea anthonii Leloux, 2003 (Pl. 2, fig. 5)

v*2003 *Columactinastraea anthonii* sp. nov Leloux: 188, pl. 1, figs 1–5, text-fig. 1.

DIMENSIONS. d = 4–5.3 mm; c-c = 1–1.8 mm; s = 24.

DESCRIPTION. Massive, cerioid colony; calices pentagonal or hexagonal in outline; costosepta compact, arranged in three cycles in six systems; S1 and S2 nearly equal; paliform structures in front of S1 and S2; columella styliform to substyliform; wall thickness ranges between 0.2–0.5 mm.

TYPE LOCALITY OF SPECIES. Upper Maastrichtian of the Netherlands (Middle part of Meerssen Member).

DISTRIBUTION. Upper Maastrichtian of the Netherlands.

Columactinastraea fallax (Umbgrove, 1925) (Pl. 2, fig. 2)

v*1925 *Columastraea fallax* spec. nov.; Umbgrove: 119, pl. 8, fig. 1, pl. 10, fig. 11.
1999 *Columastraea fallax*; Leloux: 193, fig. 2.
2000b *Columnastrea fallax*, Umbgrove 1925; Löser: 21.
2002 *Columastrea fallax* Umbgrove, 1925; Baron-Szabo: 57.
2002 *Columastraea fallax* (Umbgrove, 1925); Leloux: 14.
2003 *Columastraea fallax* Umbgrove, 1925; Leloux: 195.

DIMENSIONS. d (max) = 1.2–1.7 mm, juvenile around 0.7 mm; c-c = 1–1.8 mm; s = 12.

DESCRIPTION. Massive, cerioid to subplocoid colony; calices subpolygonal in outline; costosepta compact, non- or subconfluent, arranged in two cycles in six systems; paliform structures irregularly in front of S1 and S2; columella substyliform or consisting of a few papillae, sometimes fusing with some of the oldest septa.

TYPE LOCALITY OF SPECIES. Upper Maastrichtian of the Netherlands.

DISTRIBUTION. Upper Maastrichtian of the Netherlands.

Columactinastrea pygmaea (Felix, 1903*b*) (Pl. 2, fig. 1)

*1903*b* *Astrocoenia pygmaea* Felix: 54, pl. 3, figs 4–5.
1914 *Astrocoenia pygmaea* Felix 1903; Felix: pars 7, p. 235.
1954 *Actinastrea pygmaea* Felix 1903; Alloiteau: 52, pl. 4, fig. 6, 8, fig. 2.
1975 *Actinastrea pygmaea* (Felix); Beauvais *et al.*: 44, pl. 4, figs 1a, b.
(v)1978 *Columactinastraea pygmaea* (Felix 1903); Turnšek & Polšak: 147, 168, pl. 3, figs 1–4.
(v)1994 *Columactinastraea pygmaea* (Felix, 1903); Turnšek: 9, pl. 2, figs 1–3.

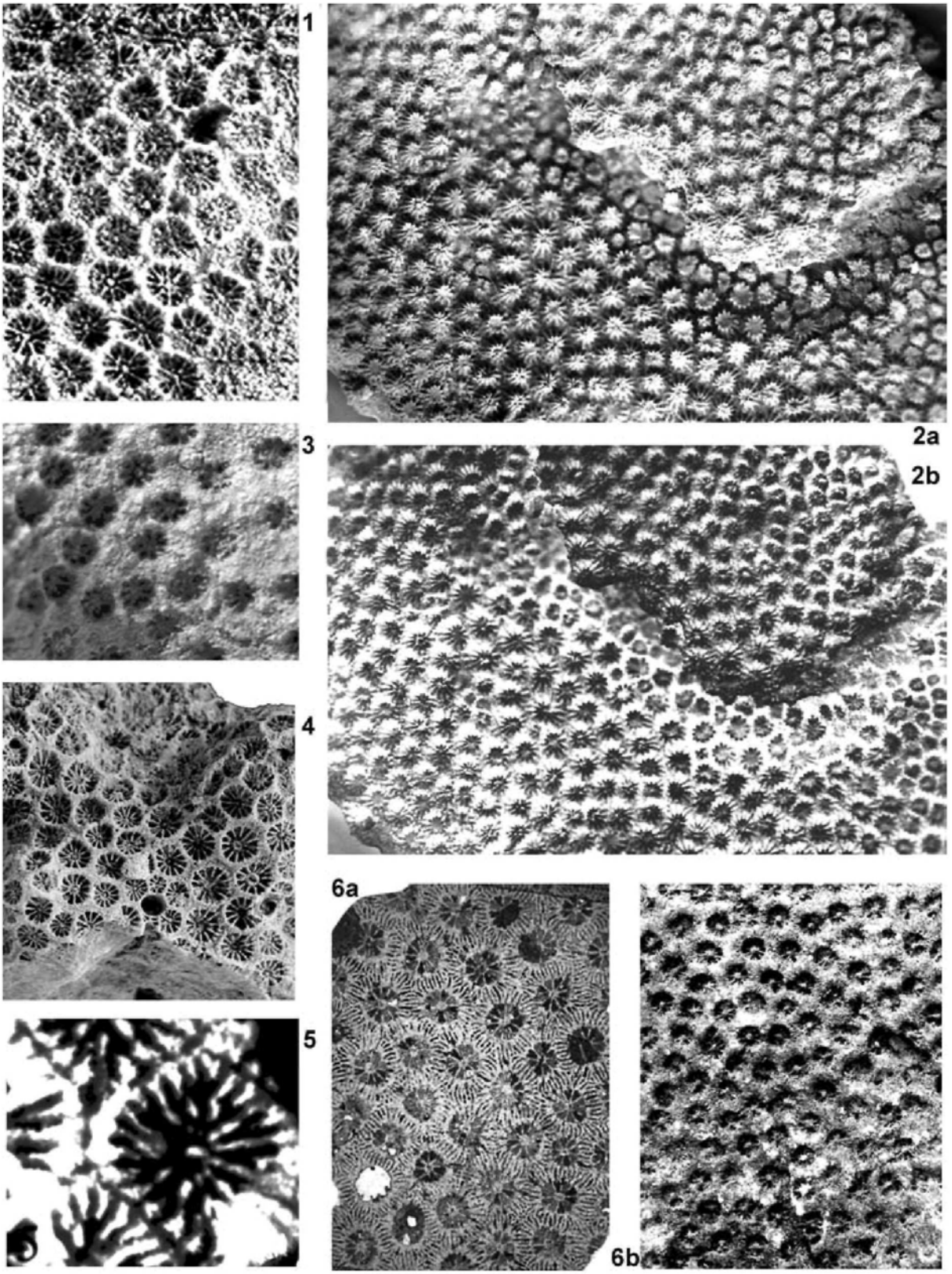


Plate 2 **Fig. 1** *Columactinastrea pygmaea* (Felix, 1903*b*), cross thin section, BMNH, AZ 471, Upper Campanian–Maastrichtian of the UAE/Oman border region, ×7. **Fig. 2** *Columactinastraea fallax* (Umbgrove, 1925), Upper Maastrichtian of the Netherlands. **2a**, lectotype, cast, upper surface, RGM 29074, ×3; **2b**, 'positive sketch' of RGM 29074 (provided for the first time), ×3. **Fig. 3** *Stylophora octophylla* (Felix, 1906), upper surface, BMNH, AZ 548, Middle–Upper Maastrichtian of the UAE/Oman border region, ×8. **Fig. 4** *Columactinastrea torallolensis* (Reig Oriol, 1989), cross thin section, BMNH, AZ 2539, Middle–Upper Maastrichtian of the UAE/Oman border region, ×4. **Fig. 5** *Columactinastrea anthonii* Leloux, 2003, holotype, upper surface, RGM 216001, Upper Maastrichtian of the Netherlands, ×8 (courtesy J. Leloux). **Fig. 6** *Holocoenia madagascariensis* (Alloiteau, 1958), holotype, MNHN Mo5002, Campanian–Maastrichtian of Madagascar. **6a**, cross thin section, ×2.5; **6b**, upper surface, ×2.

(v)1997 *Columactinastraea pygmaea* (Felix) 1903: Turnšek: 39, figs 39A–C.
v1998 *Columactinastraea pygmaea* (Felix, 1903); Baron-Szabo: 130, pl. 2, fig. 1.
2000b *Columactinastraea pygmaea* (Felix 1903); Löser: 20.
v2000 *Columactinastraea pygmaea* (Felix, 1903); Baron-Szabo: 98, pl. 2, fig. 4.
v2002 *Columactinastraea pygmaea* (Felix, 1903); Baron-Szabo: 22, pl. 3, fig. 4.
v2003 *Columactinastraea pygmaea* (Felix, 1903); Baron-Szabo: 116, pl. 1, figs 1, 3–4, 6, pl. 2, figs 1–7.
2003 *Columactinastraea* ? *pygmaea* (Felix, 1903); Leloux: 192, text-fig. 2.

DIMENSIONS. d = 1.1–1.7 mm, juveniles 0.9 mm; c-c = (1) 1.3–2.2 mm; s = 8s1 + 8s2 (+s3 in late adult corallites).

DESCRIPTION. Massive-knobby, cerioid corallum; corallites polygonal or slightly rounded in outline; costosepta arranged in two complete cycles in eight systems; beginning of a third cycle in some corallites; pali or paliform lobes irregularly in front of S1 and S2; columella styliform and made of a few papillae, sometimes fusing with one of the oldest septa.

TYPE LOCALITY OF SPECIES. Campanian of Portugal (Azinhaga do Pinhal-do-Loura).

DISTRIBUTION. Santonian–Campanian of southern France, Slovenia and Croatia, Campanian of Portugal and northern Spain (Torallola), Upper Campanian–Maastrichtian of the UAE/Oman border region.

Columactinastrea torallolensis (Reig Oriol, 1989) (Pl. 2, fig. 4)

*1989 *Placocolumastraea torallolensis* nov. sp.; Reig Oriol: 7, pl. 4, figs 1–2.
v1998 *Columactinastrea guadelupae* (Wells, 1932); Baron-Szabo: 130, pl. 1, fig. 2.
v2000 *Columactinastrea guadelupae* (Wells, 1932); Baron-Szabo: 98, pl. 1, fig. 5.
2000b *Placocolumastraea torallolensis,* Reig Oriol 1989; Löser: 64.

DIMENSIONS. d = 2–4 mm; d (lumen) = 2–2.5 mm, juvenile corallite = 1.5 mm; c-c = 2–4 mm; s = 24, juvenile around 22.

DESCRIPTION. Massive colony, cerioid, corallites irregularly polygonal in outline; costosepta arranged in three complete cycles in six systems in adult corallites; columella substyliform, sometimes fused with axial ends of S1.

TYPE LOCALITY OF SPECIES. Campanian of northern Spain (Torallola).

DISTRIBUTION. Campanian of northern Spain, Middle–Upper Maastrichtian of the UAE/Oman border region.

Genus ***HOLOCOENIA*** Milne Edwards & Haime, 1851*a*

TYPE SPECIES. *Astrea micrantha* Roemer, 1841, Upper Valanginian–Lower Hauterivian of Germany (Lower Saxony); designation by Milne Edwards & Haime (1851*a*).

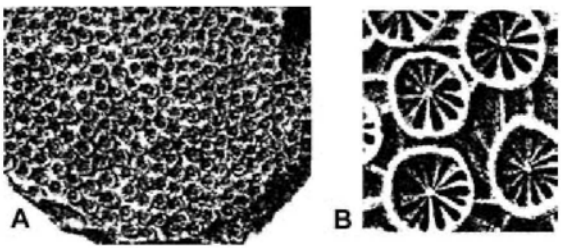


Figure 11 Sketches of *Holocoenia indica* Stoliczka, 1873, as figured in Stoliczka (1873), Danian of India (Ninnyoor Formation, Arrialoor Group. **A**, upper surface of colony, ×1.5; **B**, close-up of **A**, ×10; note the strongly emphasised inner corallite wall.

DIAGNOSIS. Colonial, massive to globular, ploco-thamnasterioid, sometimes appearing plocoid due to development of strong inner corallite wall. Gemmation intracalicinal. Costosepta compact, confluent to subconfluent, serrated. Columella styliform. Endothecal dissepiments sparse. Wall septothecal.

Holocoenia indica Stoliczka, 1873 (Fig. 11)

*1873 *Holocoenia indica*; Stoliczka: 25, pl. 5, figs 1–1b.
1914 *Holocoenia indica* Stoliczka 1873; Felix: pars 7, p. 151.
2000b *Holocoenia indica,* Stoliczka 1873; Löser: 42.
2002 *Holocoenia indica* Stoliczka, 1873; Baron-Szabo: 23.

DIMENSIONS. d = 1.5 mm, corallites in budding stages are larger; s = 12 + s3.

DESCRIPTION. Plocoid (-thamnasterioid) colony; plocoid appearance due to development of strong inner wall; corallites superficially subcircular to irregularly polygonal in outline; costosepta compact, generally confluent, arranged in two cycles in six systems; the beginning of a third cycle present in a few corallites.

TYPE LOCALITY OF SPECIES. Danian of India (Ninnyoor Formation, Arrialoor Group).

DISTRIBUTION. Danian of India (Ninnyoor Formation, Arrialoor Group).

Holocoenia madagascariensis (Alloiteau, 1958) (Pl. 2, fig. 6)

v*1958 *Actinastraea decaphylla* Mich. sp. var. *madagascariensis* nov. var.; Alloiteau: 185, pl. 35, fig. 1.
2000b *Actinastraea decaphylla madagascariensis,* Alloiteau 1958; Löser: 6.
2002 *Actinastraea decaphylla madagascariensis* Alloiteau, 1954; Baron-Szabo: 21.

DIMENSIONS. d (lumen) = 1.7–3 mm; c-c = 2.5–4 mm; s = 16–20 (8s1 + 8s2–10s1 + 10s2).

DESCRIPTION. Plocoid to ploco-thamnasterioid colony; gemmation intracalicinal; costosepta confluent to subconfluent, developed in two cycles in eight or 10 systems, alternating in length and thickness.

REMARKS. Alloiteau (1958) created the taxon *madagascariensis* as a new variation of the species *Actinastraea decaphylla* Michelin. However, the taxon *Actinastraea decaphylla*

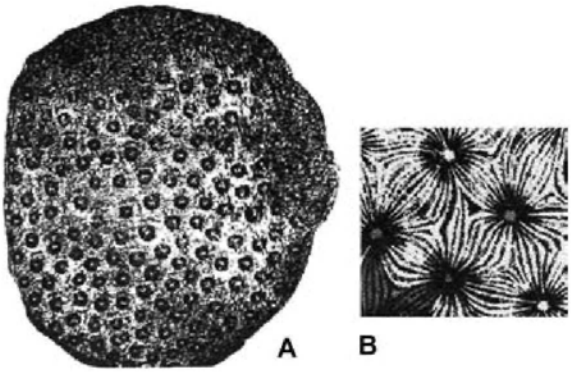


Figure 12 Sketches of *Holocoenia parvula* (Stoliczka, 1873), as figured in Stoliczka (1873), Danian of India (Ninnyoor Formation, Arrialoor Group. **A**, upper surface of colony, ×2; **B**, close-up of **A**, ×6.

represents a species of *Actinastraea*, whereas Alloiteau's specimen belongs to a different genus. In order to avoid confusion with Michelin's species the name of the subspecies was used and ranked in the species level.

TYPE LOCALITY OF SPECIES. Campanian–Maastrichtian of Madagascar (Bodaroka).

DISTRIBUTION. Campanian–Maastrichtian of Madagascar.

Holocoenia parvula (Stoliczka, 1873) (Fig. 12)

*1873 *Stylina parvula*; Stoliczka: 21, pl. 4, figs 6–6d.
1914 *Stylina parvula* Stoliczka 1873; Felix: pars 7, p. 151.
2000b *Stylina parvula*, Stoliczka 1873; Löser: 75.
2002 *Stylina parvula* Stoliczka, 1873; Baron-Szabo: 178.

DIMENSIONS. d = 1.5–2 mm, corallites in budding stage reach 3 mm; s = 24 + s4.

DESCRIPTION. Ploco-thamnasterioid colony; corallites subcircular to irregularly polygonal in outline, costosepta compact, confluent, arranged in three complete cycles in six systems; in some calices the beginning of a fourth cycle is present.

TYPE LOCALITY OF SPECIES. Danian of India (Ninnyoor Formation, Arrialoor Group).

DISTRIBUTION. Danian of India (Ninnyoor Formation, Arrialoor Group).

Family **POCILLOPORIDAE** Gray, 1842

DIAGNOSIS. Plocoid, generally ramose, mostly hermatypic. Colony formation by extratentacular budding. Septa rarely more than two cycles, reduced to narrow laminae or striae, even to spines. Columella styliform, vertically discontinuous. Coenosteum solid or vesicular.

Genus ***STYLOPHORA*** Schweigger, 1819

TYPE SPECIES. *Madrepora pistellata* Esper, 1792, Recent, Indopacific.

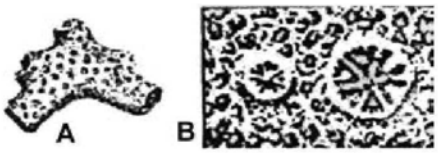


Figure 13 Sketches of *Stylophora garumnica* Vidal, 1921, as figured in Vidal (1921), Maastrichtian of Spain. **A**, upper surface of colony, ×1.5; **B**, close-up of **A**, ×13.

DIAGNOSIS. Colonial, ramose to submassive, plocoid. Colony formation by extratentacular budding. Corallites tend to spiral irregularly around branches, set in solid, spinose coenosteum. Septa compact, rarely more than 2 cycles present. Septa of first cycle uniting with styliform columella. Wall compact. Endothecal dissepiments thin, vesicular.

Stylophora garumnica Vidal, 1921 (Fig. 13)

*1921 *Stylophora garumnica*, n. sp.; Vidal: 92, pl. 8, figs 8–10.
1937*a* *Stylophora garumnica* Vidal 1921; Bataller: 278, 3 text-figs on p. 279.
1991 *Stylophora ponderosa* Vaughan, 1900; Bryan: 428 ff, figs 7 A–B.
2000b *Stylophora garumnica*, Vidal 1921; Löser: 76.
2002 *Stylophora garumnica* Vidal, 1921; Baron-Szabo: 24.

DIMENSIONS. d = 0.5–1 mm; c-c = 1–2.5 mm; s = 6 + s.

DESCRIPTION. Ramose colony, plocoid; corallites circular in outline, embedded in compact coenosteum; septa arranged in one cycle in six systems and three septa of a beginning second cycle; S1 reach the center of corallite where they unite with the styliform columella.

REMARKS. The type specimens of the species *Stylophora ponderosa* Vaughan, 1900 (syntypes USNM M158274 and M158275) from the Paleocene of Alabama are characterised by corallites having a lumen diameter of 0.7–1.2 mm and two complete cycles of septa in six systems. The material documented as *Stylophora ponderosa* Vaughan from the Upper Paleocene of the USA (Alabama) by Bryan (1991, see fig. 7B for corallite details) has corallites with a diameter d (including corallite wall) of 0.6–1 mm and with septal developments in six systems of two generally incomplete cycles, thus more closely agreeing with *Stylophora garumnica* Vidal.

TYPE LOCALITY OF SPECIES. Maastrichtian of Spain (Isona, La Posa)

DISTRIBUTION. Maastrichtian of Spain, Upper Paleocene of the USA (Salt Mountain Limestone, Alabama).

Stylophora octophylla (Felix, 1906) (Pl. 2, fig. 3; see Pl. 4, fig. 1)

*1906 *Astraeopora octophylla* n. sp.; Felix: 44, pl. 3, figs 6, ?6a.
1911 *Actinacis (?) octophylla* (Felix); Trauth: 161.
1914 *Astraeopora octophylla* Felix 1906; Felix: pars 7, p. 241.
2000b *Astreopora octophylla*, Felix 1906; Löser: 12.
v2000 *Stylophora octophylla* (Felix, 1906); Baron-Szabo: 100, pl. 1, figs 1, 7, pl. 2, figs 1–2.

v2002 *Stylophora octophylla* (Felix, 1906); Baron-Szabo: 24, pl. 6, figs 2–5.

DIMENSIONS. d = 0.6–1.1 mm; c-c = 1–2.5 mm; s: 8 (+ s2).

DESCRIPTION. Massive or ramose, plocoid colony; calices circular in outline, separated by a dense, granular coenenchyme; costosepta straight, thin, non-confluent, arranged in one cycle in eight systems, beginning of a second cycle can be present; septal development in six or seven systems in some corallites; wall parathecal and synapticulothecal.

TYPE LOCALITY OF SPECIES. Senonian of Ukraine (Delyatin, Iwano–Frankowskaya).

DISTRIBUTION. Senonian of Ukraine and Romania, Maastrichtian of Jamaica (new material) and the UAE/Oman border region.

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 453; 523; J-66-30; (=Ducketts Land Settlement); 532; 533o; J-66-51 (=Shaw Castle).

Genus ***MADRACIS*** Milne Edwards & Haime, 1849*a*

TYPE SPECIES. *Madracis asperula* Milne Edwards & Haime, 1849*a*, Recent, eastern Atlantic (off Madeira).

DIAGNOSIS. Colonial, ramose to submassive, plocoid to subcerioid. Gemmation extracalicinal. Corallites embedded in a vesicular coenosteum. Septa well developed, smooth marginally, higher cycles reduced to spines. Columella styliform, prominent. Endothecal dissepiments sparse.

Madracis johnwellsi Frost & Langenheim, 1974 (Pl. 3, figs 4, 7)

*1974 *Madracis johnwellsi* n. sp.; Frost & Langenheim: 186, pl. 55, figs 1–10.
1975 *Madracis rotiformis* (sp. nov.); Wu: 101, pl. 9, figs 1–4.
1992 *Madracis johnwellsi* Frost & Langenheim, 1974; Budd *et al.*: 593.
pars1994 *Madracis rotiformis* Wu; Liao & Xia: 98, pl. 16, fig. 2, non figs 1, 3.
2000b *Madracis rotiformis*. Wu 1975; Löser: 49.
2001 *Madracis rotiformis* Wu 1975; Löser & Liao: 666.
v2002 *Madracis* sp.; Baron-Szabo: 24, pl. 7, fig. 3.

DIMENSIONS. d (lumen) = 1–1.5 mm; c-c = 1–3.5 mm; s = 8–16 (8s1 + 8s2).

DESCRIPTION. Colonial, ramose, plocoid; gemmation extracalicinal; corallites embedded in a recrystalised coenosteum; septa compact, straight, developed in two cycles in eight irregular systems; S1 reach the axial region, S2 generally reduced to spines, but some may be subequal with S1; columella styliform; endothecal dissepiments subtabulate, sparse; wall septoparathecal.

REMARKS. In addition to the dimensions of skeletal elements, one of the most characteristic features of the species *Madracis johnwellsi* Frost & Langenheim, 1974, is the presence of first order septa that reach the axial region and fuse with the columella. Due to different types of preservation in the material documented in e.g. Wu (1975) and Baron-Szabo (2002), first order septa may appear more reduced than in the original documentation of the species *johnwellsi*. However, in the latter material in areas of better preservation a septal development closely corresponding to the form *Madracis johnwellsi* is present.

Figure 14 *Madracis vaughani* Wells, 1941, (based on the illustration of *Madracis densa* Budd, 1992 *in* Schuster [1996: pl. 14, fig. 1]), Danian of Egypt, upper surface of colony, ×5.

TYPE LOCALITY OF SPECIES. Upper Eocene of Mexico (Ixtaclum shale, Simojovel road section).

DISTRIBUTION. Campanian–Maastrichtian of Tibet (Gamba County, Houshan), Lower Maastrichtian of northeastern Mexico (Cerralvo, this paper), Upper Maastrichtian of Jamaica, Upper Eocene of Mexico (Ixtaclum shale).

NEW MATERIAL. Lower Maastrichtian of northeastern Mexico (Cerralvo): UANL-CE MAAS 219.

Madracis vaughani Wells, 1941 (Fig. 14)

v*1941 *Madracis vaughani*; Wells: 309, pl. 1, figs 4–4c.
v1992 *Madracis densa* Budd n. sp.; Budd *in* Budd *et al.*: 575, fig. 2.11.
(v)1996 *Madracis densa* Budd, 1992; Schuster: 71, pl. 14, fig. 2.

DIMENSIONS. d = 1.2–2 mm; c-c = 1.5–3 mm; s = 10–20.

DESCRIPTION. Colonial, ramose to submassive, plocoid; corallites embedded in a vesicular coenosteum; septa well developed, smooth marginally, arranged in two cycles in 10 systems, higher cycles reduced to spines or absent in juvenile corallites; styliform columella prominent.

TYPE LOCALITY OF SPECIES. Middle Eocene of Peru (Restin Formation).

DISTRIBUTION. Danian of Egypt, Middle Eocene of Peru (Restin Formation), Upper Eocene of Panama (Gatuncillo Formation).

Family **ACROPORIDAE** Verrill, 1902

DIAGNOSIS. Massive or ramose, plocoid colonies formed by extratentacular budding. Basal epitheca present. Corallites small, wall porous, synapticulothecate, merging with coenenchyme, pseudocostate. Septa nonexsert, in two cycles, composed of simple spiniform trabeculae projecting inward and upward from vertical wall trabeculae, often fusing to

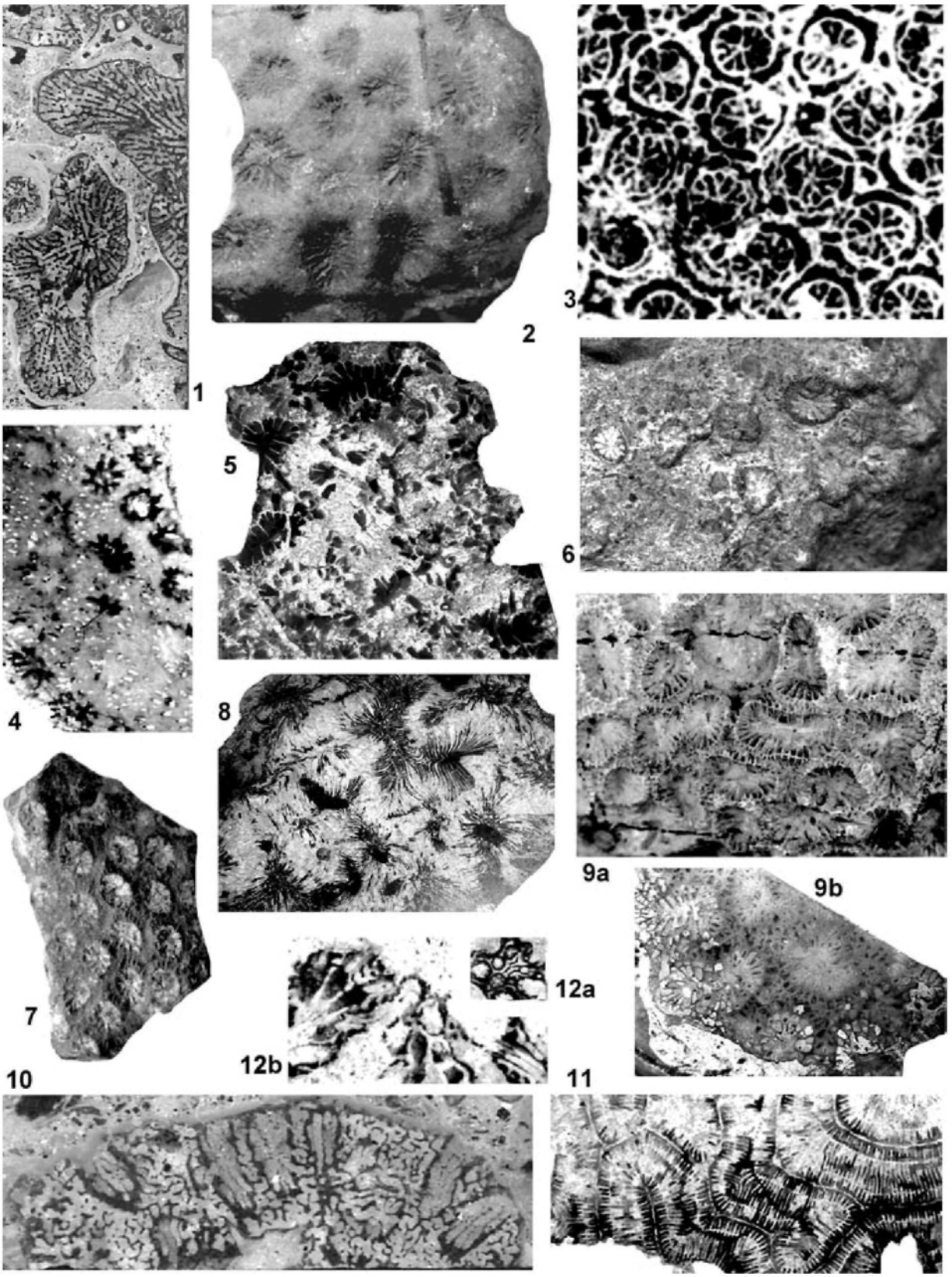


Plate 3 **Fig. 1** *Acropora* sp., cross thin section, GBA, K&S 14-5, Paleocene of Austria, ×4. **Fig. 2** *Favia somalensis* Gregory, 1900, holotype, upper surface, BMNH, R.5041, Upper Paleocene of Somalia, ×2. **Fig. 3** *Astreopora auvertiaca* (Michelin, 1844), cross thin section, SAZU So-7 (11136), Paleocene of Slovenia, ×10 (courtesy D. Turnšek). **Fig. 4** *Madracis johnwellsi* Frost & Langenheim, 1974, cross thin section, Coates coll. NMNH, no. 536, Upper Maastrichtian of Jamaica (Shaw Castle, Maldon Formation), ×7. **Fig. 5** *Favia gregoryi* Wells, 1935, cross thin section, Coates coll. NMNH, no. 352, Upper Maastrichtian of Jamaica, ×1.5. **Fig. 6** *Astreopora esperanzae* Frost & Langenheim, 1974, upper surface, Coates coll. NMNH, no. 496c-II, Middle–Upper Maastrichtian of Jamaica, ×3. **Fig. 7** *Madracis johnwellsi* Frost & Langenheim, 1974, upper surface

Table 3 Characteristics of the acroporid genera *Acropora, Astreopora and Dendracis.*

	Acropora	*Astreopora*	*Dendracis*
Colony shapes	Ramose, finely branched, rarely submassive	Massive, ramose, finely branched, encrusting	Ramose, submassive, finely branched
Axial of leading corallite	Present	Absent	Absent
Corallite integration	Plocoid	Plocoid	Plocoid
Dissepiments	Absent	Tabulate	?
Synapticulae (*sensu* Wells 1956)	Present throughout corallum	Absent	Present in vicinity of wall
Columella	Absent	Absent, but pseudo-columella may be present	Absent
Corallite wall	Synapticulothecal, porous	Parathecal–septothecal, incomplete	Synapticulothecal

form laminae. Columella usually wholly absent, or parietal. Endotheca and exotheca thin, tabular, when developed. Coenenchyme between corallites reticulate, flaky, usually spinose or striate on surface, light.

REMARKS. The definition of this family includes characteristics described from Recent forms: polyps variable in colour, in shades of brown, yellow, green, violet and grey. Column wall infolding on retraction, nearly covering tentacles. In *Acropora* the tentacles are retractile and introvertible, with scattered nematocysts. Directive mesenteries present. Mesenteries in six pairs, all or in part filamentiferous, not extended perithecally. Coelentera of adjoining polyps united by ramified systems of canaliculae parallel to the surface, penetrating coenenchyme. Stomodaeum smooth.

Genus ***ACROPORA*** Oken, 1815

TYPE SPECIES. *Millepora muricata* Linnaeus, 1758, Recent, Moluccas, designated by Verrill (1902).

DIAGNOSIS. Colonial, ramose, rarely massive or incrusting, plocoid. Branches with an axial or leading corallite larger than the more numerous radial corallites budded from it. Corallites united by light, reticulate, spinose or pseudocostate coenosteum. Columella and dissepiments absent. Wall synapticulothecal, porous.

REMARKS. In many respects the genera *Acropora*, *Astreopora* and *Dendracis* show very close affinities to each other. Table 3 gives an overview on the characteristics of these genera.

***Acropora* sp.** (Pl. 3, fig. 1)

v1996 Hexakoralle, Morphotyp 6; Tragelehn: 198, pl. 60, figs 7–8. [topotypes studied].

DIMENSIONS. d (lumen) of radial corallites = 1.2–2.5 mm; c-c = 3.5–4 mm; s = 12–24.

DESCRIPTION. Corallum ramose, branches flattened, plocoid; radial corallites protuberant, circular in outline, embedded in a porous coenosteum; septa arranged in two to three cycles in six systems.

REMARKS. Because the specimens are only fragments they cannot be assigned to a species.

DISTRIBUTION. Paleocene of Austria (in Tragelehn, 1996, and new material presented here).

NEW MATERIAL. Paleocene of Austria, GBA, sample no.: K&S 14-5.

Genus ***ASTREOPORA*** Blainville, 1830

TYPE SPECIES. *Astrea myriophthalma* Lamarck, 1816, Recent, Red Sea.

DIAGNOSIS. Colonial, massive to ramose. Coenosteum reticular, formed by outwardly inclined trabeculae, with spinose surface. Columella absent, but pseudo-columella, formed by trabecular extensions of axial ends of septa, may be present. Dissepiments tabulate. Corallite wall generally incomplete.

Astreopora auvertiaca (Michelin, 1844) (Pl. 3, fig. 3)

v*1844 *Astrea Auvertiaca*; Michelin: 159, pl. 47, fig. 10. [topotypes studied].
1850 *Astreopora Auvertiana*; d'Orbigny: vol. 2, p. 426.
1850*b* *Areacis Auvertiaca*; Milne Edwards & Haime: 107.
1874 *Areacis Auvertiaca* Mich sp.; Reuss: 13.
non v1875 ? *Astreopora auvertiana m*; d'Achiardi: 199.
1881 *Areacis Auvertiaca*; Quenstedt: 983, pl. 181, figs 25, 25 x.
1912 *Astraeopora pseudopanicea* n. sp.; Oppenheim: 101, pl. 10, figs 1–1a.
1925 *Areacis Auvertiaca* Michelin sp. 1844; Felix: pars 28, p. 237 (older synonyms cited therein).
(v)1980 *Astreopora tecta* (Catullo, 1856); Pfister: 57, pl. 1 figs 5–6.

view, UANL-CE MAAS 219, Lower Maastrichtian of Mexico, ×4. **Fig. 8** *Colpophyllia reagani* Durham, 1942, cross thin section, Coates coll. NMNH, no. J-66-13-55a, Upper Maastrichtian of Jamaica, natural size. **Fig. 9** *Favia gregoryi* Wells, 1935, holotype, BMNH, R.30214, Eocene of Jamaica. **9a**, upper surface view, ×1.5; **9b**, polished cross cut, ×1.5. **Fig. 10** *Astreopora hexaphylla* Felix, 1906, oblique thin section, GBA, K&S 14-7, Paleocene of Austria, ×9. **Fig. 11** *Dictuophyllia conferticostata* (Vaughan, 1899), cross thin section, Coates coll. NMNH, no. 523a, Upper Maastrichtian of Jamaica, ×3.5. **Fig. 12** *Astreopora hexaphylla* Felix, 1906, Coates coll. NMNH, no. 429a, Maastrichtian of Jamaica. **12a**, polished surface, ×5; **12b**, cross and longitudinal view of corallites, oblique, ×8.

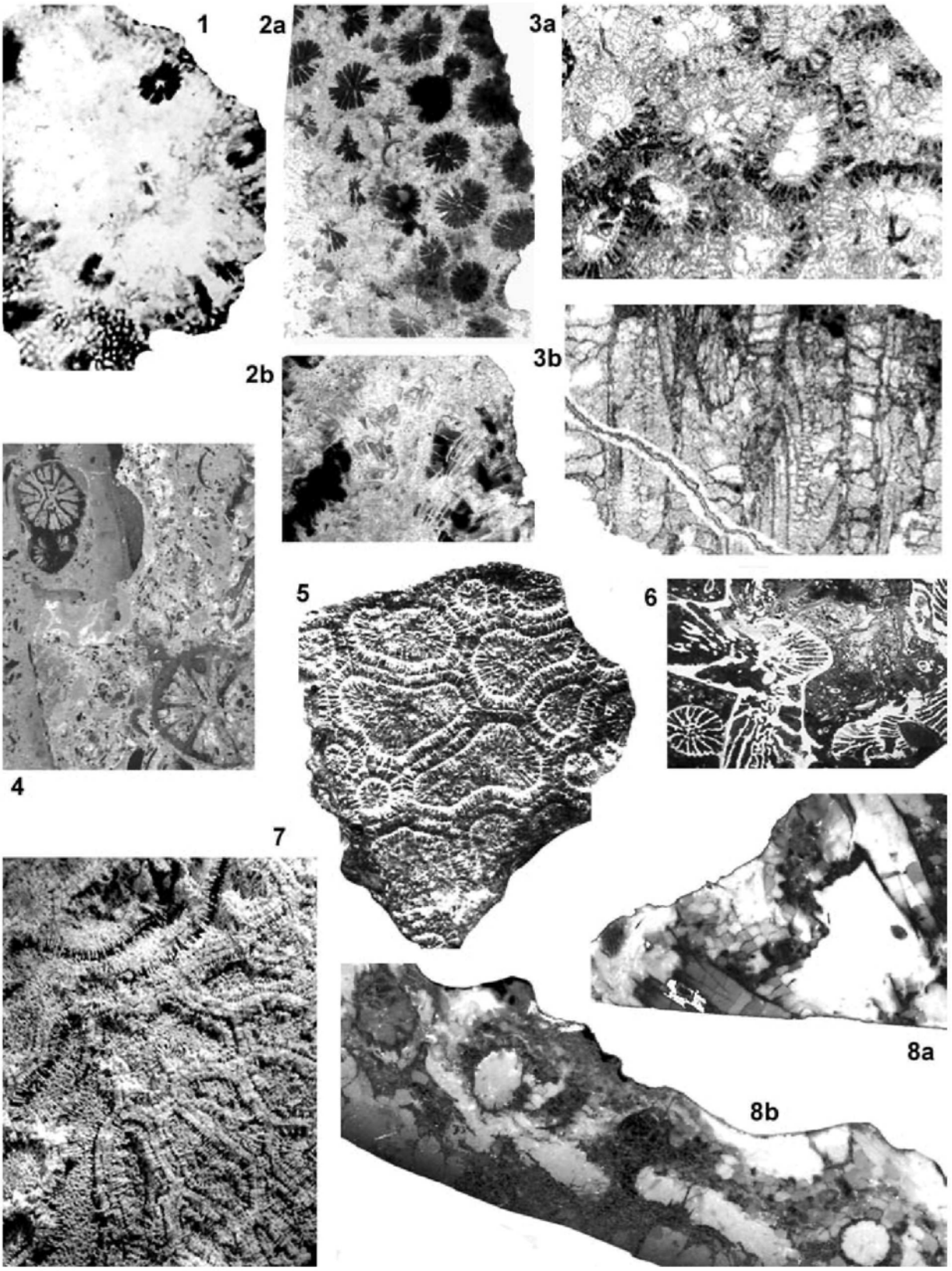


Plate 4 **Fig. 1** *Stylophora octophylla* (Felix, 1906), cross thin section, Coates coll. NMNH, no. 532b, Upper Maastrichtian of Jamaica, ×9. **Fig. 2** *Antiguastrea cellulosa* (Duncan, 1863), Coates coll. NMNH, no. 298, Upper Maastrichtian of Jamaica. **2a**, cross thin section, ×3; **2b**, longitudinal thin section, oblique, ×3. **Fig. 3** *Monticulastraea insignis* Duncan, 1880, BMNH, AZ 74, Middle–Upper Maastrichtian of the UAE/Oman border region. **3a**, cross thin section, ×3; **3b**, longitudinal thin section, ×4. **Fig. 4** *Cladocora gracilis* (d'Orbigny, 1850), cross thin section, GBA, K&S 14-2, Paleocene of Austria, ×5. **Fig. 5** *Dictuophyllia reticulata* (Goldfuss, 1826), (holotype of *Favia planissima* Umbgrove, 1925), cast of specimen, RGM, 29040, upper surface, ×4. **Fig. 6** *Cladocora gracilis* (d'Orbigny, 1850), cross thin section, Coates coll. NMNH,

(v)1996 Hexakoralle, Morphotyp 9; Tragelehn: 198, pl. 61, figs 3–4.
v1998 *Astraeopora pseudopanicea* Oppenheim, 1912; Turnšek & Drobne: 135, pl. 3, figs 2–6.

DIMENSIONS. d = 1.5–2.2 mm, juveniles as small as 1 mm; s = 12–24.

DESCRIPTION. Colonial, submassive, plocoid; septa compact, developed in two to three cycles in six regular or irregular systems; in more juvenile corallites septa developed in six regular systems, becoming more irregular in older corallites; third cycles generally incomplete; S1 reach corallite centre, S2 and S3 alternate; in older corallites some septa of S2 can be nearly equal with S1; columella absent; wall septothecal, complete to incomplete.

TYPE LOCALITY OF SPECIES. Eocene of France (Auvert, Seine-et-Oise).

DISTRIBUTION. Paleocene of Austria and Slovenia (Adriatic platform), Eocene of France and Bosnia, Oligocene of Italy.

Astreopora hexaphylla Felix, 1906 (Pl. 3, figs 10, 12 a, b)

*1906 *Astraeopora hexaphylla* n. sp.; Felix: 45, pl. 8, figs 7–7a.
1914 *Astraeopora perexigua*; Oppenheim: 698, pl. 26, figs 4–6.
1914 *Astraeopora hexaphylla* Felix 1906; Felix: pars 7, p. 241.
1974 *Astraeopora perexigua* Oppenheim, 1914; Eliášová: 142, text-fig. 18.
v1996 Hexakoralle, Morphotyp 10; Tragelehn: 198, pl. 61, fig. 5. [topotypic material studied].
v1996 Hexakoralle, Morphotyp 15; Tragelehn: 198, pl. 62, fig. 6. [topotypic material studied].
2000b Astreopora hexaphylla, Felix 1906; Löser: 12.
2002 *Astreopora hexaphylla* Felix, 1906; Baron-Szabo: 25.

DIMENSIONS. d (lumen) = 0.4–0.8 mm; d = 0.6–1.2; c-c = 0.7–2.2 mm; s = 6–12.

DESCRIPTION. Colonial, ramose or encrusting to subreptoid, plocoid; septa compact, thin, very short and thorn-like or long, reaching the axial region of calice, arranged in one or two cycles in six regular or irregular systems; columella absent; wall septothecal, complete to incomplete, 0.1–0.4 mm in thickness.

TYPE LOCALITY OF SPECIES. Senonian of Ukraine (Delyatin, Iwano–Frankowskaya).

DISTRIBUTION. Senonian of Ukraine, Maastrichtian of Jamaica (this paper), Paleocene of Austria (in Tragelehn 1996, and new material presented here), Eocene of Slovakia.

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 429a (about 20 fragments of knobby and columnar colonies) and 594f (=?Jerusalem Mountain Inlier [*Titanosarcolites*-limestone] or ?Catadupa); Paleocene of Austria, GBA, sample no.: K&S 14-7.

Astreopora esperanzae Frost & Langenheim, 1974 (Pl. 3, fig. 6; Pl. 4, figs 8a, b)

*1974 *Astreopora (Astreopora) esperanzae* n. sp.; Frost & Langenheim: 190, pl. 58, figs 1–9.
1992 Astreopora esperanzae Frost & Langenheim, 1974; Budd *et al.*: 593.
1997 *"Acropora" esperanza* Frost & Langenheim, 1974; Vecsei & Moussavian: 135, pl. 36, fig. 6.

DIMENSIONS. d (lumen) = 0.6–1.8 mm; c-c = 0.7–2 mm; s = 8–20.

DESCRIPTION. Colonial, encrusting to massive, or ramose to subreptoid plocoid; gemmation extracalicinal; corallites embedded in a reticular coenosteum; septa thin, extending to the axial region or very reduced, spine-like; columella absent, but pseudo-columella, formed by trabecular extensions of axial ends of septa, may be present in a few corallites; dissepiments tabulate; wall parathecal–septothecal, incomplete.

TYPE LOCALITY OF SPECIES. Middle Eocene of Mexico (San Juan Formation, Mesa de Copoya).

DISTRIBUTION. Middle–Upper Maastrichtian of Jamaica (this paper), Paleocene of Italy (Maiella), Middle Eocene of Mexico (San Juan Formation).

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica: NMNH, Coates coll., sample nos.: 496c-II; 505; 594b (9 fragments) (=Ducketts Land Settlement).

Genus ***DENDRACIS*** Milne Edwards & Haime, 1849*a*

TYPE SPECIES. *Madrepora gervillei* Defrance, 1828, Eocene of France.

DIAGNOSIS. Colonial, ramose, rarely massive or incrusting, plocoid; gemmation extracalicinal; corallites can be projecting, embedded in porous coenosteum, becoming solid due to secondary thickening; columella absent; occurrence of dissepiments unclear; wall (?para-) synapticulothecal.

Dendracis sp.

?1993 *Acropora tergestina* (Oppenheim, 1901); Carbone *et al.*: 227, fig. 11 a.
1993 *Dendracis* sp.; Carbone *et al.*: 227, figs 11 b-c.

DIMENSIONS. d = 0.8–1.5 mm; c-c = 1.5–4 mm.

DESCRIPTION. Colonial, ramose, plocoid; gemmation extracalicinal; corallites projecting, embedded in porous or solid coenosteum; septa very reduced; number of septa and arrangement of septal apparatus unknown; columella absent; thecal structures unknown.

no 370a, Upper Maastrichtian of Jamaica, ×3. **Fig. 7** *Dictuophyllia reticulata* (Goldfuss, 1826), holotype, mold (steinkern preservation) of specimen, upper surface, IPB, Goldfuss coll. 212b, Upper Maastrichtian of the Netherlands, ×3. **Fig 8** *Astreopora esperanzae* Frost & Langenheim, 1974, Coates coll. NMNH, no. 505, Upper Maastrichtian of Jamaica. **8a**, longitudinal thin section, ×3; **8b**, cross thin section, x 3.5.

REMARKS. Carbone *et al.* (1993) documented a specimen described as *Acropora tergestina*. The corallum consists of a small fragment of a colony that, however, seems to correspond to some parts of the corallum of *Dendracis* sp. which is documented from the same locality in that publication. The main difference between the genera *Acropora* and *Dendracis* is the presence of an axial corallite in the former. Because (1) the presence of that feature in this specimen is unclear, (2) the development of the corallites in this specimen closely corresponds to the kind observed in the type material of some species of *Dendracis* (e.g. in the syntypes of *D. cantabrigensis* Vaughan, MCZ 114206) and (3) the dimensions of its skeletal elements closely correspond to the ones in *Dendracis* sp. of Carbone *et al.* (1993), the form documented as *Acropora tergestina* is tentatively grouped with *Dendracis* sp.

DISTRIBUTION. Upper Paleocene–Lower Eocene of Somalia.

Suborder **FAVIINA** Vaughan & Wells, 1943 (=Astraeoina Alloiteau, 1952*a*; = Meandriina Alloiteau, 1952*a*)

DIAGNOSIS. Solitary and colonial. Septa composed of one or more fan systems of simple or compound trabeculae, laminar and imperforate, with margins more or less regularly dentate. Dissepiments well developed. Synapticulae mostly absent. Polyps small to large, with ridged stomodaea and tentacles usually arranged in one or two rings.

Family **FAVIIDAE** Gregory, 1900 (= Hemiporitidae Alloiteau, 1952*a*)

DIAGNOSIS. Solitary and colonial. Colony formation by extratentacular and various plans of intratentacular budding. Epitheca rarely developed. Wall septothecal, usually solid but occasionally irregularly porous near summits, or parathecal, externally costate. Exotheca and peritheca in some forms. Septa exsert, laminar, composed of polycentric and fibrose microstructure, dentate on upper margins, usually united to each other at inner margins. Paliform lobes, formed by the smaller internal fan system, often present. Columella usually parietal; rarely absent, laminar, or styliform.

Genus ***FAVIA*** Oken, 1815 (= *Barbadiastrea* Wells, 1945 (Type species. *B. favioides* Wells, 1945, Eocene of Barbados [Upper Scotland Formation]).

TYPE SPECIES. *Madrepora fragum* Esper, 1793, Recent, Atlantic; subsequent designation by Milne Edwards & Haime, 1848*a*.

DIAGNOSIS. Massive to incrusting, plocoid. Gemmation intracalicinal due to septal division (*sensu* Morycowa & Roniewicz 1990). Corallites mono- to tristomodaeal. Endothecal and exothecal dissepiments vesicular. Costosepta dentate laterally and marginally, compact but rare pores may occur at their axial margins or in median part of septa. Costae generally well-developed. Paliform lobes present in some corallites. Columella spongy–trabecular. Wall parathecal to septothecal.

REMARKS. Very detailed descriptions of representatives of *Favia fragum* were provided by Cuif & Perrin (1999).

Favia gregoryi Wells, 1935 (Pl. 3, figs 5, 9*a*, *b*)

v*1935 *Favia* (?) *gregoryi*; Wells: 185, pl. 10, figs 1–2.
1992 *Favia* (?) *gregoryi* Wells; Budd *et al.*: Table 1 and p. 594.
2003 *Favia* ? *gregoryi* Wells, 1935; Filkorn: 1.

DIMENSIONS. d (max, monocentric) = 6–9 (11 in latest stages) mm; d (min, monocentric) = 4.5–7 mm; s (monocentric calice) = 26–36; size of the colony = 5–15 cm in diameter.

DESCRIPTION. Massive–bulbous, plocoid corallum; monocentric calices slightly elliptical or very elongated in outline; gemmation intracalicinal, producing dicentric, tricentric, or rarely quadricentric corallites; costosepta thin, straight, compact with rare pores, non-confluent, with delicate granules laterally; four sets of septa can be distinguished according to length and thickness; first set extends to axial region of calice; trabecular prolongations of their inner ends might form a pseudocolumella; second and third set of septa irregularly alternate in length and thickness; youngest septa very short or rudimentary; columella irregularly trabecular, weakly developed; wall parathecal or septothecal; endothecal dissepiments subtabulate to cellulose, well-developed; exothecal wall well-developed, formed by numerous vesicular dissepiments.

TYPE LOCALITY OF SPECIES. Eocene of Jamaica.

DISTRIBUTION. Maastrichtian of Mexico (Ocozocuautla Formation, see Filkorn 2003), Middle–Upper Maastrichtian (this paper) and Middle Eocene (Lutetian) of Jamaica.

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica: NMNH, Coates coll., sample nos.: 309; 368a; 456b; 495; 497L; 497q; 505a; J-66-30Ba; 71-20a2; J-71-20b2; J-71-20c2; J-71-20d2; J-71-20e2; J-71-20f2 (= Ducketts Land Settlement); 352; 376; 396; (= Jerusalem Mountain Inlier); 431d (= Catadupa); 575a; 575b; (= ?Rio Minho); J-29452 (= Central Inlier [*Orbignya*-beds]).

Favia somaliensis Gregory, 1900 (Pl. 3, fig. 2)

v*1900 *Favia somaliensis*, sp. nov.; Gregory: 35, pl. 1, figs 4a-b.
2000b *Favia somaliensis*, Gregory 1900; Löser: 36.

DIMENSIONS. d (max, monocentric) = 3–6 mm; d (min, monocentric) = 3–5 mm; s (monocentric calice) = up to 30; size of the colony = 5.5 × 7 cm.

DESCRIPTION. Massive, plocoid corallum; monocentric calices slightly elliptical or very elongated in outline; gemmation intracalicinal, producing dicentric, tricentric, or rarely quadricentric corallites; costosepta thin to moderate, compact with rare pores, non-confluent, with delicate granules laterally; four sets of septa can be distinguished according to length and thickness; first set extends to axial region of calice; trabecular prolongations of their inner ends fuse with columella; second and third set of septa irregularly alternate in length and thickness; youngest septa very

short or rudimentary; columella irregularly trabecular, generally well-developed; wall parathecal or septothecal; endothecal dissepiments thin, very abundant; exothecal wall well-developed, formed by numerous vesicular dissepiments.

TYPE LOCALITY OF SPECIES. Upper Paleocene of Somalia (lower part of Auradu Limestone).

DISTRIBUTION. Upper Paleocene of Somalia (lower part of Auradu Limestone).

Genus ***DICTUOPHYLLIA*** Blainville, 1830

TYPE SPECIES. *Meandrina reticulata* Goldfuss, 1826, Maastrichtian of the Netherlands.

DIAGNOSIS. Colonial, massive, meandroid. Gemmation intracalicinal, polystomodaeal budding. Collines tectiform to tholiform. Costosepta compact, granulated laterally. Columella thin, lamellar, continuous or discontinuous. Ambulacrae irregularly present, reduced in places. Wall septothecal to parathecal.

Dictuophyllia conferticostata (Vaughan, 1899) (Pl. 3, Fig. 11)

1865 *Diploria crassolamellosa,* spec. nov.; Duncan *in* Duncan & Wall: 7, 12.
1868 *Diploria crassolamellosa* Duncan; Duncan: 24.
v*1899 *Diploria conferticostata,* sp. nov.; Vaughan: 239, pl. 39, figs 1–3.
v1899 *Diploria conferticostata,* var. *columnaris* var. nov.; Vaughan: 24, pl. 39, fig. 4.
v1919 *Leptoria conferticostata* (Vaughan); Vaughan: 194.
1925 *Leptoria conferticostata* Vaughan sp. 1899; Felix: 90.
v1934*a* *Dictuophyllia conferticostata* (Vaughan); Wells: 77.
v*1960* *Dictuophyllia conferticostata* Vaughan; Berryhill, *et al.*: 151.
1987 *Dictuophyllia conferticostata* (Vaughan); Kuzmicheva: 60.
1994 *Meandroria patellaris* (Reuss); Liao & Xia: 179, pl. 54, figs 8–9.
2000b *Dictuophyllia conferticostata* (Vaughan 1899); Löser: 28.
2001 *Meandroria patellaris* (Reuss 1854); Löser & Liao: 666.
2002 *Leptoria (Dictuophyllia) conferticostata* (Vaughan); Mitchell: 6 ff., table 1.
v2002 *Dictuophyllia conferticostata* (Vaughan, 1899); Baron-Szabo: 27, pl. 9, fig. 2.
2003 *Dictuophyllia conferticostata* (Vaughan, 1899); Filkorn: 1.
v*2003* *Dictuophyllia conferticostata* (Vaughan, 1899); Schafhauser *et al.*: 190ff.

DIMENSIONS. d (series, wall to wall) = 0.8–2 mm; c-c (series) = 1–3.5 mm; s/mm = 8–13/2, in areas of intense budding the density of septa reaches 16 in 2 mm; ambulacrae = 0–2 mm.

DESCRIPTION. Lamellar, knobby, columnar, or bulbous, meandroid colony; polyps arranged in long parallel or wavy series; series generally 1–1.5 mm wide (wall to wall), united by tectiform collines or separated by ambulacrae; costosepta thin, developed in three size orders; axial ends of septa rounded, claviform or rarely rhopaloid; columella delicate, lamellar, continuous or discontinuous; endotheca and exotheca made of numerous thin, vesicular dissepiments.

REMARKS. The subspecies *Dictuophyllia conferticostata* var. *columnaris* very closely agrees with the juvenile stages of *Dictuophyllia conferticostata.* Because the specimen Vaughan based his new subspecies on represents a very small individual, it is suggested that it is a juvenile image of *D. conferticostata* and, therefore, ranked as a junior synonym of *Dictuophyllia conferticostata.*

The genus *Dictuophyllia* shows great resemblance to the genus *Meandrina* Lamarck. However, they differ in that *Meandrina* lacks ambulacrae and has septa formed by simple trabeculae.

TYPE LOCALITY OF SPECIES. Campanian (-?Maastrichtian) of Jamaica (Clarendon).

DISTRIBUTION. Campanian–Maastrichtian of Tibet (Gamba County, Houshan), Campanian–Maastrichtian (new material) and Eocene of Jamaica, Maastrichtian of Mexico (Ocozocuautla and Cardenas Formations), Danian of Puerto Rico.

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 303; 335; 341; 342; 373a; 375d; 379d; J-71-103c; (= Jerusalem Mountain Inlier); 318; 318a; 319; 447a; 448a; 448c; 448e; 448f; 449a; 449b; 467a; 470e; 475a; 475b-I; 480; 485L; 486a; 486d; 487a-I; 487c; 490a; 492a; 492b; 492c; 492e; 493b; 496a; 496b; 496f; 496g; 496j; 496k; 497a; 497b; 497c; 497d; 497e-I; 497j; 497m; 497p; 500b; 500c; 502a; 506a-I; 509;-I; 514; 515a; 515b-I; 515d; 516a; 516c-I; 516d; 523a; 523b; 524a; 524b; 524c; 524d; 524e; 524f; 524g; 526a; 526b; 526c; 526e; 526f-I; 527a; 527b; 527c; 527d; 527e-I; 527f; 527g; 528a; 528b; 528c; 528d; 528e; 528f-I; 528g; J4120; J4121a; J4121b; J4169a; J-66-31-14-I; J-66-32 (top)a; J-71-20a2; J-71-20b2; J-71-20a; J-71-20b; J-71-20c; J-71-20d; J-71-20e; J-71-20f; J-71-20g; J-71-20h; J-71-20i; J-71-126a; J-71-126b; J-71-126c; (= Ducketts Land Settlement); 430; 431a; 431b; 432a; 432h; 432L; 432m; 435a; 435b; 435c; 435d; 436a; 436g; 439; 440a; 440b; 440e; 440f; 440g; 440h; 440i; 440j; 440k; 440L; 441a; 442b; 442c; 442e; 442k; 445a; 445b; 445c; 446a; J-66-27a; J-66-27b; J-66-27c; J-66-27d; J-66-28; (= Catadupa); 533a; 533b; 533c; 533d; 533e; 533f; 533g; 533h; 533m; 533p; 540f; 563a; 563b; 563c; 563d; 563e; 563f; 563g; 563h; 564a; 564b; 564c; J-66-51a; J-66-51b; J-66-51c; J-66-51d; J-66-54-3a; J-66-54-3b; J-66-54-4; J-71-17a; J-71-17c; J-71-17e; J-71-17i-II; J-71-17L; J-71-17m; J-71-17n; J-71-11a; J-71-11b; (= Shaw Castle, Maldon Formation); 545a; 545b-I; 545c; 545f; 545h; 545i; 545j; 545L; 545m; 545p; 545q; 545u; 548b; 548c; 548d; 548e; 548f-I; 548g; 548L; 548n; 548 548o; 548q; 551; 560; 561a; 561b; 561d; 561e; 576a; 576b; 576c; J-71-41-15; J-71-41-16a; J-71-42-17a; J-71-42-17b; J-71-42-17c; J-71-42-17d;; J-66-87a; J-66-87b; J-66-87c; J-66-87d; PC8Aa; PC8Ab; PC8Ac; PC8Ad; PC8Ae; PC8Af (= Rio Minho); 572A-01-I; J-66-43a; J-66-48a; J-71-13h3; J-71-13i3; J-71-13j3; J-71-13k3; J-71-13L3; J-71-13u3; J-71-18; J-71-18b; J-66-49b; J-66-49c (= Vaughnsfield); 562g; 562i; (= Bowen's coral bed, Coffee Ground); 474 (= Logie Green); J3444i; J3444j; J3444L; J3461a; J3461b; J3461c; J3461d; J3461e; J3461f; J3461a2; J3461b2;

(= Welcome Hall); J3500a; J3502b; J3502; J3502f; (= Point Flamstead); J4425a; J4426a; J4439f; (= Nine Turns-Coffee Piece); J-71A; J-72-13A-2k; J-72-13A-2L; J-72-13A-2m; J-72-13A-2n; J-72-13A-2o; J-72-13A-2p; J-72-13A-2q; J-72-13A-2r; J-72-13A-2u; J-72-13Ba; J-72-13B (lower)a; J-72-13B (lower)b; J-72-13B (lower)c; J-72-13B (lower)d; J-72-13B (lower)e; J-72-13B (lower)f; J-72-13B (lower)g; J-72-13B (lower)h; J-72-13B (lower)i; J-72-13B (lower)j; J-72-13B (lower)k; J-72-13B (lower)L; J-72-13B (lower)m; J-72-13B(lower)n; J-72-2a; J-72-5Aa; J-72-5Ab; J-72-5Ac-II; (=Marchmont Inlier); J-71-.66a (= Woodland Shale); 585a-II; 585b; 585c; 568a; 568b; 570g; 583a; 583b; 583c; 583d; 586a; 586b; 586d; 586e; 592; 571a; 591d-I; 594b; 594c; 594d; 594e; 595g; JAG 18.5c (= probably Cambridge area); J3459b (= probably Welcome Hall).

Figure 15 *Hydnophora styriaca* (Michelin, 1847), based on the illustration in de la Revilla & Quintero (1966), ?Lower Maastrichtina of Spain, ×2.

Dictuophyllia reticulata (Goldfuss, 1826) (Pl. 4, figs 5, 7)

1799 *Méandrite*; Faujas-Saint-Fond: 190, pl. 35, figs 1–2.
v*1826 *Meandrina reticulata* nobis; Goldfuss: vol. 1, p. 63 and 245, pl. 21, fig. 5.
1830 *Dictyophyllia reticulata*; Blainville: vol. 60, p. 325.
1834 *Dictyophyllia reticulata*; Blainville: 360, pl. 53, fig. 4.
1851*b* *Dictyophyllia reticulata*; Milne Edwards & Haime: vol. 7, p. 70.
1860 *Dictyophyllia reticulata*; Milne Edwards: vol. 3, p. 207.
1914 *Dictyophyllia reticulata* Goldfuss sp. 1826; Felix: pars 7, p. 242.
1921 *Pachygyra Vallcebri*, n. sp.; Vidal: 5, pl. 8, figs 1–3.
v1925 *Favia planissima* spec. nov.; Umbgrove: 106, pl. 10, fig. 12.
1925 *Diploria reticulata*, gen. nov. nom., Goldf. sp.; Umbgrove: 107, pl. 9, fig. 8.
2000b *Favia planissima*, Umbgrove 1926; Löser: 36.
v2002 *Dictuophyllia reticulata* (Goldfuss, 1826); Baron-Szabo: 27, pl. 9, fig. 1.
v2002 *Favia planissima* Umbgrove, 1925; Leloux: 14.

DIMENSIONS. d (series, wall to wall) = 0.7–1.2 mm; c-c (series) = 1.5–4 mm; s/mm = 14–16/2; ambulacrae = 1–3.5 mm.

DESCRIPTION. Meandroid colony; polyps arranged in long wavy series; series separated by ambulacrae; costosepta thin, developed in generally three size orders; axial ends of septa rounded, claviform or rarely rhopaloid; columella delicate, lamellar, mainly continuous.

TYPE LOCALITY OF SPECIES. Upper Maastrichtian of the Netherlands (St. Pietersberg).

DISTRIBUTION. Campanian of Spain, Campanian–Maastrichtian of Tibet, Upper Maastrichtian of the Netherlands.

(?) ***Dictuophyllia batalleri*** (Reig Oriol, 1987)

v*1987 *Anisoria batalleri* n. sp.; Reig Oriol: 6, pl. 1, figs 6–7, pl. 2, fig. 1.
2000b *Anisoria batalleri*, Reig Oriol 1987; Löser: 8.

DIMENSIONS. d (wall–wall) = 1.5–3 mm; ambulacrae = 4–9 mm; s/mm = 14/5.

DESCRIPTION. Meandroid corallum; calicinal series separated by generally wide ambulacrae; costosepta compact, non-confluent, granulated laterally, arranged in two irregular size orders; S3 present in places; ?elongate columellar structures irregularly present.

REMARKS. In having a rather septothecal wall and possibly columellar structures, but lacking synapticulae, the holotype of the species *batalleri* differs from *Anisoria* but corresponds to the genus *Dictuophyllia*. Because the holotype of the species *batalleri* is inconclusive as to the columellar structures, assignment to the latter genus *Dictuophyllia* is provisional until the type can be re-examined in thin section.

TYPE LOCALITY OF SPECIES. Maastrichtian of Spain (Isona, Lléida).

DISTRIBUTION. Maastrichtian of Spain.

Genus ***HYDNOPHORA*** Fischer von Waldheim, 1807

TYPE SPECIES. *Madrepora excesa* Pallas, 1766 (= *Hydnophora demidovii* Fischer von Waldheim, 1807), Recent, Indian Ocean.

DIAGNOSIS. Colonial, massive, lamellar or foliaceous, hydnophoroid. Gemmation intratentacular. Collines short, discontinuous. Septa compact, finely granulated laterally. Columella irregularly trabecular to lamellar, discontinuous. Endothecal dissepiments thin, vesicular. Wall septoparathecal.

Hydnophora styriaca (Michelin, 1847) (Fig. 15)

v*1847 *Monticularia styriana n.*; Michelin: 295, pl. 68, fig. 2. [topotypes studied].
1849*b* *Hydnophora styriana*; Milne Edwards & Haime: Ser. 3, vol. 11, p. 304.
1850 *Hydnophora styriana*; d'Orbigny: vol. 2, p. 207.
1854 *Hydnophora styriana*; Milne Edwards & Haime: 94.
1854 *Hydnophora styriaca* Milne Edwards & Haime; Reuss: 111.
1857 *Hydnophora styriaca*; Milne Edwards: vol. 2, p. 425.

1857 *Hydnophora styriaca* (Michelin); Pictet: 409, pl. 105, fig. 10.
1858–61 *Hydnophora styriaca* (Michelin); de Fromentel: 169.
1877 *Hydnophora styriaca*; de Fromentel: 468, pl. 120, fig. 2.
v1903*a* *Hydnophora styriaca* (Michelin); Felix: 279.
1914 *Hydnophora styriaca* Michelin sp. 1847; Felix: pars 7, p. 181.
1930 *Hydnophororaraea styriaca* (Michelin); Oppenheim: 224, pl. 14, figs 4–4a, pl. 18, figs 1–1a.
1930 *Hydnophororaraea rapulum*; Oppenheim: 230, pl. 14, figs 3–3a, pl. 18, figs 7–7a.
1930 *Hydnophororaraea aconus*; Oppenheim: 232, pl. 18, figs 2–2a, pl. 19, fig. 4.
v1932 *Hydnophora* (?) *blancoensis*; Wells: 243, pl. 35, fig. 7.
?1954 *Hydnophora styriaca* (Michelin); Kolosváry: 85, pl. 6, figs 13–16.
1966 *Hydnophororaraea styriaca* Michelin; de la Revilla & Quintero: 14, pl. 1, fig. 2.
(v)1976 *Hydnophora styriaca* (Michelin 1847); Turnšek & Buser: 55, 78, pl. 11, figs 4–6.
v1979 *Hydnophora styriaca* (Michelin); Scholz: 62, text-figs 50–51.
?1982 *Hydnophororaraea* cfr. *styriaca* (Mich.); Matteucci *et al.*: 81, tab. 1.
v1982 *Hydnophora styriaca* (Michelin) 1847; Beauvais: vol. 1, p. 88 ff, pl. 5, fig. 6, pl. 7, fig. 2, pl. 42, figs 3–4. [topotypes studied].
(v)1992 *Hydnophora styriaca*; Moussavian: 123, pl. 23, figs 3–4.
v1996 *Hydnophora styriaca* (Michelin, 1847); Baron-Szabo & Steuber: 11, pl. 2, figs 2, 4.
(v)1997 *Hydnophora styriaca* (Michelin) 1847; Turnšek: 105, figs 105A-E.
v1997 *Hydnophora styriaca* (Michelin, 1847); Baron-Szabo: 52, pl. 3, fig. 2.
v1998 *Hydnophora styriaca* (Michelin, 1847); Baron-Szabo: 135, pl. 12, fig. 4, text-fig. 3.
2000b *Hydnophora styriana* (Michelin 1847); Löser: 42.
v2002 *Hydnophora styriaca* (Michelin, 1847); Baron-Szabo: 28, pl. 11, fig. 6.
v2003 *Hydnophora styriaca* (Michelin, 1847); Baron-Szabo: 121, pl. 1, Fig. 7.

DIMENSIONS. d (min, collis, adult) = 1.8–2.8 mm; d (min, collis, early juvenile) = 1 mm; d (max, collis, adult) = 1.5–3.5 mm; d (max, collis, early juvenile) = 1 mm; s (collis, adult) = (6) 10–15; s (collis, early juvenile) = 6–10; c–c = 2–3.5 mm.

DESCRIPTION. Hydnophoroid colony; collis up to 3.5 mm long; septa arranged in two to three size orders; irregular trabecular columellar structures present.

TYPE LOCALITY OF SPECIES. Turonian–Campanian of Austria (Gosau Group).

DISTRIBUTION. Aptian of Greece and the German/Austrian border region, Upper Aptian–Lower Albian of Texas, Turonian–Campanian of Austria (Gosau Group), Coniacian–Maastrichtian of ? Italy (Sicily), Senonian of France and ? Hungary, in Senonian Breccia of Slovenia, Campanian–? Lower Maastrichtian of northern Spain.

Genus ***MONTICULASTRAEA*** Duncan, 1880

TYPE SPECIES. *Monticulastraea elongata* Duncan, 1880, Burdigalian–Upper Miocene of Pakistan (base of Gáj Group) (subsequently designated by Gregory 1930).

DIAGNOSIS. Colonial, hydnophoroid. Gemmation intracalicinal. Corallites indistinct, arranged in sinuous series, confined by short tectiform monticules. Costosepta compact, non-confluent, finely granulated. Columella lamellar, thin, continuous. Wall septothecal. Endothecal dissepiments thin, subtabulate. Exothecal dissepiments large, vesicular to subtabulate.

Monticulastraea insignis Duncan, 1880 (Pl. 4, figs 3a, b)

*1880 *Monticulastraea insignis*; Duncan: 87, pl. 26, figs 1–3.
1880 *Monticulastraea inaequalis*; Duncan: 88, pl. 26, fig. 4.
v1880 *Monticulastraea elongata*; Duncan: 88, pl. 27, figs 1–2.
1930 *Monticulastraea insignis* Duncan; Gregory: 96.
1933 *Monticulastraea insignis* Duncan; Kühn: 194.
(v)1999 *Hydnophora elongata* (Duncan, 1880); Bosellini: 232, figs 3c–d, 7f.
?(v)1999 *Hydnophora inaequalis* (Duncan, 1880); Bosellini: 232, figs 7g–h.
?(v)1999 *Hydnophora insignis* (Duncan, 1880); Bosellini: 232, figs 8a–b.
v2000 *Monticulastraea insignis* Duncan, 1880; Baron-Szabo: 100, pl. 2, figs 3, 5, pl. 5, fig. 3.
v2002 *Monticulastraea elongata* Duncan, 1880; Baron-Szabo: 31, pl. 14, figs 2, 4–5, pl. 15, fig. 3.

DIMENSIONS. d (series, wall–wall) = 1.5–5 mm; maximum length of collines = 2–9 mm; minimum length of collines = 0.5–3 mm; s/mm = 35–44/10; size of the colony = 6.5–12 cm in diameter.

DESCRIPTION. Massive to subfoliaceous colony; corallites arranged in sinuous series defined by short tectiform collines; costosepta compact, thin, straight, developed in two to three size orders, slightly alternating in length and thickness; S1 and S2 reach the centre of calicinal series; their axial ends may fuse with columella; S3 irregularly present; columella lamellar, thin, continuous.

REMARKS. Recently, the genus *Monticulastraea* has been subject to re-investigation re-evaluating its validity. Bosellini (1999) merged *Monticulastraea* with *Hydnophora*, Because of the occurrence of different skeletal features (e.g. the development of in exothecal wall in *Monticulastraea* lacking in *Hydnophora*) in these taxa, Baron-Szabo (2000, 2002) considered both genera as taxonomically independent groups (see discussion in Baron-Szabo 2000).

Regarding the specific characteristics it can be stated that the range of plasticity in the genus *Monticulastraea* is so high that the species *Monticulastraea elongata* and *Monticulastraea inaequalis* are considered synonymous with *Monticulastraea insignis*. In the syntypes of *Monticulastraea*

elongata the septal density varies between 30 and around 55 in 10 mm, the maximum length of the collines ranges from 2–35 mm and the width of calicinal series lies between 1.5–12 mm. For *inaequalis*, Duncan (1880) gave the septal density of 48 in 10 mm, the maximum length of the collines ranged from 1.5–28 mm (larger areas with small collines of 1.5 mm up to around 10 mm in length occur in the type specimen, thus closely corresponding to *insignis*) and the width of calicinal series between 2.5–7 mm (taken from the illustration of the type specimen in Duncan 1880, pl. 26, fig. 4). Dimensions for *insignis* are given above. It should be noted that Duncan did not give the septal density but only mentioned the occurrence of possibly three septal orders.

The merging of the species *elongata*, *inaequalis* and *insignis* differs from the species concept presented by Bosellini (1999). The dimensions given by her for these species significantly differ from the ones presented here. However, the dimensions given by Bosellini (1999) are based on non-type material collected from an area different from the locus typicus, whereas the dimensions of skeletal elements used in the present paper are directly taken from the original descriptions of the type material given by Duncan (1880).

TYPE LOCALITY OF SPECIES. Burdigalian–Upper Miocene of Pakistan (base of Gáj Group).

DISTRIBUTION. Middle–Upper Maastrichtian of the UAE/Oman border region, Lower Burdigalian of Somalia, Burdigalian–Upper Miocene of Pakistan (base of Gáj Group).

Genus ***ANTIGUASTRAEA*** Vaughan, 1919

TYPE SPECIES. *Astrea cellulosa* Duncan, 1863, Oligocene of Antigua.

DIAGNOSIS. Colony plocoid to subcerioid. Gemmation extracalicinal. Septa compact, with regularly dentate margins. Costae weak. Columella thin, lamellar. Wall septothecal and septoparathecal.

Antiguastrea cellulosa (Duncan, 1863) (Pl. 4, figs 2a, b; Pl. 5, fig. 1)

v*1863 *Astrea cellulosa*; Duncan: 378, pl. 86, figs 2–5.
v1919 *Antiguastrea cellulosa* (Duncan); Vaughan: 199, 204, 402, pl. 98, figs 3–4, pl. 99, figs 1–3, pl. 100, figs 1–4, pl. 101, figs 2, 2a.
v1919 *Antiguastrea cellulosa* var. *Silicensis*; Vaughan: 408, pl. 101, figs 1, 1a.
1925 *Antiguastrea cellulosa* Duncan sp. 1863; Felix: pars 28: p. 73 (older synonyms cited therein).
1925 *Antiguastrea cellulosa* Duncan sp. 1863 var. *silicensis* Vaughan 1919; Felix: pars 28, p. 74.
v1992 *Antiguastrea cellulosa* (Duncan, 1863); Budd *et al.*: 585, figs 7.4–7.6.
v2002 *Antiguastrea cellulosa* (Duncan, 1863); Baron-Szabo: 32, pl. 14, fig. 1.
2003 *Antiguastrea cellulosa* (Duncan, 1863); Schafhauser *et al.*: 190ff.

DIMENSIONS. d = 2–5 mm; juvenile corallites are smaller (around 1.5 mm); c–c = 2–6 mm; s = 20–44, in juvenile corallites the number of septa ranges between 14 and 18.

DESCRIPTION. Submassive, plocoid to subcerioid colony; corallites slightly projecting; costosepta compact, finely granulated laterally, in older corallites arranged in three complete cycles with the beginning of the fourth cycle, in six systems; S1 reach the centre of the calice; S of remaining cycles alternate in length and thickness; columella trabecular, weakly developed; wall septothecal and septoparathecal; endothecal dissepiments vesicular; exothecal dissepiments subtabulate to vesicular.

REMARKS. In the syntypes of *Antiguastrea cellulosa* (Duncan) (BMNH R28626 and R28743) the corallite diameter ranges from 2–6 mm and the number of septa is around 20 in juvenile corallites and reaches 48 in adults ones. It should be noted that in the type material there are larger areas that only have corallites ranging from 2.5–4 mm, whereas in other areas of the same specimen corallites ranging from 3–6 mm occur. Regarding the dimensions of the skeletal elements and the development of septa and the axial region, the Jamaican specimens correspond well with the syntypes of *Antiguastrea cellulosa*.

TYPE LOCALITY OF SPECIES. Oligocene of Antigua.

DISTRIBUTION. Maastrichtian of Mexico (Cardenas Formation), Middle–Upper Maastrichtian of Jamaica (this paper), Paleocene of Austria (this paper), Eocene of Panama, Oligocene of Antigua, Costa Rica and Mexico, Oligocene–Miocene of the southeastern USA.

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 298; 346b; 346c; 375e; 424a; 424b; J-71-4f; (= Jerusalem Mountain Inlier); 31485 (= Logie Green); 586c (= probably Cambridge area); Paleocene of Austria, NMNH, Baron-Szabo coll., USNM 1068600.

Genus ***HALDONIA*** Duncan, 1879

TYPE SPECIES. *Haldonia vicaryi* Duncan, 1879, Albian ('Upper Greensand') of England (Haldon).

DIAGNOSIS. Colonial, massive, plocoid. Gemmation extracalicinal. Costosepta compact, non-confluent, granulated. Columella absent, but trabecular extensions of axial septal ends may form pseudocolumella. Paliform structures present before S1. Wall parathecal, rarely septoparathecal. Endothecal dissepiments thin, vesicular.

REMARKS. In many respects the genera *Paraplacocoenia* Beauvais and *Columastrea* d'Orbigny resemble the genus *Haldonia*;. however, they differ in that *Columastrea* has a septothecal wall, a styliform columella and often shows second-cycle pali, while *Paraplacocoenia* has a very granulate peritheca, dissociating into trabecular structures in the costal area, and a lamellar columella.

Haldonia schindewolfi (Wells, 1934*a*) (Pl. 6, figs 2, 4)

v*1934*a* *Prodiploastraea schindewolfi*, new species; Wells: 89, pl. 4, figs 21–22.
2000b *Prodiploastraea schindewolfi*, Wells 1934; Löser: 69.
2002 *Haldonia schindewolfi* (Wells, 1934); Baron-Szabo: 32.

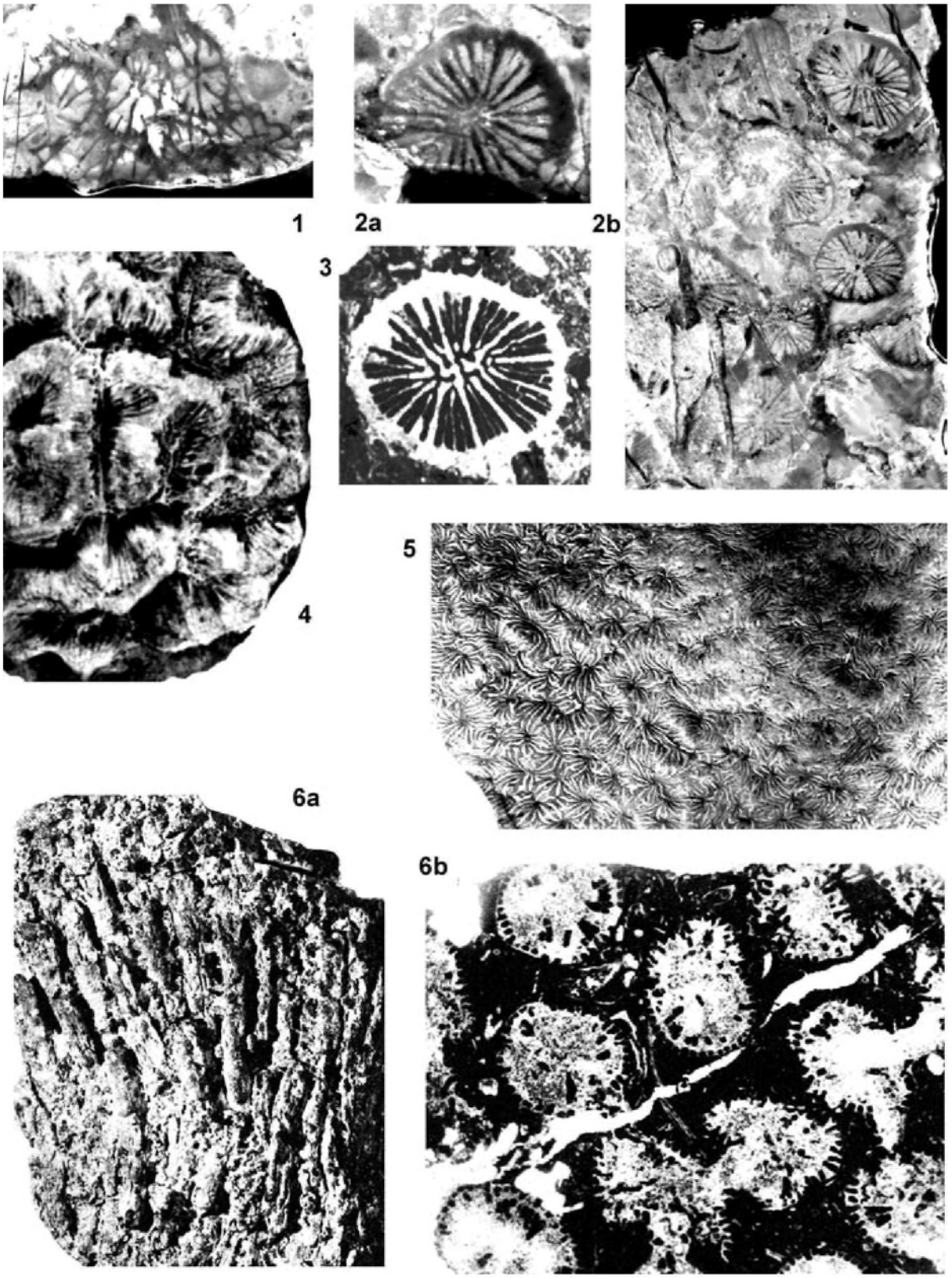


Plate 5 **Fig. 1** *Antiguastrea cellulosa* (Duncan, 1863), Baron-Szabo coll. NMNH, USNM 1068600, Paleocene of Austria, polished surface, cross view, oblique, ×3. **Fig. 2** *Cladocora barkii* (Duncan, 1880), Baron-Szabo coll. NMNH, USNM 1068599, Paleocene of Austria. **2a**, cross view of a juvenile corallite, polished surface, ×4; **2b**, polished surface of colony, ×2. **Fig. 3** *Cladocora barkii* (Duncan, 1880), cross view of juvenile corallite as figured in Schuster (1996: 'Dendroid corals facies'), Paleocene of Egypt, ×5. **Fig. 4** *Manicina hydnophoroidea* (Duncan, 1880) (= *Leptoria* cf. *pauca* of Schuster, 1996), upper surface of colony as figured in Schuster (1996: pl. 16, fig. 3a), Paleocene of Egypt, ×1.5. **Fig. 5** *Mycetophyllia multistellata* Reuss, 1864, holotype, upper surface view of colony, GBA 1864/2/31, Oligocene of Slovenia, ×1.5. **Fig. 6** *Phacellocoenia bazerquei* Alloiteau & Tissier, 1958, holotype (as presented in Alloiteau & Tissier 1958), Upper Danian of France. **6a**, longitudinal view, upper surface, ×1.5; **6b**, cross view, polished upper surface, ×5.

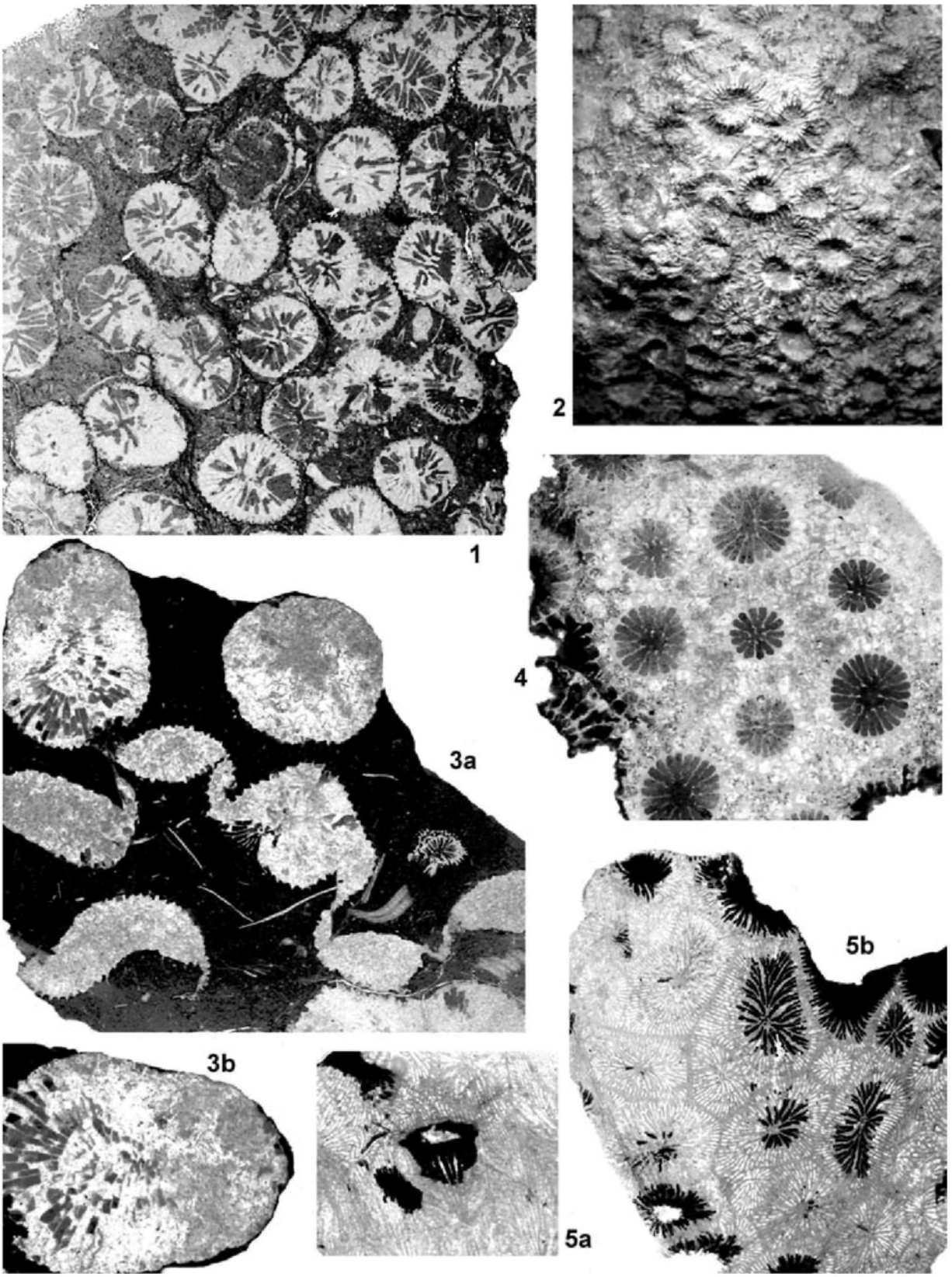


Plate 6 **Fig. 1** *Cladocora jamaicaensis* Vaughan, 1899, cross thin section, Coates coll. NMNH, no. 356, Upper Maastrichtian of Jamaica, ×3. **Fig. 2** *Haldonia schindewolfi* (Wells, 1934*a*), holotype, upper surface, NMNH, I74476, Maastrichtian of Jamaica, ×2. **Fig. 3** *Liptodendron nefiana* (Oppenheim, 1930), Coates coll. NMNH, no. 549b, Upper Maastrichtian of Jamaica. **3a**, cross thin section, ×2.5; **3b**, close-up, ×3.5. **Fig. 4** *Haldonia schindewolfi* (Wells, 1934*a*), cross thin section, Coates coll. NMNH, no. J-71-42-13a, Upper Maastrichtian of Jamaica, ×5. **Fig. 5** *Goniastrea insignis* (Duncan, 1880), Coates coll. NMNH, no. J-71-17b, Upper Maastrichtian of Jamaica. **5a**, longitudinal thin section, ×2.5; **5b**, cross thin section, ×2.5.

DIMENSIONS. d (lumen) = 2.5–4 mm, juvenile 1.5–2 mm; c-c = 3.5–8 mm; s = 24–32, juvenile around 20.

DESCRIPTION. Massive, plocoid colony; corallites circular or irregularly elliptical in outline; costosepta thin, becoming thicker in peripheral areas, compact, arranged in three complete cycles in six systems, in larger corallites septa of an incomplete fourth cycle are present; paliform structures irregularly occur before S1 and some before ?S2; columella absent; pseudocolumella present in some corallites, usually deeper in calice.

TYPE LOCALITY OF SPECIES. Maastrichtian of Jamaica (Catadupa railway).

DISTRIBUTION. Maastrichtian of Jamaica (new material).

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 434b (=Catadupa); J-42-13s (=Rio Minho).

Genus ***GONIASTREA*** Milne Edwards & Haime, 1848*b*

TYPE SPECIES. *Astrea retiformis* Lamarck, 1816, Recent, Indian Ocean (see Milne Edwards & Haime 1848*b*).

DIAGNOSIS. Colonial, massive, meandroid or cerioid, gemmation intracalicinal (mono- to tristomodaeal); corallites mono- to polycentric, arranged in meandroid series; costosepta compact, confluent or non-confluent, dentate laterally; paliform lobes present; columella discontinuous; wall parathecal to septothecal; endothecal dissepiments vesicular.

Goniastrea insignis (Duncan, 1880) (Pl. 6, figs 5a, b)

*1880 *Prionastraea insignis*; Duncan: 78, pl. 5, figs 4–5.
1925 *Prionastraea insignis* Duncan; Felix: pars 28, p. 81.

DIMENSIONS. d (max, monocentric) = 3–10 mm; d (min, monocentric) = 2–6.5 mm; c-c (same series) = 3–8 mm; c-c = 4–7 mm; s (monocentric) = 20 up to around 100; s/mm = 7–9/2.

DESCRIPTION. Cerioid to submeandroid colony; gemmation intracalicinal and ?extracalicinal; corallites mostly monocentric, polygonal in outline; occasionally arranged in short meandroid series; costosepta compact, confluent to non-confluent, arranged in two to four cycles in eight systems, carinate and finely granulated laterally; paliform lobes usually long, about half the length of the septa; columella short, lamellar, connected to septa by their axial trabecular prolongations; endothecal dissepiments very abundant, slightly arched or cellular; wall parathecal in early separating stages of corallites, becoming septothecal in later stages. Microstructural features consist of midseptal lines of single calcification centres and clusters of calcification centres surrounded by concentric layers of fibres as described for *Favia fragum* (Esper, 1795) by Cuif & Perrin (1999).

TYPE LOCALITY OF SPECIES. Upper Eocene–Oligocene of India (Dharan Pass, Nari Group).

DISTRIBUTION. Upper Maastrichtian of Jamaica (this paper), Upper Eocene–Oligocene of India.

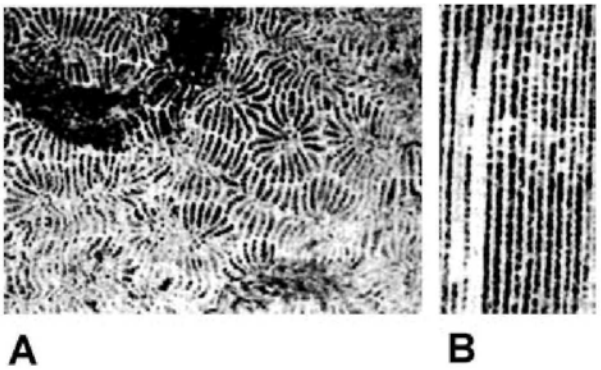


Figure 16 *Goniastrea tenera* Traub, 1938, holotype as figures in Traub (1938), Paleocene of Austria. **A**, cross view, ×3.5. **B**, lateral view, ×4.

NEW MATERIAL. Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample no.: J-71-17b (=Shaw Castle, Maldon Formation).

Goniastrea tenera Traub, 1938 (Fig. 16)

(v)*1938 *Goniastrea tenera* n. sp.; Traub: 37, pl. 1, figs 3 a–b.
1967 *Goniastrea tenera* Traub; Kühn & Traub: 9.
?v2000 *Diplocoenia* cf. *parvistella* Alloiteau, 1958; Baron-Szabo: 107, pl. 4, fig. 5.

DIMENSIONS. d (max, monocentric) = 2–3 mm; c-c (same series) = around 2 mm; s (monocentric) = 20–24; s/mm = 10/2.

DESCRIPTION. Massive, cerioid to submeandroid colony; corallites mostly monocentric, polygonal in outline; occasionally arranged in short meandroid series consisting of up to four corallites; costosepta compact, confluent to non-confluent, arranged in two to three cycles in six systems; S1 and S2 nearly equal, reaching the axial region; paliform lobes usually before S1 and S2, generally fusing with the columella,; corallite wall thin.

TYPE LOCALITY OF SPECIES. Paleocene of Austria (Salzburg).

DISTRIBUTION. ?Upper Maastrichtian of the UAE/Oman border region, Paleocene of Austria.

Genus ***COLPOPHYLLIA*** Milne Edwards & Haime, 1848*b*

TYPE SPECIES. *Madrepora gyrosa* Ellis & Solander, 1786 (=*Meandrina gyrosa* Lamarck, 1816), Recent, West Indies (designation by Milne Edwards & Haime 1848*b*).

DIAGNOSIS. Colonial, meandroid; gemmation intracalicinal and extracalicinal with terminal forking; calicinal series arranged in multiple valley systems, separated by discontinuous tectiform collines; ambulacrae rarely present; costosepta compact, non-confluent or subconfluent, with very small or no internal lobes; columella spongy and discontinuous, with lamellar linkages; wall parathecal to septoparathecal; double corallite walls generally present; endothecal dissepiments vesicular, numerous.

Colpophyllia reagani Durham, 1942 (Pl. 3, fig. 8)

*1942 *Colpophyllia reagani*; Durham: 96, pl. 16, fig. 5., pl. 17, fig. 2.
cf.1968 *Leptoria* sp.; Myers: 81, pl. 16, fig. 3.

DIMENSIONS. d (series) = 6–14 mm; c-c = 4–15 mm; s/mm = 13–18/5.

DESCRIPTION. Massive, meandroid colony; gemmation intracalicinal and extracalicinal with terminal forking; calicinal series arranged in multiple valley systems, separated by discontinuous tectiform collines; calicinal centres well-defined; ambulacrae sparse; costosepta compact, non-confluent or subconfluent, arranged in four size orders, very small internal lobes can be present; columella spongy, sometimes forming discontinuous or continuous lamellae; corallites connected by lamellar linkages; wall parathecal to septoparathecal; double corallite walls present occasionally; endothecal dissepiments vesicular, numerous.

REMARKS. In the original description, Durham (1942: 96) gives a septal density of 12–18 septa in 10 mm. However, in the illustration of the type specimen (pl. 16, fig. 5) the septal density appears to be 12–18 in 5 mm, thus very closely corresponding with the Jamaican specimens.

TYPE LOCALITY OF SPECIES. Eocene of the USA (Crescent Formation).

DISTRIBUTION. Maastrichtian of Mexico, Middle–Upper Maastrichtian of Jamaica (this paper), Eocene of the USA (Crescent Formation).

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 351; 400; 405; 413; J-66-13-55a. (= Jerusalem Mountain Inlier).

Genus ***MANICINA*** Ehrenberg, 1834 (= *Teleiophyllia* Duncan, 1864 (*Type species. T. grandis* Duncan, 1864, Miocene of the West Indies).

TYPE SPECIES. *Madrepora areolata* Linnaeus, 1758, Recent, Red Sea (designation by Milne Edwards & Haime 1850*a*).

DIAGNOSIS. Colonial, free-living or attached flabelloid and foliaceous to submassive meandroid; gemmation intracalicinal due to bigemmation (*sensu* Felix, 1903*a*, as described for *Placohelia bigemmis*) or polystomodaeal; calicinal series sinuous with indistinct to subdistinct centres, separated by tectiform collines and ambulacrae in forms that develop multiple valley systems; calicinal platform steep-sided, forming a relief of several mm; costosepta compact, non-confluent, rarely subconfluent; columella trabecular, continuous; septal lobes occasionally present; wall parathecal to septothecal; endothecal and exothecal dissepiments vesicular, abundant. Epitheca present.

Manicina hydnophoroidea (Duncan, 1880) (Pl. 5, fig. 4, Fig. 17)

*1880 *Leptoria hydnophoroidea, Duncan*; Duncan: 39, pl. 8, figs 1–2.

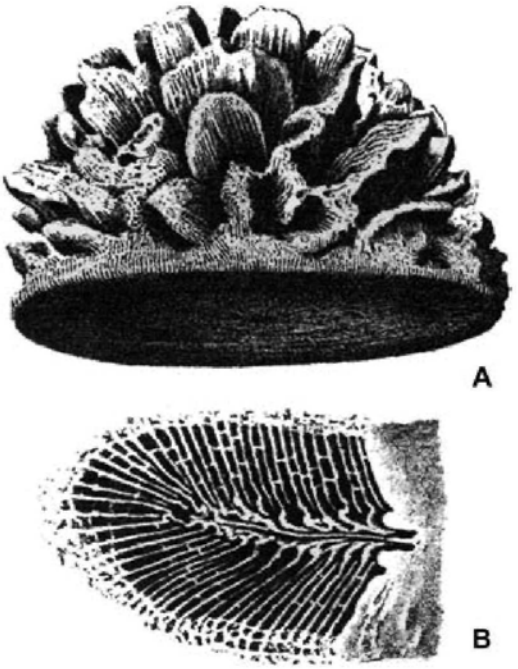


Figure 17 *Manicina hydnophoroidea* (Duncan, 1880), as figured in Duncan (1880), Paleocene of Pakistan. **A**, upper surface of colony, ×1; **B**, close-up of calicinal series, ×2.

1925 *Leptoria hydnophoroidea* Duncan 1880; Felix: pars 28, p. 90.
?(v)1996 *Leptoria laxa* Budd, 1992; Schuster: 76, pl. 16, fig. 2.
(v)1996 *Leptoria* cf. *pauca* Budd, 1992; Schuster: 76, pl. 16, figs 3 a–b.

DIMENSIONS. d (series, wall to wall) = 5–15 mm; s/mm = 18–20/10; relief of series = 10–25 mm.

DESCRIPTION. Hydnophoro–meandroid colony; calicinal series separated by collines that are 5 to around 40 mm in length; costosepta in two complete orders with a beginning third order.

REMARKS. In forming a hydnophoro–meandroid colony with steep tectiform collines and calicinal series arranged in multiple valley systems, the specimen described from the Danian of Egypt as *Leptoria laxa* Budd by Schuster (1996) rather corresponds to the genus *Manicina*.

TYPE LOCALITY OF SPECIES. Paleocene of Pakistan (Jhirk, Sind).

DISTRIBUTION. Paleocene of Pakistan and Egypt.

Genus ***CLADOCORA*** Ehrenberg, 1834 (= *Cereiphyllia* Barta-Calmus, 1973 (Type species. *Rhabdophyllia tenuis* Reuss, 1868, Oligocene of Italy); = *Rhabdocora* Fromentel, 1873 (Type species. *R. cretacea* Fromentel, 1873, Cenomanian of France [Aude]); = *Procladocora* Alloiteau, 1952*a* (Type species. *Calamophyllia gracilis* d'Orbigny, 1850 [non *Calamophyllia gracilis* Milne Edwards & Haime, 1849*b*], Lower Coniacian of France [Aude]); = *Haimesiphyllia* Alloiteau, 1957 (Type species.

Rhabdophyllia salsensis Milne Edwards & Haime, 1854, Lower Campanian of France); =? *Rhabdophyllia* Milne Edwards & Haime, 1851*a* (Type species. *R. phillipsi* Milne Edwards & Haime, 1851*a*, Jurassic of Great Britain).

TYPE SPECIES. *Madrepora flexuosa* Pallas, 1766 (=*Madrepora caespitosa* Linnaeus, 1767; =*Caryophyllia caespitosa* [Lamarck, 1816]), Recent, Mediterranean Sea.

DIAGNOSIS. Colonial, phaceloid-dendroid to subflabelloid. Gemmation intracalicinal (polystomodaeal) and extracalicinal. Costosepta compact, finely granulated laterally, dentate marginally. Paliform swellings can be present in front of S1 and S2. Pseudo-columella, formed by trabecular extension of axial septal ends, irregularly parietal, spongy to papillose, sublamellar deeper in corallum. Wall septothecal and septoparathecal. Endothecal dissepiments and epithecal wall thin.

REMARKS. Barta-Calmus (1973) created the genus *Cereiphyllia* and stated that it was characterised by (1) phaceloid growth form, (2) circular to elliptical corallites, (3) compact costosepta, that are regularly covered by numerous granules, (4) a very well-developed spongy columella, (5) numerous endothecal dissepiments, (6) parathecal to septoparathecal wall, (7) absence of both synapticulae and epithecal wall and (8) intracalicinal (-lateral) budding mode. However, reinvestigation of the type species of the genus *Cereiphyllia* (= *Rhabdophyllia tenuis* Reuss, 1868, Reuss collection at the Natural History Museum, Vienna, no. 123, 1868/000/8) revealed that the wall, although mostly septoparathecal, is also septothecal in places. Moreover, occasionally in places a thin epithecal wall is preserved. The only difference to the genus *Cladocora* seems to be the presence of a very well-developed spongy columella. Because the presence of a spongy-trabecular columella itself, although generally rather weakly developed, is in accordance with the genus *Cladocora* the genus *Cereiphyllia* is considered a junior synonym.

Cladocora barkii (Duncan, 1880) (Pl. 5, figs 2a, b, 3, Fig. 18)

*1880 *Rhabdophyllia Barkii, Duncan*; Duncan: 22, pl. 1, figs 24–28.
?*1993* *"Aplophyllia" barkai* (Duncan, 1880); Carbone *et a.*: 227.
(v)1996 Dendroid coral facies; Schuster: pl. 5, figs 1–2.

DIMENSIONS. d = 7.5–12.5 mm; s = up to 48.

DESCRIPTION. Corallum phacelo-dendroid; corallites circular or elliptical in outline; gemmation extracalicinal; costosepta thin, with rounded and spiniform granules laterally, arranged in four complete cycles in six systems in older corallites; S1 reach the centre of the corallite, youngest septa distinctly thinner and shorter; columella irregularly trabecular; wall septoparathecal, thin.

TYPE LOCALITY OF SPECIES. Paleocene of Pakistan (Laki Range, Sind).

DISTRIBUTION. Paleocene of Austria (this paper) and Pakistan, Upper Paleocene of Egypt, Upper Paleocene–Lower Eocene of ?Somalia.

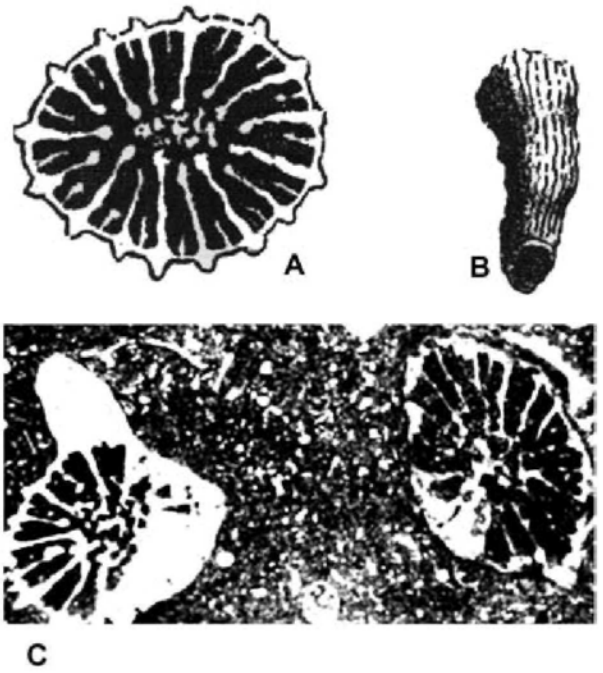


Figure 18 *Cladocora barkii* (Duncan, 1880), as figured in Duncan (1880), Paleocene of Pakistan. **A**, cross view of corallite, ×5; **B**, longitudinal view of branch, ×2. **C**, cross thin section of 'Dendroid coral facies' as figured in Schuster (1996: pl. 5, fig. 1), Upper Paleocene of Egypt, ×4.

NEW MATERIAL. Paleocene of Austria, Baron-Szabo coll., NMNH, USNM 1068599.

Cladocora gracilis (d'Orbigny, 1850) (Pl. 4, figs 4, 6)

*1850 *Calamophyllia gracilis*; d'Orbigny: vol. 2, p. 204.
v1854 *Cladocora tenuis m*; Reuss: 112, pl. 6, figs 24–25.
non 1857 *Rhabdophyllia ? gracilis* (Goldfuss); Milne Edwards: vol. 2, p. 349.
1857 *Cladocora ? tenuis*; Milne Edwards: vol. 2, p. 599.
1858–61 *Cladocora ? tenuis*; de Fromentel: 150.
1864 *Rhabdophyllia gracilis*; de Fromentel: 391, pl. 83, fig. 2.
v1903*a* *Cladocora tenuis* Reuss; Felix: 265.
1914 *Cladocora tenuis* Reuss 1854; Felix: pars 7, p. 171.
1914 *Rhabdophyllia gracilis* d'Orbigny sp. 1850; Felix: pars 7, p. 177.
1930 *Cladocora tenuis* Reuss; Oppenheim: 361, pl. 16, fig. 1, pl. 45, fig. 2.
?1937*a* *Cladocora tenuis* Reuss; Bataller: 145.
?1945 *Cladocora tenuis* Reuss; Bataller: 33.
1957 ? *Goniocora tenuis* (Reuss); Alloiteau: 192.
1974 *Procladocora tenuis* (Reuss); Beauvais & Beauvais: 485.
(v)1978 *Procladocora tenuis* (Reuss 1854): Turnšek & Polšak: 151 and 171, pl. 9, figs 1–9.
?*1982* *Procladocora tenuis* (Reuss); Matteucci *et al.*: 81, tab. 1.
v1982 *Procladocora tenuis* (Reuss) 1854; Beauvais: vol. 1, p. 103, pl. 7, fig. 2, pl. 8, fig. 1.

v1985 *Procladocora tenuis* (Reuss); Höfling: 98.
1994 *Procladocora tenuis* (Reuss 1854); Turnšek, p. 10.
(v)1996 *Cladocora* cf. *tenuis* Reuss, 1854; Schuster: 76, pl. 16, fig. 4.
(v)1997 *Procladocora tenuis* (Reuss 1854); Turnšek, p. 161, figs 161A-G.
2000b *Procladocora tenuis* (Reuss 1854); Löser: 69.
v2002 *Cladocora gracilis* (d'Orbigny, 1850); Baron-Szabo: 34, pl. 17, figs 1–3.
v2003 *Cladocora gracilis* (d'Orbigny, 1850); Baron-Szabo: 122, pl. 5, fig. 9, pl. 9, figs 3–5.
v*2003* *Cladocora gracilis* (d'Orbigny, 1850); Schafhauser *et al.*: 190ff.
v*2004* *Cladocora* cf. *C. gracilis* (d'Orbigny, 1850); Baron-Szabo *et al.*: 79R.

DIMENSIONS. d = 2.8–4.5 mm, reaching 5 mm in latest ontogenetical stages; s = 16–38.

DESCRIPTION. Corallum phacelo-dendroid; corallites circular or elliptical in outline; gemmation extracalicinal; costosepta thin, with rounded and spiniform granules laterally, arranged radially and bilaterally in three complete cycles in six systems in older corallites; S1 reach the centre of the corallite, their axial ends sometimes fuse with the columella; S2 subequal or alternate in length and thickness; youngest septa distinctly thinner and shorter, regularly alternating with septa of the preceding cycle; columella trabecular or formed by elongated segments; endotheca dissepiments thin and vesicular or subtabulate; wall septoparathecal.

TYPE LOCALITY OF SPECIES. Upper Coniacian of France (Soulatgeé, Marno-calcaires à Gauthiericeras).

DISTRIBUTION. Turonian and Upper Santonian of France, Upper Turonian–Santonian of Austria (Gosau Group), ?Upper Santonian of Spain, Santonian–Campanian of Slovenia and Croatia, Santonian–Maastrichtian of ?Italy (Sicily), Middle–Upper Maastrichtian of Jamaica (new material), Maastrichtian of Mexico (Cardenas Formation), Danian of Argentina, Paleocene of Austria (this paper), Upper Paleocene of Egypt.

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 319-II (= Ducketts Land Settlement); 370a; 420; 424b-II (= Jerusalem Mountain Inlier); 553 (= Rio Minho).

Cladocora jamaicaensis Vaughan, 1899
(Pl. 6, fig. 1)

*1899 *Cladocora jamaicaensis*; Vaughan: 234, pl. 36, figs 5–7.
1934a *Cladocora jamaicaensis* Vaughan; Wells; 72.
non1936 *Cladocora jamaicaensis* Vaughan 1899; Hackemesser: 38, pl. 5, fig. 3.
v1994 ? *Cladocora antarctica* n. sp.; Filkorn: 77, figs 29–30.
(v)1996 *Cladocora* cf. *prolifera* (d'Achiardi, 1866); Schuster: 77, pl. 16, figs 5 a–b.
(v)1997 *Rhabdophylliopsis alloiteaui* (Alloiteau & Tissier, 1958); Vecsei & Moussavian: p. 129, pl. 35, fig. 2.
(v)1997 *Cladocora* sp.; Vecsei & Moussavian: 131, pl. 36, fig. 5.
non(v)2000*a* *Procladocora jamaicaensis* (Vaughan 1899); Löser: 52, pl. 3, figs 1–5.
2000b *Cladocora jamaicaensis*, Vaughan 1899; Löser: 19.
2002 *Cladocora jamaicaensis* Vaughan, 1899; Baron-Szabo: 34.
2003 *Cladocora jamaicaensis* Vaughan, 1899; Filkorn: 1.
v*2003* *Cladocora jamaicaensis* Vaughan, 1899; Schafhauser *et al.*: 190ff.

DIMENSIONS. d (max) = 3.5–7 mm, up to 10 mm in late budding stages; d (min) = 3–5 mm; s = 30–50.

DESCRIPTION. Corallum phaceloid to subdendroid; calices circular or elongated in outline; costosepta compact, developed in four complete cycles in adult corallites, irregularly alternating in length and thickness; six to 12 septa reach the centre of the calice, their inner ends may fuse, terminate into claviform thickenings, or produce trabecular prolongations, forming a pseudo-columella; S3 distinctly thinner, reaching about half the length of the oldest ones; youngest septa somewhat smaller, or nearly equal with S3; columella reduced, trabecular, or absent; wall septothecal; epithecal wall present occasionally; endothecal dissepiments short and slightly arched in central region of the corallite, long and vesicular in peripheral area.

REMARKS. In having rather subcompact to porous septa and apparent synapticulothecal developments the specimens described from the Cretaceous of Greece in Hackemesser (1936) and Löser (2000*a*) correspond to the genus *Calamophylliopsis*.

TYPE LOCALITY OF SPECIES. Campanian (–?Maastrichtian) and Eocene of Jamaica (Blue Mountain Series).

DISTRIBUTION. Campanian–Maastrichtian and Eocene of Jamaica (Blue Mountain Series and new material, this paper), Maastrichtian of Mexico (Ocozocuautla and Cardenas Formations), Paleocene of Antarctica (Seymour Island) and Egypt, Upper Thanetian of Italy (Maiella Platform).

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 356; 409; J-71-103a (= Jerusalem Mountain Inlier).

Genus ***LIPTODENDRON*** Eliášová, 1991

TYPE SPECIES. *Liptodendron grossi* Eliášová, 1991, Eocene of the Czech Republic.

DIAGNOSIS. Colonial, phacelo–dendroid to submeandroid–flabelliform. Gemmation lateral. Costosepta subcompact, thin, sparsely granulated laterally. Columella parietal, feebly developed. Endothecal dissepiments vesicular. Wall parathecal.

Liptodendron nefiana (Oppenheim, 1930)
(Pl. 6, figs 3a, b; Pl. 7, figs 1a–c)

*1930 *Thecosmilia nefiana* n. sp.; Oppenheim: 288, pl. 15, fig. 4, pl. 26, fig. 14.
v1934*a* *Rhabdophyllia quaylei*, new species; Wells: 76, pl. 2, figs 3–4.

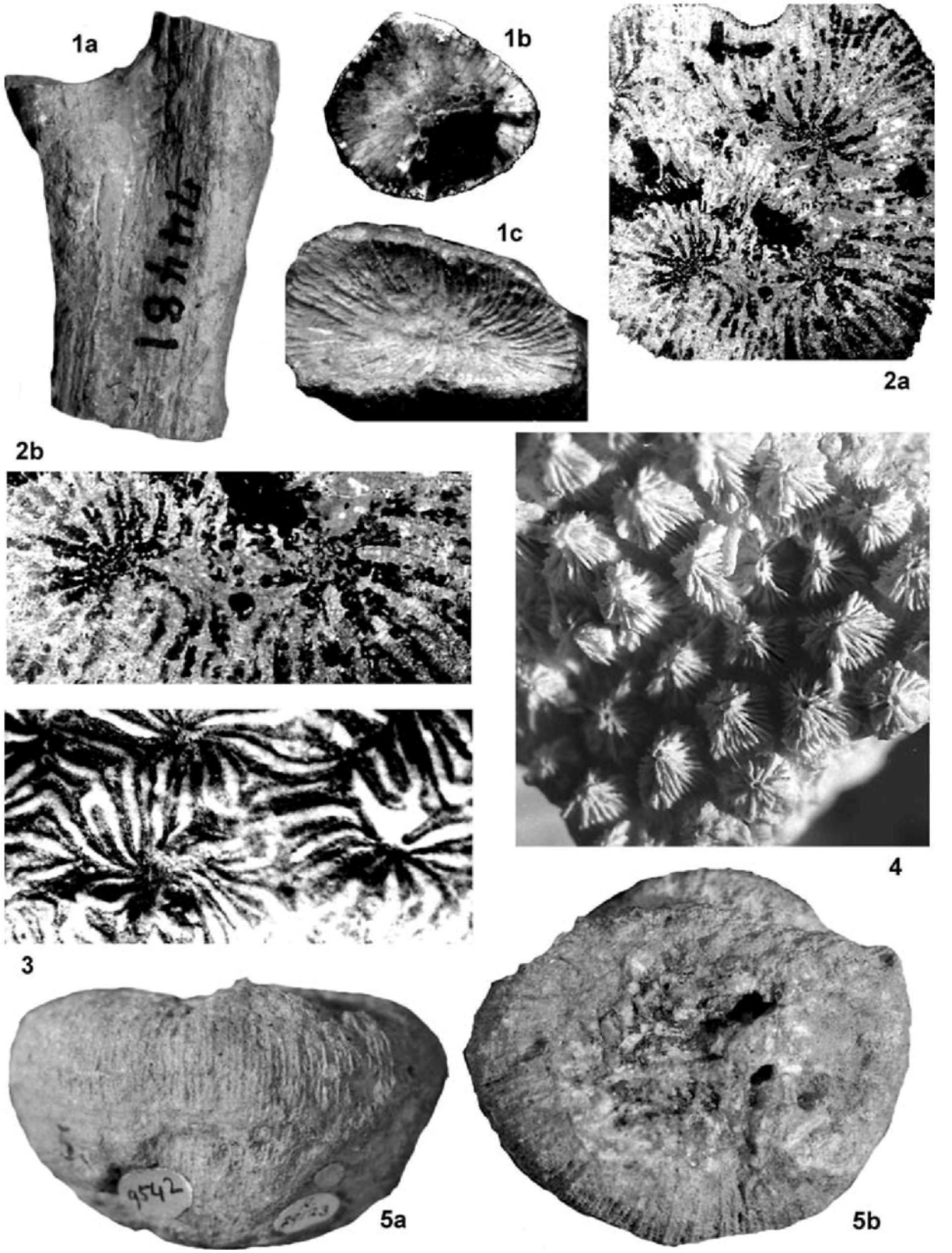


Plate 7 **Fig. 1** *Liptodendron nefiana* (Oppenheim, 1930), (syntypes of *Rhabdophyllia quaylei* Wells, 1934*a*), NMNH, I74481, Upper Maastrichtian of Jamaica. **1a**, upper surface, longitudinal view, ×3; **1b**, polished surface, cross view, ×3; **1c**, cross view, upper surface, ×3.5. **Fig. 2** *Mycetophyllia multistellata* Reuss, 1864, Coates coll. NMNH, no. 395d, Middle–Upper Maastrichtian of Jamaica. **2a**, cross thin section of juvenile colony, ×3.5; **2b**, close-up, ×6. **Fig. 3** *Mycetophyllia multistellata* Reuss, 1864, holotype, upper surface view, GBA 1864/2/31, Oligocene of Slovenia, ×6. **Fig. 4** ?*Isastrea angulosa* (Goldfuss, 1826), holotype, cast, upper surface view, IPB Goldfuss coll. 232, Upper Maastrichtian of the Netherlands, ×3. **Fig. 5** *Trachyphyllia granti* (d'Archiac & Haime, 1853), syntype, BMNH, R.29124, Eocene of Pakistan. **5a**, longitudinal view, upper surface, ×2; **5b**, cross view, upper surface, ×2.

(v)?1958 *Brachiatusmilia fuxumensis* nov. sp.; Alloiteau & Tissier: 250, pl. 1, figs 11 a–b.
2000b *Rhabdophyllia quaylei*, Wells 1934; Löser: 71.
2000b *Thecosmilia neftana*, Oppenheim 1930; Löser: 81.
2002 *Calamophyllia quaylei* (Wells); Mitchell: 6 ff., table 1.
v2002 *Liptodendron neftana* (Oppenheim, 1930); Baron-Szabo: 34, pl. 18, fig. 3.

DIMENSIONS. d (monocentric) = 6–9 (11 in latest stages) mm; d (max, in budding stage) = 19 mm; d (min) = 7–10 mm, in juvenile corallites as small as 3 mm; s (monocentric calices) = about 50 up to around 80.

DESCRIPTION. Colonial, phacelo–dendroid to submeandroid–flabelliform; gemmation lateral; calices elongated, rarely circular, in outline; costosepta subcompact, thin, sparsely granulated laterally; up to about 30 septa reach the centre of the calice, their inner ends may fuse with columella; columella parietal, feebly developed; endothecal dissepiments vesicular, abundant.

REMARKS. In having subcompact septa, a trabecular columella and a lateral budding mode, the specimens described and figured from the Santonian of Austria (Gosau Group) as species of *Thecosmilia* Milne Edwards & Haime *in* Oppenheim (1930: 281ff) closely correspond to the generic concept of *Liptodendron* Eliášová.

TYPE LOCALITY OF SPECIES. Santonian of Austria (Gosau Group at Russbach-Nefgraben).

DISTRIBUTION. Santonian of Austria (Gosau Group), Middle–Upper Maastrichtian of Jamaica (new material), Upper Danian of ?France.

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 448; 448g; (= Ducketts Land Settlement); 549b; 549c; 549d; 578 (= Rio Minho).

Genus ***PHACELLOCOENIA*** Alloiteau & Tissier, 1958

TYPE SPECIES. *Phacellocoenia bazerquei* Alloiteau & Tissier, 1958, Upper Danian of France (Haute-Garonne).

DIAGNOSIS. Colonial, phaceloid to subfasciculate. Gemmation intracalicinal and extracalicinal. Costosepta compact to subcompact, thin, finely granulated laterally. Columella trabecular, styliform-sublamellar in shape. Endothecal dissepiments thin, vesicular. Wall parathecal. Epithecal–epicostal wall present or absent.

REMARKS. Based on the reported presence of a styliform columella, the genus *Phacellocoenia* was tentatively placed in the family Stylinidae (Alloiteau & Tissier 1958). However, because in the type specimen the columella seems to be irregularly trabecular rather than a true styliform boss independent from the septal apparatus, and septal and thecal developments closely correspond to kinds found in the faviid group (e.g. as in *Liptodendron, Monticulastraea,* and *Cladocora*), the genus *Phacellocoenia* is here transferred to the family Faviidae.

Phacellocoenia bazerquei Alloiteau & Tissier, 1958 (Pl. 5, figs 6a, b)

v1958 *Phacellocoenia bazerquei* nov. sp.; Alloiteau & Tissier: 258, pl. 3, figs. 1a, b.

DIMENSIONS. d (monocentric) = 4–5 mm; d (max, in budding stage) = 6.5 mm; c-c = 6–7 mm; s (monocentric calices) = up to 48.

DESCRIPTION. Phaceloid to subfasciculate; calices circular when monocentric, becoming distorted and elongated in budding stages in outline; costosepta thin, finely granulated laterally, arranged in six systems; up to about 24 septa reach the centre of the calice, their inner ends generally fuse with columella; endothecal dissepiments vesicular, abundant.

REMARKS. According to Alloiteau & Tissier (1958) the septal development in the species *bazerquei* is in five systems with a maximum number of septa of 40. However, in some corallites of the type specimen 48 septa arranged in six systems are present. In corallites that are influenced by intracalicinal budding the septal arrangement is irregular.

TYPE LOCALITY OF SPECIES. Upper Danian of France (Haute-Garonne).

DISTRIBUTION. Upper Danian of France (Haute-Garonne).

Family **MUSSIDAE** Ortmann, 1890

DIAGNOSIS. Solitary and colonial, hermatypic. Colony formation by intratentacular budding. Centres linked by lamellae or trabeculae. Wall septothecal or parathecal. Septa endocoelic, formed by several fan systems of large, simple trabeculae, each fan systems producing a lobulate dentation. Endothecal dissepiments well developed. Columella trabecular.

Genus ***MYCETOPHYLLIA*** Milne Edwards & Haime, 1848*b*

TYPE SPECIES. *Mycetophyllia lamarckiana* Milne Edwards & Haime, 1848*b*, Recent, Indian Ocean.

DIAGNOSIS. Colonial, thamnasterioid–submeandroid. Gemmation circumoral followed by intracalicinal budding. Several series of corallite centres enclosed between collines. Corallites generally connected by lamellar linkages. Collines tectiform to tholiform. Septa confluent to non-confluent. Endothecal dissepiments abundant.

Mycetophyllia multistellata Reuss, 1864 (Pl. 5, Fig, 5; p. 7, fig. 2a,b, 3

v*1864 *Mycetophyllia multistellata*; Reuss; 18: 4, fig. 1.
1868 *Mycetophyllia multistellata* Reuss; d'Archiardi: vol. 2, p. 23, pl. 8, fig. 11.
1889 *Cyathoseris multistellata* (Reuss); Reis: 125.
1925 *Cyathoseris multistellata* (Reuss); Felix: pars 28, p. 123.

DIMENSIONS. c-c = 3.5–8 mm; s/mm (on ridge) = 11–15/5.

DESCRIPTION. Massive, thamnasterioid colony; corallites arranged in submeandroid to concentric series around the central corallite; calicinal series separated by tholiform collines; gemmation intracalicinal (and ?extracalicinal);

septa confluent, straight or wavy, compact, developed in three size orders, alternating in length and thickness; lateral surfaces covered with rounded and stunted granules, varying in size and shape, or long spiny ornamentations; about 12 septa reach the calicinal centre, columella spongy-papillose; no wall between the corallites; endothecal dissepiments subtabulate to vesicular.

REMARKS. In having generally thick septa, *Mycetophyllia multistellata* Reuss resembles the genus *Cyathoseris* Milne Edwards & Haime. However, the main differences to the genus *Cyathoseris* are due to lack of synapticulae and high abundance of endothecal dissepiments. In *Cyathoseris* synapticulae are abundant and endothecal dissepiments are sparse to absent.

TYPE LOCALITY OF SPECIES. Oligocene of Slovenia (Gornigrad).

DISTRIBUTION. Maastrichtian of Jamaica (this paper), Oligocene of Italy and Slovenia.

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll. sample nos.: 395d; J-71-3a; J-71-4d (=Jerusalem Mountain Inlier); J-71-31 (=Logie Green, Green Island).

Genus ***TRACHYPHYLLIA*** Milne Edwards & Haime, 1848*d* (= *Antillia* Duncan, 1863 (Type species. *Antillia dentata* Duncan, 1863, Miocene of the Dominican Republic); = *Antillophyllia* Vaughan, 1932 (Type species. *Antillia lonsdaleia* Duncan, 1863, Miocene of the Dominican Republic).

TYPE SPECIES. *Turbinolia geoffroyi* Audouin, 1826, Recent, Indo-Pacific (subsequently designated by Milne Edwards & Haime 1850*a*).

DIAGNOSIS. Solitary and colonial. Conical to flabellate, or meandroid. Gemmation intracalicinal. Calicinal series laterally free. Corallite centres connected by trabecular linkages. Costosepta serrated, compact, richly granulated laterally. Granulations lobulate. Paliform lobes generally before older cycles. Columella trabecular, spongy. Endothecal dissepiments abundant.

Trachyphyllia granti (d'Archiac & Haime, 1853) (Pl. 7, figs 5a, b; Pl. 8, figs 4a, b, Fig. 19)

v*1853 *Montlivaltia Granti*; d'Archiac & Haime: 191, pl. 12, figs 5a–b.
1857 *Montlivaltia Granti*; Milne Edwards: vol. II, p. 322.
1861 *Montlivaltia Granti*; de Fromentel: 114.
1880 *Montlivaltia Granti, d'Archiac & Haime*; Duncan: 34, pl. 11, figs 14–17.
?1880 *Montlivaltia Lynyani, Duncan*; Duncan: 35, pl. 14, figs 1–2.
1925 *Montlivaultia Granti* d'Archiac & Haime sp. 1853; Felix: pars 28, p. 48.
?1925 *Montlivaultia Lynyani* Duncan 1880; Felix: pars 28, p. 48.

DIMENSIONS. d (max) = 62 mm; d (min) = 47 mm; s = 192; s/mm = around 25/10; d (min)/d (max) = 0.76.

Figure 19 *Trachyphyllia granti* (d'Archiac & Haime, 1853), as figured in Duncan (1880), Paleocene of Pakistan, longitudinal upper surface view, ×0.8.

DESCRIPTION. Solitary, cylindro-turbinate; costosepta arranged in six cycles in six systems, granulated marginally and laterally; columella trabecular; endothecal dissepiments thin, vesicular; wall septoparathecal–epicostal; epithecal wall multilamellar.

REMARKS. In addition to forming a cylindro-turbinate corallum with salient angles above, having paliform septal lobes (here interpreted as paliform lobes) and apparently lobulate granulations (see Duncan 1880: pl. 14, fig. 2) the specimen described as *Montlivaltia lynyani* by Duncan (1880) rather corresponds to the genus *Trachyphyllia*. However, because the presence or absence of a columella is unclear, assignment to the latter genus is provisional until the type can be re-examined.

TYPE LOCALITY OF SPECIES. Eocene of Pakistan.

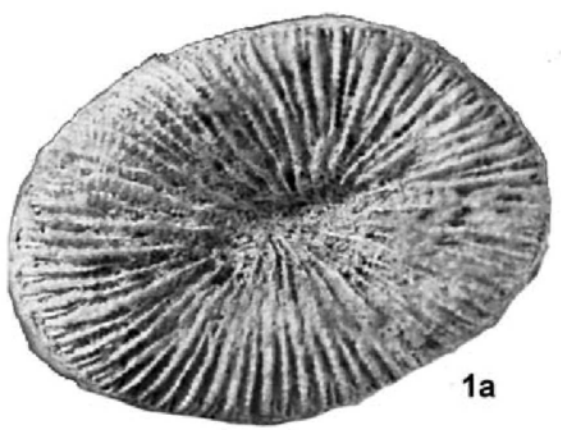
DISTRIBUTION. Paleocene–Eocene of Pakistan.

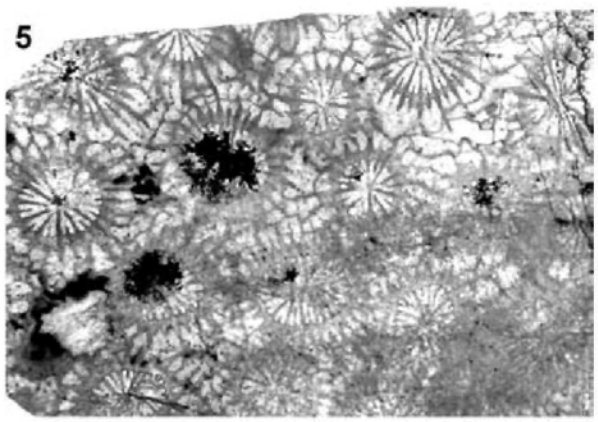
Trachyphyllia sawkinsi (Vaughan, 1926) (Pl. 8, figs 1a, b, 2)

v*1926 *Antillia sawkinsi*; Vaughan, *in* Vaughan & Hoffmeister: 118, pl. 2, figs 6–6a.
(v)1946 *Antillophyllia olssonni*; Durham, *in* Clark & Durham: 80, pl. 25, figs 8–9.
1956 *Antillophyllia sawkinsi* (Vaughan); Wells: F407, figs 305.3a–3b.
1974 *Antillophyllia sawkinsi* (Vaughan); Frost & Langenheim: 282, pl. 106, figs 3–8, pl. 108, figs 1–8.

DIMENSIONS. d = 16 × 21 mm; s = ca. 100; s/mm = 10–14/5; d (min)/d (max) = 0.8.

DESCRIPTION. Solitary, juvenile corallum turbinate to patellate; costosepta compact, developed in unclear size orders, strongly beaded marginally and laterally; septa nearly equal in thickness, generally very twisted and crowded, around 20 of which reach the axial region; columella trabecular, spongy–papillose, mainly composed of twisted trabecular rods; columellar pit 3.5 × 5.5 mm; endothecal





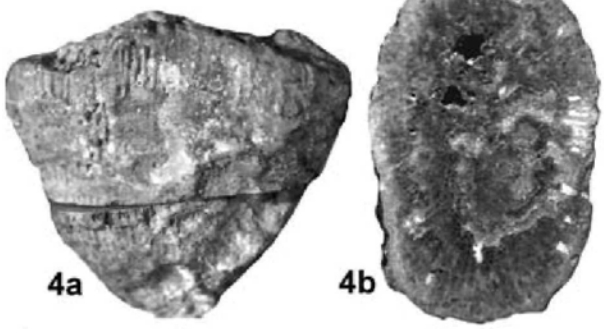


Plate 8 **Fig. 1** *Trachyphyllia sawkinsi* (Vaughan, 1926), holotype, NMNH, M353652, Miocene of Trinidad. **1a**, upper surface, cross view, ×2.7; **1b**, upper surface, lateral view, ×2.7. **Fig. 2** *Trachyphyllia sawkinsi* (Vaughan, 1926), cross thin section, Coates coll. NMNH, no. RA2, Maastrichtian of Jamaica, ×3.5. **Fig. 3** *Placocoenia macrophthalma* (Goldfuss, 1826), holotype, upper surface view, IPB, Goldfuss coll., no. 236, Upper Maastrichtian of the Netherlands, ×3. **Fig. 4** *Trachyphyllia granti* (d'Archiac & Haime, 1853), syntype, BMNH, R.29123, Eocene of Pakistan. **4a**, longitudinal view, upper surface, ×1; **4b**, polished cross view, ×1.2. **Fig. 5** *Placocoenia major* Felix, 1903*a*, cross thin section, UNAM, IGM 8722, Maastrichtian of Mexico (Cardenas Formation), ×3.

dissepiments thin, vesicular; wall septoparathecal–epicostal; epithecal wall multilamellar.

REMARKS. The specimen from the Maastrichtian of Jamaica represents a rather juvenile corallum of *sawkinsi*. In being rather patellate to subturbinate and having a slightly smaller corallite diameter and slightly smaller number of septa, the Jamaican specimen corresponds well to the lower 10 mm of the corallum of *sawkinsi*.

TYPE LOCALITY OF SPECIES. Miocene of Trinidad.

DISTRIBUTION. Maastrichtian of Jamaica (this paper), Upper Eocene of Colombia, Upper Oligocene–Lower Miocene of Mexico, Miocene of Trinidad.

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll. sample no.: Ra2.

Family **ISASTREIDAE** Alloiteau, 1952*a*

DIAGNOSIS. Colonial; gemmation extracalicinal and intracalicinal; cerioid or subcerioid; wall septoparathecal with rare synapticulae; endotheca more or less developed, vesicular; columella parietal; trabeculae simple and compound.

Genus ***ISASTREA*** Milne Edwards & Haime, 1851*a*

TYPE SPECIES. *Astrea helianthoides* Goldfuss, 1826, Upper Jurassic of Germany (Heidenheim); original designation by Milne Edwards & Haime, 1851*a*.

DIAGNOSIS. Colony massive or columniform, cerioid. Gemmation extracalicinal and submarginal. Corallites prismatic, directly united by their walls. Columella rudimentary or absent. Septa thin, densely packed, with a reduced costal part, granulated laterally. Endotheca well-developed. Wall septoparathecal.

? ***Isastrea angulosa*** (Goldfuss, 1826) (Pl. 7, fig. 4)

1799 *Astroite*; Faujas-Saint-Fond: 211, pl. 41, fig. 4.
v*1826 *Astrea angulosa*; Goldfuss: 69, pl. 23, fig. 7.
1850 *Stephanocoenia angulosa*; d'Orbigny: vol. 2, p. 277.
1857 *Isastrea angulosa*; Milne Edwards: vol. 2, p. 529.
1914 *Isastrea angulosa* Goldfuss sp. 1826; Felix: pars 7, p. 174.
1925 *Isastraea angulosa* Goldfuss sp.; Umbgrove: p. 107.
?1987 *Brachyseris supracretacea*, (D'Orbigny, 1848); Meyer: pl. 5, fig. 2.
1999 *Isastrea angulosa*; Leloux: 193, fig. 2.
2000b *Isastrea angulosa* (Goldfuss 1826); Löser: 43.
2002 *Isastrea angulosa* (Goldfuss, 1826); Baron-Szabo: 36.
2003 *Isastrea angulosa* (Goldfuss, 1826); Leloux: 194.

DIMENSIONS. d (max) = 5–7 mm; d (min) = 2.5–5 mm; c-c = 4.5–7 mm; s = 32–44.

DESCRIPTION. Cerioid corallum in steinkern preservation; corallites irregularly polygonal in outline; costosepta arranged in four nearly complete cycles in six systems, alternating in length and thickness; columella weakly developed, trabecular; endothecal dissepiments subtabulate, abundant.

REMARKS. Due to the problematic preservation of the holotype of the species *angulosa*, its generic assignment cannot be decided. A transfer to e.g. the genera *Favites* or *Goniastrea* seems possible. Therefore, until better material from the type locality of the species *angulosa* is available, the generally accepted grouping with the genus *Isastrea* is here followed.

TYPE LOCALITY OF SPECIES. Upper Maastrichtian of the Netherlands (Meerssen Member, St. Pietersberg).

DISTRIBUTION. Upper Maastrichtian of the Netherlands (St. Pietersberg), ?Danian of France (Vigny).

Family **PLACOCOENIIDAE** Alloiteau, 1952*a*

DIAGNOSIS. Colonial, massive. Corallites large, separated by a non-vesicular peritheca. Wall septoparathecal to septothecal, generally thick. Costosepta exsert, beaded. Endothecal dissepiments vesicular to subhorizontal. Synapticulae absent or present. Columella lamellar. Trabeculae simple.

Genus ***PLACOCOENIA*** d'Orbigny, 1849

TYPE SPECIES. *Astrea macrophthalma* Goldfuss, 1826, Maastrichtian of the Netherlands (St. Pietersberg, Maastricht).

DIAGNOSIS. Massive, plocoid solony. Gemmation due to extracalicinal budding. Corallites subcylindrical, united by a perithecal wall. Costosepta compact, arranged radially or bilaterally. Septal margins beaded. Columella lamellar. Endothecal dissepiments vesicular to subhorizontal. Wall septoparathecal.

Placocoenia macrophthalma (Goldfuss, 1826) (Pl. 8, fig. 3)

v*1826 *Astrea macrophthalma* nobis; Goldfuss; 70 pl. 24, fig. 2.
1850 *Placocoenia macrophthalma*; d'Orbigny: vol. 2, p. 277.
1857 *Placocoenia macrophthalm*; Milne Edwards: vol. 2, fig. 270.
1867 *Placocoenia macrophthalm*; de Fromentel: 507.
1881 *Placocoenia macrophthalma*; Quenstedt: p. 999, pl. 182, fig. 15.
1914 *Placocoenia macrophthalma* Goldfuss sp. 1826; Felix: pars 7, p. 155.
1937*b* *Placocoenia macrophthalma* Goldfuss sp. 1826; Bataller: 303.
2000b *Placocoenia macrophthalma* (Goldfuss 1826); Löser: 63.
v2002 *Placocoenia macrophthalma* (Goldfuss, 1826); Baron-Szabo: 38, pl. 21, fig. 2.
parsv2004 *Placocoenia macrophthalma* (Goldfuss, 1826); Leloux: 319, text-fig. 4, ?pl. 4, ?figs 1–2 non pl. 1, figs 1–4a non pl. 2, figs 1–6, non pl. 3, figs 1–3.

DIMENSIONS. d (lumen) = 7–8 mm; c-c = 10–12 mm; s = 40–48.

DESCRIPTION. Massive, plocoid colony; costosepta nonconfluent to subconfluent, bilaterally arranged in three cycles,

with the beginning of a fourth one, in eight irregular systems; perithecal dissepiments vesicular, well-developed.

REMARKS. The specimens assigned to *Placocoenia macrophthalma* (Goldfuss, 1826) by Leloux (2004, pl. 1, figs 1–4a; pl. 2, figs 1–6; pl. 3, figs 1–3) show characteristics that differ from the ones of the placocoeniids. The specimens are preserved as 'steinkerns' and therefore they represent negative images of the former skeleton (meaning that, on the one hand, the former voids within the skeletons were filled with sediment and, on the other hand, the skeletons themselves were dissolved, leaving spaces). In the pictures on pl. 1, fig. 2 and pl. 2, figs 1–2, 4 as well as pl. 3, fig. 3 images of the imprints of the original septal flanks are shown indicating that they were highly granulated and in some places were connected by synapticulae. Moreover, as shown on e.g. pl. 2, fig. 1 (on the left in the picture), in several places the fillings between the former septa are connected by rods, which have to be considered pores in the original septa. However, the presence of porous septa and synapticulae differ from the concept of the placocoeniids and therefore specimens are excluded from this group.

TYPE LOCALITY OF SPECIES. Maastrichtian of the Netherlands (St. Pietersberg).

DISTRIBUTION. Campanian–?Lower Maastrichtian of Spain, Maastrichtian of the Netherlands.

Placocoenia major Felix, 1903*a* (Pl. 8, fig. 5)

v*1903*a* *Placocoenia major* nov. sp.; Felix: 298, pl. 20, fig. 1, text-fig. 50.
1914 *Placocoenia major* Felix 1903; Felix: pars 7, p. 155.
1930 *Heliastaea corollaris* (Reuss); Oppenheim: 318, pl. 48, fig. 13.
1930 *Placocoenia major* Felix; Oppenheim: 407, pl. 37, figs 8–8a.
v1982 *Placocoenia major* Felix 1903; Beauvais: vol. 1, p. 111–112, pl. 7, fig. 5, pl. 8, figs 2–3.
v1996 *Placocoenia major* Felix, 1903; Baron-Szabo & Steuber: 11, pl. 2, fig. 3.
v1999 *Placocoenia major* Felix, 1903; Baron-Szabo: 446, pl. 1, fig. 5, pl. 2, figs 1, 3.
2000b *Placocoenia major*, Felix 1903; Löser: 63.
v2002 *Placocoenia major* Felix, 1903; Baron-Szabo: 38, pl. 21, figs 3–5.
v*2003* *Placocoenia major* Felix, 1903; Schafhauser *et al.*: 190ff.

DIMENSIONS. d = 3.5–6 mm; d (lumen) = 1.8–3 mm; c-c = 4–7.5 mm; s = 20–34.

DESCRIPTION. Massive, plocoid colony; gemmation extracalicinal; corallites circular to elliptical in outline; costosepta compact, non-confluent, finely granulated laterally, arranged in six systems in juvenile corallites and in eight systems in adult ones; columella lamellar; endothecal and exothecal dissepiments vesicular to subtabulate; wall septoparathecal.

TYPE LOCALITY OF SPECIES. Coniacian–Campanian of Austria (Gosau Group).

DISTRIBUTION. Aptian of Greece, Lower Coniacian of southern France, Coniacian-Campanian of Austria (Gosau Group), Maastrichtian of Mexico (Cardenas Formation).

Genus ***PARAPLACOCOENIA*** M. Beauvais, 1982

TYPE SPECIES. *Placocoenia orbignyana* Reuss, 1854, Santonian of Austria (Gosau Group).

DIAGNOSIS. Colonial, massive or knobby, plocoid. Gemmation due to extracalicinal budding. Corallites united by a granulate peritheca. Costosepta radial, granular laterally, compact, in the costal area dissociating into trabecular structures. Septal margins beaded. Peritheca tabulo-columnar. Small trabecular–lamellar columella. Endothecal dissepiments thin and subtabulate, abundant. Wall septoparathecal. Septal microstructure consisting of simple trabeculae forming dark axial lines.

REMARKS. In many respects the genus *Paraplacocoenia* Beauvais resembles the genus *Haldonia*. However, very granulate peritheca, dissociating into trabecular structures in the costal area and a lamellar columella are present in *Paraplacocoenia* but not in *Haldonia*.

Paraplacocoenia rotula (Goldfuss, 1826) (Pl. 9, figs 1a–c, 2a, b)

v*1826 *Astrea rotula* nobis; Goldfuss: vol. 1, p. 70, pl. 24, fig. 1.
1850 *Phyllocoenia marticensis*; d'Orbigny: vol. 2, p. 204.
1850 *Cryptocoenia rotula*; d'Orbigny: vol. 2, p. 277.
1851*b* *Astrea rotula*; Milne Edwards & Haime: 98.
1854 *Placocoenia Orbignyana m*; Reuss: 99, pl. 9, figs 1, 2.
1857 ? *Cyphastraea orbignyana* (Reuss); Milne Edwards: vol. 2, p. 277.
1879 *Placocoenia Dumortieri*; de Fromentel: 508, pl. 136, fig. 1.
1881 *Astrea rotula* Goldf.; Quenstedt: 854, pl. 176, figs 49o, x–z.
1899 *Phyllocoenia excelsa* de Fromentel; Söhle: pl. 10, fig. 1.
1903*a* *Placocoenia orbignyana* Reuss; Felix: 296, fig. 48.
1903*a* *Placocoenia Dumortieri* Fromentel; Felix: 297, text-fig. 49.
1914 *Placocoenia Dumortieri* de Fromentel 1879; Felix: pars 7, p. 155.
1914 *Placocoenia orbignyana* Reuss 1854; Felix: pars 7, p. 155.
1914 *Orbicella rotula* Goldfuss sp. 1826; Felix: pars 7, p. 167.
1930 *Placocoenia Dumortieri* de Fromentel; Oppenheim: 405, pl. 37, figs 12–12a, pl. 42, figs 1, 3–5.
1937*a* *Placocoenia orbignyana* Reuss; Bataller: p. 105.
1937*b* *Placocoenia Dumortieri* Fromentel 1879; Bataller: 302.
1982 *Placocoenia dumortieri* de Fromentel 1879; Beauvais: vol. 1, p. 107, figs 19–20.
v1982 *Paraplacocoenia orbignyana* (Reuss) 1854; Beauvais: vol. 1, p. 114, pl. 9, figs 1, 2 (older synonyms cited therein).

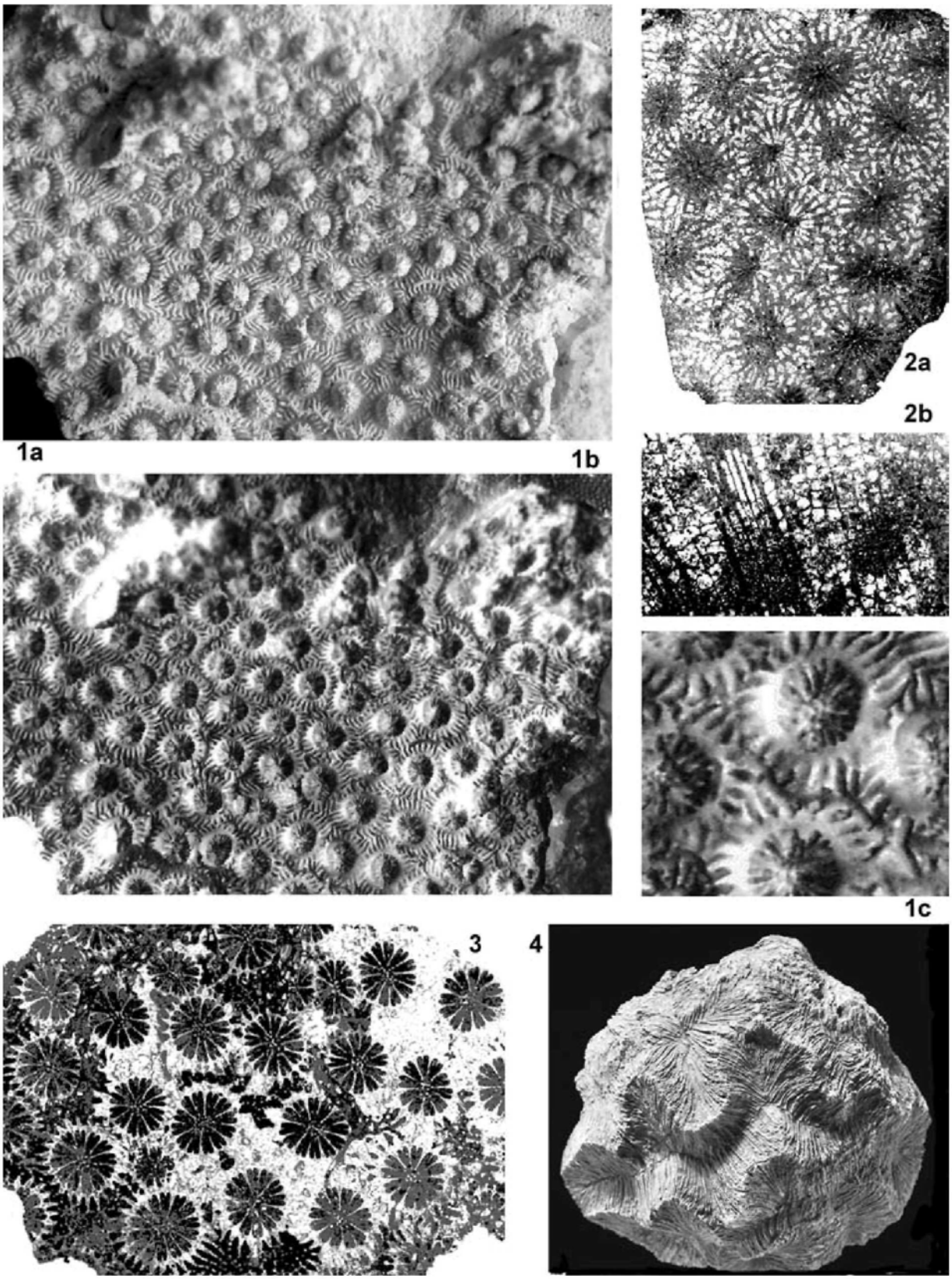


Plate 9 **Fig. 1** *Paraplacocoenia rotula* (Goldfuss, 1826), holotype, IPB, Goldfuss coll., no. 235, Maastrichtian–Danian of the Netherlands. **1a**, cast, upper surface view, ×2; **1b**, 'positive sketch' (presented for the first time), ×2; **1c**, close-up of **1b**, ×8. **Fig. 2** *Paraplacocoenia rotula* (Goldfuss, 1826), Coates coll. NMNH, no. 533, Upper Maastrichtian of Jamaica. **2a**, cross thin section, ×4; **2b**, longitudinal thin section, ×5. **Fig. 3** *Neocoenia lepida* (Reuss, 1854), cross thin section, BMNH, AZ 479, Middle–Upper Maastrichtian of the UAE/Oman border region, ×3.5. **Fig. 4** *Astrogyra edwardsi* (Reuss, 1854), upper surface of colony, BMNH, AZ 975, Middle–Upper Maastrichtian of the UAE/Oman border region, ×1.5.

1986 *Placocoenia dumortieri* de Fromentel, 1887; Tchéchmédjiéva: 67ff.
1986 *Phyllocoenia marticensis* d'Orbigny, 1850; Tchéchmédjiéva: 68ff.
1987 *Paraplacocoenia* sp. (*P. vignyensis* n. sp.); Meyer: 25, pl. 4, fig. 6.
1992 *Placocoenia dumortieri* Fromentel 1879; Turnšek: 166, fig. 2.
?1996 *Montastrea* sp.; Schuster: 77, pl. 17, figs 1 a-b.
(v)1996 Hexakoralle, Morphotyp 8; Tragelehn: 198, pl. 61, figs 1–2.
(v)1997 *Placocoeniopsis katzi* Kuzmicheva 1975; Vecsei & Moussavian: 131, pl. 36, fig. 1.
v1999 *Paraplacocoenia orbignyana* (Reuss, 1854); Baron-Szabo: 445, pl. 4, fig. 4, pl. 7, figs 1–2, text-fig. 2.
1999 *Montastraea rotula*; Leloux: 193, fig. 2.
2000b *Montastraea rotula* (Goldfuss 1826); Löser: 53.
2000b *Paraplacocoenia orbignyana* (Reuss 1854); Löser: 59.
2000b *Placocoenia dumortieri*, de Fromentel 1879; Löser: 63.
v2000 *Paraplacocoenia orbignyana* (Reuss, 1854); Baron-Szabo: 104, pl. 4, fig. 1.
2002 *Placocoenia dumortieri* Fromentel, 1879; Baron-Szabo: 38.
v2002 *Paraplacocoenia orbignyana* (Reuss, 1854); Baron-Szabo: 39, pl. 22, figs 1, 4.

DIMENSIONS. d = 3.5–5 mm, juvenile 3 mm; d (lumen) = 1.8–3 mm; c-c = 3–6 mm; s = 24, juvenile 22.

DESCRIPTION. Massive, plocoid colony; corallites subcylindrical; costosepta non-confluent to subconfluent, arranged in three complete cycles in six regular or irregular systems; columella is lamellar, short, thin, or rudimentary; perithecal dissepiments vesicular to subhorizontal, abundant; wall septoparathecal.

TYPE LOCALITY OF SPECIES. Maastrichtian of the Netherlands (St. Pietersberg).

DISTRIBUTION. Upper Cretaceous of southern France (Provence), Santonian of northeastern Spain (Catalonia), Santonian of Austria (Gosau Group), Santonian–Campanian of Slovenia, Coniacian–Maastrichtian of Croatia, Upper Campanian of Bulgaria, Upper Campanian–Maastrichtian of the UAE/Oman border region, ?Lower Maastrichtian of Spain, Upper Maastrichtian of Jamaica (this paper), Maastrichtian–Danian of the Netherlands (St. Pietersberg), Danian of France (Vigny), Italy, and ?Egypt, Paleocene of Austria.

NEW MATERIAL. Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample no.: 533 (= Shaw Castle, Maldon Formation).

Genus ***NEOCOENIA*** Hackemesser, 1936

TYPE SPECIES. *Neocoenia renzi* Hackemesser, 1936, Cretaceous of Greece.

DIAGNOSIS. Colonial, massive, plocoid. Gemmation extracalicinal. Corallites circular or subpolygonal. Costosepta compact, non-confluent, granular. Columella well-developed, trabecular, spongy or made of twisted or lamellar trabecular processes. Wall parathecal to septoparathecal. Endothecal and exothecal dissepiments vesicular or subtabulate.

Neocoenia lepida (Reuss, 1854) (Pl. 9, fig. 3)

v*1854 *Astrea lepida m.*; Reuss: 114, pl. 12, figs 1, 2. [topotypes studied].
v1903*a* *Phyllocoenia lepida* Reuss sp. 1854; Felix: 293.
1936 *Phyllocoenia lepida* (Reuss); Hackemesser: 19.
1978 *Neocoenia lepida* (Reuss 1854); Turnšek & Polšak: 153, 172, pl. 10, figs 1–3.
?*1982* *Neocaeniopsis lepida* (Reuss); Matteucci *et al.*: 81, tab. 1.
1982 *Neocaeniopsis lepida* (Reuss) 1854; Beauvais: vol. 2, p. 104, pl. 35, figs 2a–c.
v1997 *Neocoenia lepida* (Reuss, 1854); Baron-Szabo: 64, pl. 5, figs 3, 4 (older synonyms are cited therein).
2000b *Neocoenia lepida* (Reuss 1854); Löser: 55.
v2000 *Neocoenia lepida* (Reuss, 1854); Baron-Szabo: 102, pl. 3, fig. 1.
non2003 *Neocoenia lepida* (Reuss 1854); Götz: 5, tab. 1, pl. 1, fig. 5.
v2002 *Neocoenia lepida* (Reuss, 1854); Baron-Szabo: 39, pl. 22, figs 2–3, 6.

DIMENSIONS. d (lumen) = 2.5–4 mm, while late adult stage = 4.5 mm, and juvenile = 1.5–2 mm; d = 3.5–4.5 mm, late adult stage = 5.5 mm, juvenile = 2.5 mm; c-c = 3–6.5 mm; s = 24 + s3, juvenile = 20; size of the colony = 5–13 cm in diameter.

DESCRIPTION. Massive-knobby, plocoid colony; corallites circular in outline; costosepta straight, non-confluent, compact, 24 in number, arranged in three cycles in six systems; regularly alternating in length. Septal flanks have spiniform granulations. Septa of the first cycle extend to, and may fuse with, the columella; pali or paliform lobes irregularly occur in front of S1 and S2; columella variably developed: spongy-papillose, thin lamellar, or formed by a few twisted segments.

TYPE LOCALITY OF SPECIES. Upper Coniacian–Lower Campanian of Austria (Gosau Group at Gosau).

DISTRIBUTION. Cretaceous of Greece, Cenomanian–Turonian of France, Cenomanian of Lebanon, (?Upper Turonian-) Lower Coniacian–Lower Campanian of Austria (Gosau Group), Santonian–Campanian of Hungary and Romania, Santonian and Maastrichtian of ?Italy (Sicily), Campanian of Serbia, Upper Campanian–Maastrichtian of the UAE/Oman border region.

Genus ***ASTROGYRA*** Felix, 1900

TYPE SPECIES. *Gyrosmilia edwardsi* Reuss, 1854, Santonian of Austria (Gosau Group).

DIAGNOSIS. Colonial, massive, meandroid. Gemmation intracalicinal. Calicinal series forked, generally united by peritheca or exotheca. Ambulacrae present, narrow. Costosepta compact, non-confluent, laterally granulate and carinate. Columella lamellar, discontinuous. Endothecal dissepiments abundant. No synapticulae. Wall parathecal to septoparathecal.

Astrogyra edwardsi (Reuss, 1854) (Pl. 9, fig. 4; Pl. 10, fig. 4)

v*1854 *Gyrosmilia edwardsi m.*; Reuss: 92, pl. 4, figs 1–3.
1857 *Thecosmilia ? edwardsi*; Milne Edwards: vol. 2, p. 362.
1900 *Astrogyra edwardsi*; Felix: 2.
non1930 *Astrogyra edwardsi* (Reuss); Oppenheim: 308, pl. 33, figs 5, 5a.
1937*a* *Astrogyra edwardsi* Reuss sp. 1854; Bataller: 120, text-fig. 121.
1956 *Astrogyra edwardsi* (Reuss); Bendukidze: 91, pl. 1, fig. 5, pl. 7, figs 8–8a.
v1982 *Astrogyra edwardsi* (Reuss) 1854; Beauvais: vol. 1, p. 78, pl. 5, fig. 2 (older synonyms are cited therein).
1986 *Astrogyra edwardsi* (Reuss, 1854); Tchéchmédjiéva: 67ff.
2000b *Astrogyra edwardsi* (Reuss 1854); Löser: 13.
v2000 *Astrogyra edwardsi* (Reuss, 1854); Baron-Szabo: 104, pl. 5, fig. 1, pl. 6, fig. 4.
v2002 *Astrogyra edwardsi* (Reuss, 1854); Baron-Szabo: 40, pl. 23, figs 1–2, pl. 24, fig. 1.

DIMENSIONS. d (series including peritheca) = (12) 18–25 (30) mm; d (ambulacrum) = 1–5 mm; s/mm = 10–18/10; size of the colony = 12–15 cm in diameter.

DESCRIPTION. Massive, meandroid, corallum; corallites arranged in parallel or wavy series; costosepta thin, straight, developed in three generations with the beginning of a fourth one; S1 and S2 are of the same length but differ in thickness; inner ends are rhopaloid or claviform with trabecular prolongations that may extend to, and fuse with, the columella; columella lamellar very thin, discontinuous.

REMARKS. According to Beauvais (1982: vol. 1, p. 80) *Astrogyra edwardsi* (Reuss), in Oppenheim (1930) represents a younger synonym of *Astrogyra orbignyi* (de Fromentel).

TYPE LOCALITY OF SPECIES. Turonian–Campanian of Austria (Gosau Group).

DISTRIBUTION. Upper Cretaceous of Romania, Senonian of Georgia (in Caucasia), Turonian–Campanian of Austria (Gosau Group), Upper Santonian of northern Spain (Catalonia), Upper Campanian of Bulgaria, Middle–Upper Maastrichtian of the UAE/Oman border region.

Genus ***TAXOGYRA*** Wells, 1937

TYPE SPECIES. *Meandrina macroreina* Michelin, 1847, Upper Santonian of France (Aude).

DIAGNOSIS. Colonial, massive, meandroid. Gemmation intracalicinal (-polystomodaeal), resulting in long sinuous calicinal series, separated by flattened collines. Ambulacrae absent. Costosepta compact, confluent, laterally granulate and carinate. Columella formed by series of small lamellae, discontinuous. Endothecal dissepiments abundant. No synapticulae. Wall parathecal to septoparathecal.

(?) ***Taxogyra zuberi*** (Felix, 1906) (Fig. 20)

*1906 *Hydnophyllia Zuberi* n. sp.; Felix: 48, pl. 3, fig. 5; text-fig. on p. 48.

Figure 20 (?) *Taxogyra zuberi* (Felix, 1906), as figured in Felix (1906), Senonian of Ukraine, upper surface cross view of colony, ×2.

1914 *Hydnophyllia Zuberi* Felix 1906; Felix: pars 7, p. 181.
2000b *Hydnophyllia zuberi*, Felix 1906; Löser: 43.

DIMENSIONS. c-c (wall–wall) = 3–5 mm; s/mm = 12–13/5.

DESCRIPTION. Meandroid colony; calicinal series separated by tectiform to flattened collines; calicinal centres indistinct to subdistinct, isolated corallites present in places; septa arranged in two size orders or subequal.

REMARKS. In the original description Felix (1906) states that his new species *Hydnophyllia Zuberi* lacks a columella. However, in the text-fig. on p. 48 axial structures in the form of small lamellae seem to be present. Because all the other skeletal structures also correspond well with *Taxogyra*, the assignment to this genus is suggested.

TYPE LOCATION OF SPECIES. Senonian of Ukraine (Delyatin, Iwano–Frankowskaya).

DISTRIBUTION. Senonian of Ukraine.

Genus ***COLUMNOCOENIA*** Alloiteau, 1952*a* (= *Placocoeniopsis* Alloiteau, 1952*a* (Type species. *P. arnaudi* Alloiteau, 1952*a*, Maastrichtian of France); = *Columnocoeniopsis* Reig Oriol, 1989 (*C. eduardi* Reig Oriol, 1989), Upper Santonian–Lower Campanian of Spain).

TYPE SPECIES. *Columnocoenia lamberti* Alloiteau, 1957, Upper Santonian of France (Aude).

DIAGNOSIS. Colonial; massive, plocoid. Gemmation extracalicinal. Costosepta compact, arranged radially. Columella lamellar. Endothecal dissepiments vesicular to tabulate. Pali before first and second cycle septa. Wall synapticulothecal and septothecal. Trabeculae simple arranged in diverging systems (*sensu* Morycowa 1971).

Columnocoenia arnaudi (Alloiteau, 1957) (Pl. 10, figs 2a, b; Fig. 21)

v1952*a* *Placocoeniopsis arnaudi*; Alloiteau: 641 (nom. nud.).
v*1957 *Placocoeniopsis arnaudi*; Alloiteau: 235, pl. 6, fig. 4, pl. 19, fig. 1.

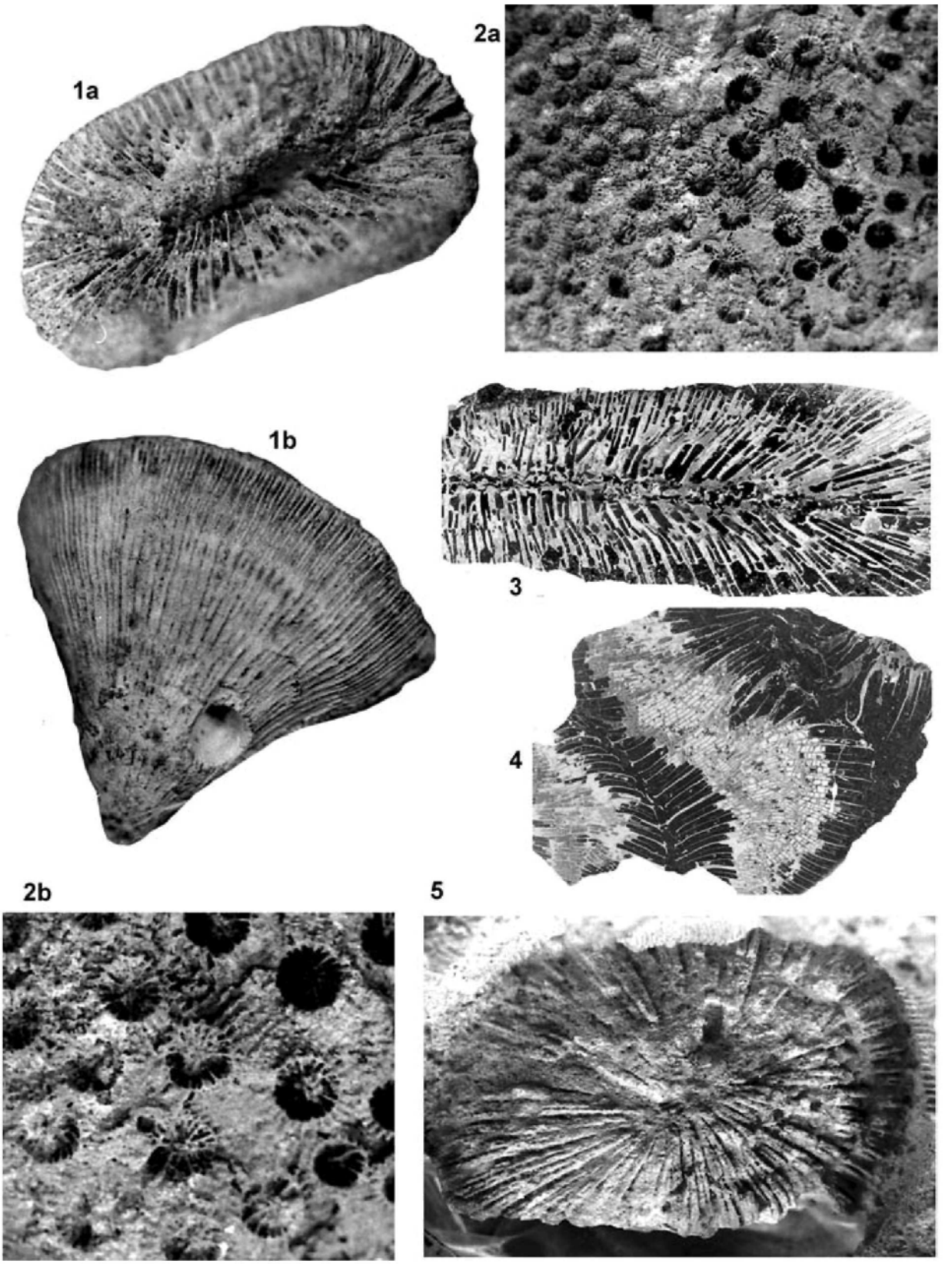


Plate 10 **Fig. 1** *Trochosmilia faujasi* Milne Edwards & Haime, 1848*d*, holotype, NMHN, Michelin coll., M-550, Maastrichtian of the Netherlands. **1a**, upper surface, cross view, ×3.5; **1b**, longitudinal view, ×3. **Fig. 2** *Columnocoenia arnaudi* (Alloiteau, 1957), holotype, NMHN, Alloiteau coll., R.10951, Campanian of France. **2a**, upper surface, ×3.5; **2b**, close-up, ×6. **Fig. 3** *Placosmilia sinuosa* (Reuss, 1854), cross thin section, BMNH, AZ 59, Middle–Upper Maastrichtian of the UAE/Oman border region, ×2. **Fig. 4** *Astrogyra edwardsi* (Reuss, 1854), cross thin section, BMNH, AZ 421, Middle–Upper Maastrichtian of the UAE/Oman border region, natural size. **Fig. 5** *Montlivaltia angusticostata* Umbgrove, 1925, holotype, upper surface, cross view, RGM 29143, Upper Maastrichtian of the Netherlands, ×2.5.

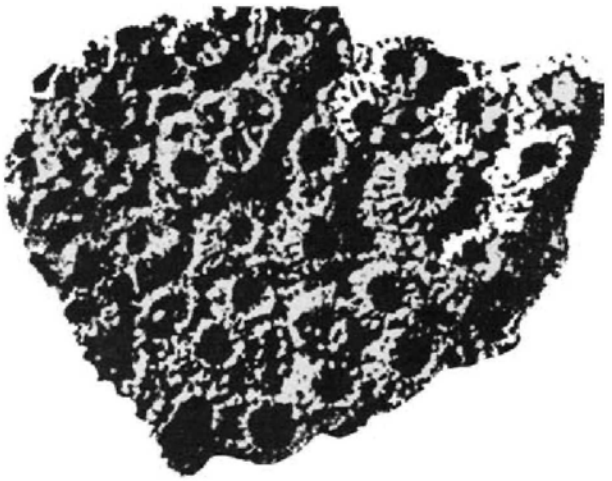


Figure 21 *Columnocoenia arnaudi* (Alloiteau, 1957), upper surface of colony, as figured in Kuzmicheva (1975: 18, pl. 1, fig. 5), Danian of Ukraine, ×3.

Figure 22 *Columnocoenia katzi* (Kuzmicheva 1975), holotype, as figured in Kuzmicheva (1975: 19, pl. 2, fig. 1a), Danian of Ukraine, cross view of surface, ×3.

1975 *Placocoeniopsis arnaudi* Alloiteau, 1957; Kuzmicheva: 18, pl. 1, fig. 5.
1986 *Placocoeniopsis arnaudi* Alloiteau, 1950; Tchéchmédjiéva: 67, fig. 9 and p. 77, fig.12.
1987 *Placocoeniopsis arnaudi* Alloiteau, 1957; Kuzmicheva: 111, pl. 17, fig. 7, pl. 18, fig.1.
2002 *Placocaeniopsis arnaudi* Alloiteau 1952*b*; Löser: 526 (older synonyms cited therein).

DIMENSIONS. d = 1.5–3 mm; d (lumen) = 1.2–2.5 mm; c-c = 3–4.5 mm; s = 24.

DESCRIPTION. Plocoid colony, corallites circular in outline; costosepta arranged in three complete cycles in six systems; number of costae equal to number of septa.

TYPE LOCALITY OF SPECIES. Campanian of France (Dordogne).

DISTRIBUTION. Campanian of France, Upper Campanian of Bulgaria, Danian of Ukraine.

Columnocoenia katzi (Kuzmicheva, 1975) (Fig. 22)

*1975 *Placocoeniopsis katzi* sp. Nov; Kuzmicheva: 19, pl. 11, fig. 1.
1987 *Placocoeniopsis katzi* Kuzmicheva, 1975; Kuzmicheva: 112, pl. 18, fig. 2.
non1997 *Placocoeniopsis katzi* Kuzmicheva 1975; Vecsei & Moussavian: 131, pl. 36, fig. 1.

DIMENSIONS. d = 4–5.5 mm; d (lumen) = 3–4.5 mm; c-c = 4.5–7.5 mm; s = 24 + s4.

DESCRIPTION. Plocoid colony; costosepta developed in three complete cycles with the beginning of a fourth cycle in six systems; pali irregularly occur before S1 and S2; number of costae slightly larger than number of septa.

REMARKS. In having a (parathecal-) septoparathecal wall, septa that, in the costal area, dissociate into trabecular structures and a tabulate peritheca, the specimen documented as *Placocoeniopsis katzi* Kuzmicheva 1975 by Vecsei & Moussavian (1997) rather corresponds to the genus *Paraplacocoenia*.

TYPE LOCALITY OF SPECIES. Danian of Ukraine.

DISTRIBUTION. Danian of Ukraine.

Family **MONTLIVALTIIDAE** Dietrich, 1926 (=Axosmiliidae Geyer, 1955)

DIAGNOSIS. Solitary and colonial. Colony formation by various plans of complete and incomplete intratentacular budding. Where budding is incomplete centres are linked by lamellae. Corallite wall septothecal or parathecal. Epitheca well developed and complete. Septa exsert, with regular conical dentations, composed of one fan system of large simple trabeculae ('montlivaltiid type' see Roniewicz, 1996), with lateral striae or granulations. Columella usually absent; when present parietal or lamellar. Endotheca abundant. Exotheca in some colonial forms.

REMARKS. In the description establishing the family, Geyer (1955) bases Axosmiliidae solely on the following features: 'septa reach the epithecal structure; sparsely developed endothecal dissepiments.' However, in the type specimen of the nominatform *Axosmilia* Milne Edwards & Haime, 1848*a*, the endotheca consists of numerous dissepiments. Furthermore, the septal development in *Axosmilia* corresponds to the kind observed in the forms of the family Montlivaltiidae. Therefore, the separation between the families does not seem justified (Baron-Szabo 2002).

Subfamily **MONTLIVALTIINAE** Dietrich, 1926

DIAGNOSIS. Montlivaltiids with columella absent or trabecular.

Genus ***MONTLIVALTIA*** Lamouroux, 1821

TYPE SPECIES. *Montlivaltia caryophyllata* Lamouroux, 1821, Middle Jurassic (Upper Bathonian) of Calvados.

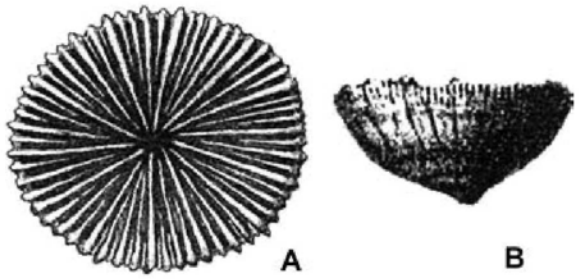


Figure 23 *Montlivaltia atlantica* (Morton, 1829), as figured in Duncan (1880: as species *ranikoti*), Middle Paleocene of Pakistan. **A**, cross view of corallum, ×2; **B**, upper surface longitudinal view, ×1.5.

DIAGNOSIS. Solitary, trochoid to subcylindrical, or turbinate. Septa compact, thin, exsert, in general numerous and crowded. Columella absent. Endothecal dissepiments abundant, vesicular. Epitheca membraniform.

Montlivaltia atlantica (Morton, 1829) (Fig. 23)

*1829 *Anthophyllum atlanticum*; Morton: 61, pl. 1, figs 9–10.
1830 *Anthophyllum atlanticum*; Morton: 123, pl. 8, figs 9–10.
1834 *Anthophyllum atlanticum*; Morton: 80, pl. 1, figs 9–10.
1845 *Montlivaltia atlantica*; Lonsdale: 65, figs a–b.
1850 *Coelosmilia Atlantica*; d'Orbigny: vol. 2, p. 276.
1851*a* *Coelosmilia ?Atlantica*; Milne Edwards & Haime: 49.
1857 *Coelosmilia ?Atlantica*; Milne Edwards: vol. 2, p. 179.
1870 *Coelosmilia ?atlantica* Mort.; Bölsche: 217.
1880 *Montlivaltia Ranikoti, Duncan*; Duncan: 35, pl. 3, figs 12–14.
1914 *Coelosmilia atlantica* Morton sp. 1834; Felix: pars 7, p. 219.
1925 *Montlivaltia Ranikoti* Duncan 1880; Felix: pars 28, p. 49.
1991 *Montlivaltia atlantica* (Morton); Cook & Ramsdell: 13, table 1.
2000b *Coelosmilia atlantica* (Morton 1830); Löser: 20.

DIMENSIONS. d (max) = 18 mm; d (min) = around 12 mm; s = around 80; h = up to about 40 mm.

DESCRIPTION. Solitary, conical or subcylindrical, top flat with a possible slight central depression; septa unequal, 20 of which are dominant; epithecal wall thin.

REMARKS. The characteristics given above are taken from the original descriptions by Morton (1834: 80) and Lonsdale (1845: 65).

TYPE LOCALITY OF SPECIES. Senonian (Gloucester County)–Upper Paleocene (Monmouth County) of New Jersey.

DISTRIBUTION. Senonian (Gloucester County)–Upper Paleocene (Monmouth County) of New Jersey, Middle Paleocene of Pakistan (Jhirk, Sind).

Montlivaltia angusticostata Umbgrove, 1925 (Pl. 10, fig. 5)

v*1925 *Montlivaltia angusticostata* spec. nov.; Umbgrove: 101, pl. 10, figs 10, 13.
1999 *Montlivaltia angusticostata*; Leloux: 193, fig. 2.
parsv2000 *Montlivaltia* sp.; Baron-Szabo: 103, non pl. 3, figs 2, 4, 7.
2000b *Montlivaltia angusticostata*, Umbgrove 1925; Löser: 53.
2002 *Montlivaltia angusticostata* Umbgrove, 1925; Baron-Szabo: 42.
2002 *Montlivaltia angusticostata* Umbgrove, 1925; Leloux: 13.

DIMENSIONS. d: 32 × 40 mm; d (min)/d (max): 0.8; s: around 180.

DESCRIPTION. Solitary, ?subturbinate–cylindrical; septa developed in six nearly complete or complete cycles, regularly alternating; 24 septa reach the centre of corallite, circumscribing the empty calicinal pit.

REMARKS. The material from the UAE/Oman border region included in the synonymy with *Montlivaltia angusticostata* is the sample BMNH AZ 79.

TYPE LOCALITY OF SPECIES. Upper Maastrichtian of the Netherlands (St. Pietersberg, Meerssen Member).

DISTRIBUTION. Upper Maastrichtian of the Netherlands, Middle–Upper Maastrichtian of the UAE/Oman border region.

Genus ***TROCHOSMILIA*** Milne Edwards & Haime, 1848*a*

(= *Strobilosmilia* Alloiteau, 1957 (Type species. *Trochosmilia granifera* Milne Edwards & Haime, 1854, Lower Campanian of France); = *Edwardsosmilia* Alloiteau, 1952*a* (Type species. *Trochosmilia faujasi* Milne Edwards & Haime, 1848*d*, Maastrichtian of The Netherlands); =? *Parasmiliopsis* Alloiteau, 1957 (Type species. *Trochosmilia cenomana* Fromentel, 1862, Cenomanian of France).

TYPE SPECIES. *Turbinolia cornicula* Michelin, 1846, Bartonian of France (Nice) (see Milne Edwards & Haime 1848*a*).

DIAGNOSIS. Solitary, trochoid, fixed, calice subcircular. Calicular pit elliptical and large. Wall septothecal or septoparathecal. Septa vertically discontinuous, beaded marginally. Columella spongy–papillose. Endothecal dissepiments thick, sparsely developed. Epitheca rudimentary or absent.

REMARKS. Detailed descriptions of representatives of *Trochosmilia cornicula* are given in Gill & Russo (1973).

Trochosmilia cristata (Duncan, 1880) (Fig. 24)

?1880 *Feddenia typica* Variety 2; Duncan: 37, pl. 11, figs 6–7.
*1880 *Feddenia cristata*; Duncan: 37, pl. 11, figs 8.
1880 *Feddenia elongata*; Duncan: 37, pl. 4, figs 8–10.

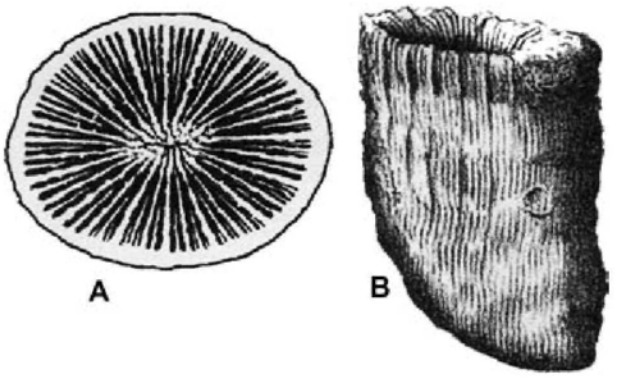


Figure 24 *Trochosmilia cristata* (Duncan, 1880), as figured in Duncan (1880), Paleocene of Pakistan. **A**, cross view of corallum, ×2; **B**, upper surface longitudinal view, ×1.5.

1925 *Feddenia cristata* Duncan 1880; Felix: pars 28, p. 54.
1925 *Feddenia elongata* Duncan 1880; Felix: pars 28, p. 54.

DIMENSIONS. d (min) = 17.5 mm; d (max) = 28–30 mm; d (min)/d (max) = 0.58–0.63; s = 96 + s in late adult stages.

DESCRIPTION. Solitary, elliptical in outline; septa thin, straight, developed in five complete cycles in six systems in late adult stages, alternating; up to 24 septa reach the centre of corallite, circumscribing the very elongate and narrow calicinal pit.

TYPE LOCALITY OF SPECIES. Paleocene of Pakistan (Jhirk, Sind).

DISTRIBUTION. Paleocene of Pakistan.

Trochosmilia faujasi Milne Edwards & Haime, 1848*d* (Pl. 10, figs 1a, b)

v*1848*d* *Trochosmilia Faujasi*; Milne Edwards & Haime: vol. 4, p. 241, pl. 5, figs 6–6a.
?1850 *Ellipsosmilia Faujasii*; d'Orbigny: vol. 2, p. 276.
1857 *Trochosmilia Faujasi*; Milne Edwards: vol. 2, p. 160.
1857 *Trochosmilia Faujasi* Edwards et Haime; Pictet: vol. 4, p. 382.
1880 *Feddenia typica*; Duncan: 36, pl. 11, figs 1–3.
1880 *Feddenia typica* Variety 1; Duncan: 36, pl. 11, figs 4–5.
1914 *Trochosmilia Faujasi* E. H. 1849; Felix: pars 7, p. 215.
1925 *Trochosmilia Faujasi* E. H. sp.; Umbgrove: 114, pl. 11, fig. 16.
v1952*a* *Edwardsosmilia Faujasi* M. Edw.; Alloiteau: 634, pl. 6, figs 2a–b.
(v)1975 *Cyathoceras ellipticus* (sp. nov.); Wu: 109, pl. 9, fig. 9.
(v)1994 *Cyathoceras ellipticus* Wu; Liao & Xia: 187, pl. 53, figs 3–4, pl. 54, fig. 10, pl. 55, figs 10, 13–14.
1999 *Edwardsosmilia faujasi*; Leloux: 193, fig. 2.
2000b *Cyathoceras ellipticus*, Wu 1975; Löser: 23.
2001 *Cyathoceras ellipticus*, Wu 1975; Löser & Liao: 666.
2002 ?*Trochosmilia faujasi* Milne Edwards & Haime, 1848; Baron-Szabo: 46.
2002 *Cyathoceras ellipticus* Wu, 1975; Baron-Szabo: 162.

DIMENSIONS. d (min) = 8–15 mm; d (max) = 20–26 mm; d (min)/d (max) = 0.50–0.67; s = around 192 in late adult stages.

DESCRIPTION. Solitary, elliptical in juvenile stages, becoming elliptical–flabellate in adult stages; septa thin, straight, developed in six complete cycles in six systems in late adult stages, regularly alternating; up to 48 septa reach the centre of corallite, circumscribing the very elongate and deep calicinal pit; columella irregularly trabecular.

TYPE LOCALITY OF SPECIES. Maastrichtian of the Netherlands (Meerssen Member).

DISTRIBUTION. Campanian–Maastrichtian of Tibet (Gamba county, Zongshan Formation), Maastrichtian of the Netherlands, Paleocene of Pakistan.

Genus ***MEANDRASTRAEA*** d'Orbigny, 1849 (= *Mycetophyllopsis* Oppenheim, 1930 (Type species. *Mycetophyllia antigua* Reuss, 1854, Santonian of Austria (Gosau Group); = *Comophyllastraea* Alloiteau, 1957 (Type species. *C. corbariensis* Alloiteau, 1957, Lower Coniacian of France [Aude]).

TYPE SPECIES. *Astrea pseudomeandrina* Michelin, 1841, Turonian of France (Uchaux).

DIAGNOSIS. Colonial, massive, meandroid. Gemmation intracalicinal. Corallite centres distinct, arranged in meandroid series, separated by tectiform collines. Costosepta compact, confluent or non-confluent, dentate, sometimes forming vertical carines. Columella parietal, spongy, lamellar in some corallites. Wall parathecal. Endothecal dissepiments numerous, vesicular.

Meandrastraea antiqua (Reuss, 1854) (Fig. 25)

v*1854 *Mycetophyllia antiqua m.*; Reuss: 104, pl. 22, fig. 9. [topotypes studied].
1857 *Mycetophyllia antiqua*; Milne Edwards: vol. 2, p. 376.
1858–61 *Mycetophyllia antiqua*; de Fromentel: 166.
1903*a* *Mycetophyllia antiqua* Reuss; Felix; 273.
1914 *Mycetophyllia antiqua* Reuss 1854; Felix: pars 7, p. 179.
1930 *Mycetophyllopsis antiqua* Reuss; Oppenheim: 378, pl. 16, fig. 4.
?1937*b* *Mycetophyllopsis antiqua* Reuss sp. 1854; Bataller: 305.
1943 *Mycetophyllopsis antiqua* (Reuss, 1854); Vaughan & Wells: 100, pl. 25, fig. 10.
1956 *Mycetophyllopsis antiqua* (Reuss, 1854); Wells: F399, fig. 294.3.
1956 *Mycetophyllia antiqua* Reuss; Bendukidze: 90, pl. 7, fig. 6.
1978 *Mycetophyllopsis antiqua* (Reuss 1854); Turnšek & Polšak: 150, 170, pl. 5, figs 3–4.

Figure 25 *Meandrastraea antiqua* (Reuss, 1854), based on the illustration of the holotype in Vaughan & Wells (1943), Upper Turonian–Lower Coniacian of Austria, upper surface of colony, ×1.

(v)1982 *Meandrastraea antiqua* (Reuss) 1854; Beauvais: vol. 1, p. 55, pl. 2, figs 6a–b.
1992 *Meandrastraea calzadai* n. sp.; Reig Oriol: 37, pl. 8, figs 5–6.
non1995 *Meandrastrea antiqua* (Reuss 1854); Abdel-Gawad & Gameil: 13, pl. 14, fig. 1.
1997*b* *Mycetophyllopsis antiqua* (Reuss, 1854); Reig Oriol: 55–56.
2000*b* *Meandrastraea antiqua* (Reuss 1854); Löser: 50.
2000*b* *Meandrastraea calzadai*, Reig Oriol 1992: Löser, 50.
2002 *Meandrastraea antiqua* (Reuss, 1854); Baron-Szabo: 50.

DIMENSIONS. d (series) = 9–15 mm; c-c (same series) = 6–12 mm; s/mm = 12–17/10.

DESCRIPTION. Meandroid colony; calicinal series generally formed by up to four corallites; costosepta moderate to thick, arranged in four size orders.

REMARKS. The species *antiqua* has been mentioned from the ?Lower Maastrichtian of Spain (e.g., Bataller 1937*b*) without any illustrations of the material. Therefore, a digital sketch of the holotype of the species as documented in Beauvais (1982: pl. 2, fig. 6b) is presented here.

In having meandroid calicinal series separated by large tholiform to rather flattened collines, and a discontinuous lamellar columella (as seen in the specimen described as *Meandrastraea antiqua* [Reuss 1854] in Abdel-Gawad & Gameil, 1995: pl. 14, fig. 1) the specimen described from the Santonian–Campanian of Greece by Abdel-Gawad & Gameil (1995) rather corresponds to the genus *Taxogyra*.

TYPE LOCATION OF SPECIES. Upper Turonian–Lower Coniacian of Austria (Gosau Group at St. Wolfgang, Seeleiten).

DISTRIBUTION. Upper Turonian–Campanian of Austria (Gosau Group), Coniacian of France (Bugarach), Senonian of Georgia (in Caucasus), ?Lower Maastrichtian of northern Spain.

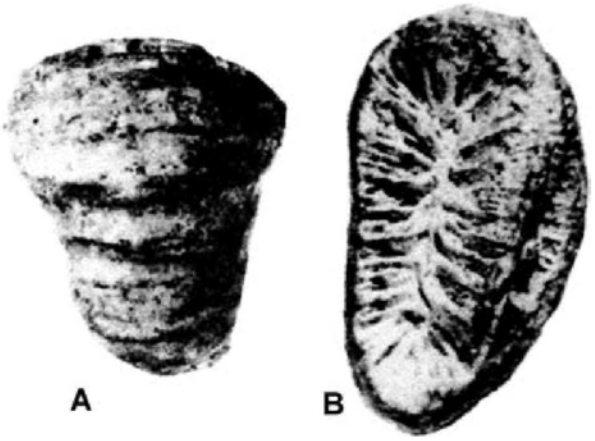


Figure 26 *Placosmilia bojnicensis* Alloiteau, 1949, based on the illustrations in Alloiteau & Tissier (1958), Danian of France. **A**, upper surface of corallum, longitudinal view, ×1.5; **B**, upper surface of corallum, cross view, ×2.

Subfamily **PLACOSMILIINAE** Alloiteau, 1952*a*

DIAGNOSIS. Montlivaltiids with lamellar columella.

Genus ***PLACOSMILIA*** Milne Edwards & Haime, 1848*a*

(= *Placosmiliopsis* M. Beauvais, 1982 (Type species. *Trochosmilia saltzburgiana* Milne Edwards & Haime, 1848*a*, Upper Santonian of Austria [Gosau Group]); = *Fhragmosgyra* Reig Oriol, 1994 (Type species. *F. torallolensis* Reig Oriol, 1994, Upper Santonian-Lower Campanian of Spain).

TYPE SPECIES. *Turbinolia cymbula* Michelin, 1846, Santonian of France (Aude) (see Milne Edwards & Haime 1848*a*).

DIAGNOSIS. Colonial. Younger specimens flabellate, becoming meandroid in later ontogenetical stages. Gemmation intracalicinal, resulting in a single meandroid calicinal series. Costosepta compact, arranged bilaterally. Septal margins granular. Endothecal dissepiments well-developed, occurring throughout the whole corallum. Columella lamellar, generally continuous. Wall parathecal to septoparathecal. Multilamellar epithecal wall sometimes present.

Placosmilia bojnicensis Alloiteau, 1949 (Fig. 26)

(v)*1949 *Placosmilia bojnicensis* nov. sp.; Alloiteau: 20, pl. 2, figs 8 a–b, pl. 7, fig. 2.
(v)1958 *Placosmilia* aff. *bojnicensis* Alloiteau 1949; Alloiteau & Tissier: 254, pl. 3, figs 2–3b.

DIMENSIONS. d (max) = 13–35 mm; d (min) = 9–19 mm; s/mm = 18–20/10; h = 17–35 mm.

DESCRIPTION. Flabelliform corallum, elongated in outline; costosepta compact, straight, becoming wavy toward the axial region, arranged in three size orders with the beginning of a fourth; S1 and S2 reach centre of corallum; columella lamellar, discontinuous.

TYPE LOCALITY OF SPECIES. Eocene of Slovakia (Bojnice Basin).

DISTRIBUTION. Danian of France, Eocene of Slovakia.

Placosmilia sinuosa (Reuss, 1854) (Pl. 10, fig. 3)

v1854 *Trochosmilia Boissyana* M. Edw. et H.; Reuss: 87, pl. 6, figs 1–2. [topotypes studied].
v*1854 *Euphyllia sinuosa* m.; Reuss: 92, pl. 16, fig. 3. [topotypes studied].
1857 *Thecosmilia ? sinuosa*; Milne Edwards: vol. 2, p. 360.
1900 *Lasmogyra irregularis*; Felix: 3.
1903*a* *Trochosmilia psecadiophora* nov. sp.; Felix: 331, pl. 24, figs 7, 7a–c.
(v)1982 *Placosmilia sinuosa* (Reuss) 1854; Beauvais: vol. 1, p. 62, pl. 3, fig. 3 (older synonyms cited therein).
1992 *Phragmosmilia psecadiophora* (Felix 1903); Turnšek: 167, fig. 2.
1996 *Aulosmilia protectans* (Nötling); Metwally: 386, figs 4b–c.
2000b *Lasmogyra irregularis*, Felix 1900; Löser: 45.
2000b *Placosmilia psecadiophora* (Felix 1903); Löser: 61.
2000b *Placosmilia sinuosa* (Reuss 1854); Löser: 65.
v2000 *Placosmilia sinuosa* (Reuss, 1854); Baron-Szabo: 107, pl. 6, fig. 5.
2002 *Placosmilia irregularis* (Felix, 1900); Baron-Szabo: 52.
v2002 *Placosmilia sinuosa* (Reuss, 1854); Baron-Szabo: 52, pl. 35, fig. 1.
2002 *Phragmosmilia psecadiophora* (Felix 1903); Baron-Szabo: 66.

DIMENSIONS. d (max) = 80–125 mm; d (min) = 20–40 mm; s/mm = 15–19/ 10; h = 4–9 cm.

DESCRIPTION. Flabelliform corallum, very elongated in outline; costosepta compact, straight, becoming wavy toward the axial region, arranged in three size orders irregularly alternating in length and thickness; in some parts of the corallum the beginning of a fourth size order is present; S1 and S2 reach centre of corallum; columella very thin, lamellar, discontinuous.

REMARKS. In the description of the type material of *Placosmilia sinuosa* (Reuss) Beauvais (1982: vol. 1, p. 62 and table 1) gives the minimum diameter as ranging from 29.5 – 34.5 mm and the density of the septa as 10 in 10 mm. In contrast, the photograph of the type presented by Beauvais (1982: vol. 4, pl. 3, fig. 3) indicates that the minimum diameter is 19 up to around 40 mm and the density of septa is around 20 in 10 mm, thus completely agreeing with the original description by Reuss (1854: 92). Assuming that Beauvais' text is a printing error, it can be stated that the specimens of the Middle–Upper Maastrichtian of the UAE/Oman border region very closely correspond with the Austrian material.

TYPE LOCALITY OF SPECIES. Santonian of Austria (Gosau Group at Nefgraben).

DISTRIBUTION. Turonian–Campanian of Austria (Gosau Group), Santonian of southern France (Corbières), Maastrichtian of Croatia, Middle–Upper Maastrichtian of the UAE/Oman border region.

Genus ***ELASMOPHYLLIA*** d'Achiardi, 1875 (= *Dordonophyllia* Alloiteau, 1957 (Type species. *Dordonophyllia arnaudi* Alloiteau, 1957, Campanian of France [Dordogne]).

TYPE SPECIES. *Elasmophyllia gigantea* d'Achiardi, 1875, Eocene of Italy (Friul, Brazzano).

DIAGNOSIS. Colonial, dendroid to subphaceloid. Gemmation intracalicinal. Corallites monocentric to tricentric. Costosepta compact, granulated laterally. Columella lamellar. Endothecal dissepiments vesicular. Wall septoparathecal to septothecal.

REMARKS. Recent re-investigation of the d'Achiardi collection housed at the Paleontological Institute of Pisa (Italy) (Baron-Szabo unpublished results) during the summer of 2003 revealed that only one specimen labeled as *Elasmophyllia gigantea* d'Achiardi could be found. Despite the fact that it was clearly labeled as having been collected from the type locality of the species (Brazzano), it, however, does not correspond to the original figures of *Elasmophyllia gigantea* (d'Achiardi 1875: pl. 8, figs 4a–d, pl. 9, fig. 1). Moreover, the poor preservation of the specimen does not allow the precise study of fine details of the skeleton. Therefore, the generic and specific diagnoses of *Elasmophyllia gigantea* d'Achiardi represent descriptions with characteristics taken from the original description of d'Achiardi (1875: 149) and observations of the specimen at hand, which has to be considered a topotype.

Elasmophyllia gigantea d'Achiardi, 1875 (Pl. 11, figs 1–5)

v*1875 *Elasmophyllia gigantea*; d'Achiardi: 149, pl. 8, figs 4 a–d, pl. 9, fig. 1. [topotypes studied].
1925 *Elasmophyllia gigantea* d'Achiardi 1875; Felix: pars 28, p. 50.
v1957 *Dordonophyllia Arnaudi*; Alloiteau: 195, pl. 6, figs 10 a–b.
2002 *Dordonophyllia arnaudi* Alloiteau 1957; Löser: 268.
2002 *Elasmophyllia arnaudi* (Alloiteau, 1957); Baron-Szabo: 53.

DIMENSIONS. d (max) = 5–11.5 mm; d (min) = 3–10 mm; s = 48–96.

DESCRIPTION. Dendroid to subphaceloid corallum; costosepta thin, arranged bilaterally in four complete cycles in six systems in juvenile corallites (3–6 mm), increasing to five incomplete or complete cycles in six systems in later adult or budding stages, respectively; up to 12 septa reach corallite centre; septal flanks finely granulated.

REMARKS. Illustrations of the type material of *Dordonophyllia arnaudi* Alloiteau, 1957, are given on Pl. 11, figs 2a, b.

TYPE LOCALITY OF SPECIES. Eocene of Italy (Friul, Brazzano).

DISTRIBUTION. Campanian of France (Dordogne), Maastrichtian of Jamaica (this paper), Paleocene of Austria (this paper), Eocene of Italy.

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 429b (=?Jerusalem Mountain Inlier

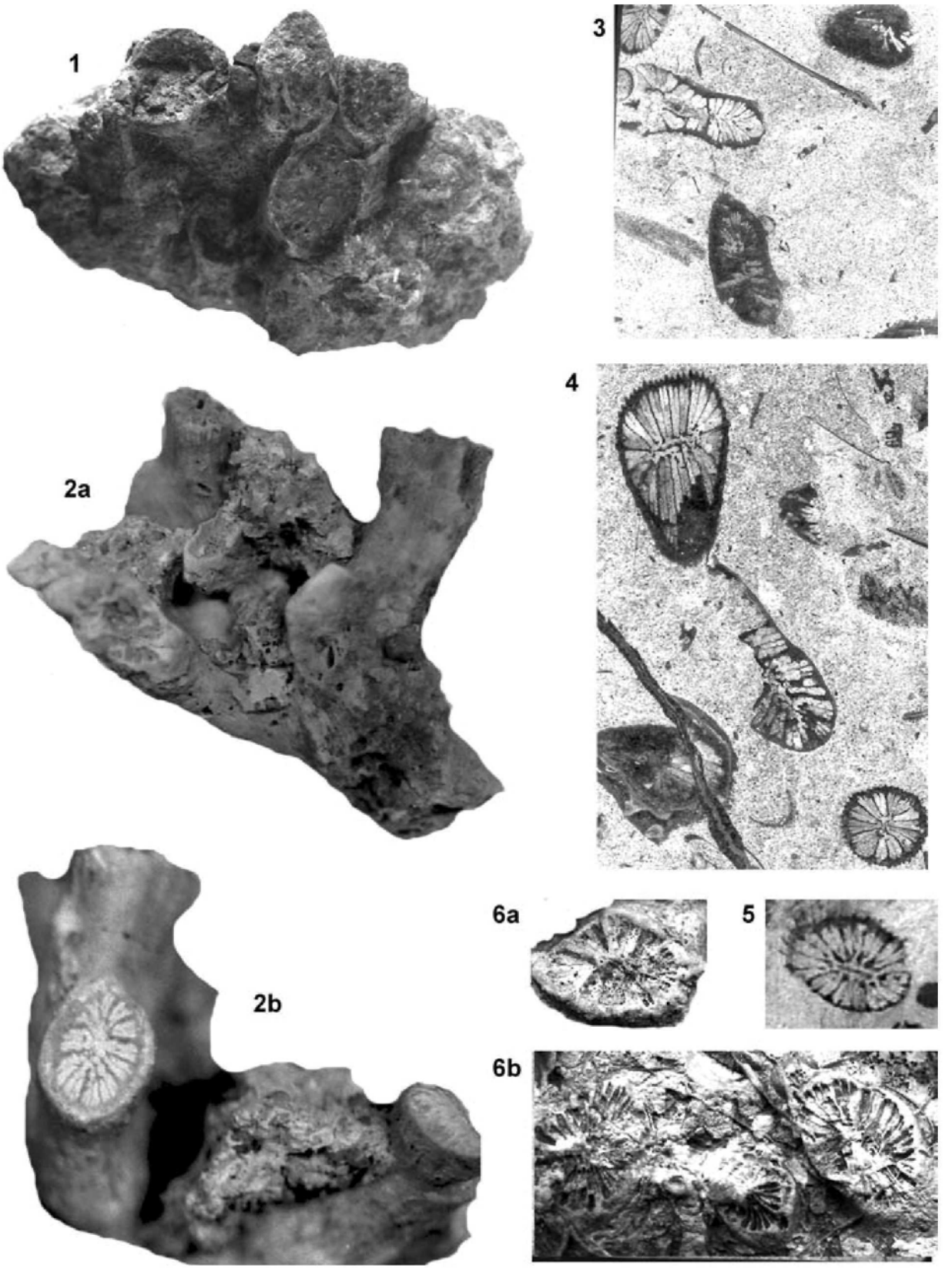


Plate 11 **Fig. 1** *Elasmophyllia gigantea* d'Achiardi, 1875, topotype, Paleontological Institute, Pisa d'Achiardi 1875 coll., not cataloged, Eocene of Italy (Friaul), ×2. **Fig. 2** *Elasmophyllia gigantea* d'Achiardi, 1875 (holotype of *Dordonophyllia arnaudi* Alloiteau, 1957), Campanian of France, NMHN, Arnaud coll., R.10930. **2a**, upper surface, lateral view, ×2; **2b**, upper surface, cross view, ×3. **Fig. 3** *Elasmophyllia gigantea* d'Achiardi, 1875, cross thin section, GBA, K&S 11–2, Paleocene of Austria, ×2.5. **Fig. 4** *Elasmophyllia gigantea* d'Achiardi, 1875, cross thin section, GBA, K&S 11–1, Paleocene of Austria, ×3.5. **Fig. 5** *Elasmophyllia gigantea* d'Achiardi, 1875, cross thin section, Coates coll. NMNH, no. 429a-II, Upper Maastrichtian of Jamaica, ×3.5. **Fig. 6** *Calamophylliopsis marini* (Bataller, 1936), upper surface, Paleocene of Austria, Baron-Szabo coll., NMNH, USNM 1068598. **6a**, juvenile corallite, cross view, ×4. **6b**, part of the colony, ×2.

[*Titanosarcolites*-limestone] or ?Catadupa); Paleocene of Austria, GBA, sample nos.: K&S 11–1; K&S 11–2.

Genus ***PEPLOSMILIA*** Milne Edwards & Haime, 1850*a*

TYPE SPECIES. *Peplosmilia austeni* Milne Edwards & Haime, 1850*a*, Cenomanian of England (Haldon).

DIAGNOSIS. Solitary, subcylindrical, fixed. Septa slightly exsert, compact, granulated laterally. Endothecal dissepiments abundant, vesicular. Columella lamellar, well-developed. Epitheca membraniform.

Peplosmilia latona (Felix, 1903*a*) (Pl. 12, fig. 1)

v*1903*a* *Montlivaltia Latona* nov. sp.; Felix: 240, pl. 22, fig. 4.
1914 *Montlivaltia latona* Felix 1903; Felix: pars 7, p. 160.
v1925 *Placosmilia robusta* spec. nov.; Umbgrove: 115, pl. 11, fig. 33.
?1930 *Plesiophyllia latona* (Felix); Oppenheim: 297, pl. 35, figs 5, 5a, pl. 45, fig. 8.
1930 *Haplaraea diversicostata*; Oppenheim: 32, pl. 25, figs 1–1b, pl. 30, figs 8 and 14.
v1982 *Peplosmilia latona* (Felix) 1903; Beauvais: vol. 1, p. 72, pl. 4, fig. 6.
1999 *Placosmilia robusta*; Leloux: 193, fig. 2.
2000b *Plesiophyllia latona* (Felix 1903); Löser: 61.
2000b *Placosmilia robusta* Umbgrove 1925; Löser: 65.
2002 *Placosmilia robusta* Umbgrove, 1925; Baron-Szabo: 52.
v2002 *Peplosmilia latona* (Felix, 1903*a*); Baron-Szabo: 54, pl. 37, figs 5–6.
v2002 *Placosmilia robusta* Umbgrove, 1925: Leloux: 14, pl. 1, fig. 3.
v2003 *Peplosmilia latona* (Felix, 1903*a*); Baron-Szabo: 124, pl. 4, figs 1, 3–6.
parsv2004 *Placosmilia* ? *robusta* (Umbgrove, 1925); Leloux: 317, pl. 5, fig. 1 non figs 2–5b.

DIMENSIONS. d = 21 × 23 mm; s = around 80.

DESCRIPTION. Cast of a solitary, slightly compressed corallum; costosepta arranged in four complete cycles with the beginning of a fifth cycle in six systems; S1 and S2 reach the axial region; columella lamellar, thick.

REMARKS. The holotype of *Peplosmilia latona* (Felix) is slightly larger and has therefore a slightly larger number of septa (d = 23 × 26 mm; s = around 100) than the specimen form the Upper Maastrichtian of the Netherlands (lectotype of *Placosmilia robusta* Umbgrove; see Plate 12, fig. 1, RGM 29036). Therefore, it is assumed that they belong to the same species.

TYPE LOCALITY OF SPECIES. Turonian–Campanian of Austria (Gosau Group).

DISTRIBUTION. Turonian–Campanian of Austria (Gosau Group), Upper Maastrichtian–Lower Danian of the Netherlands (St. Pietersberg).

Family **DERMOSMILIIDAE** Koby, 1887

DIAGNOSIS. Solitary and colonial. Gemmation intracalicinal. Corallites free until reaching a large size. Septa beaded, sparsely and irregularly perforated. Columella trabecular. Synapticulae present. Endothecal dissepiments mainly peripheral. Septal merging axially only. Trabeculae simple, sometimes diverging.

Genus ***CALAMOPHYLLIOPSIS*** Alloiteau, 1952*a*

TYPE SPECIES. *Calamophyllia flabellata* de Fromentel, 1861, Upper Jurassic (Oxfordian) of France.

DIAGNOSIS. Colonial, phaceloid to dendroid. Gemmation intracalicinal–polystomodaeal. Extracalicinal appearance in places due to early detachment of new corallites. Centres permanently monocentric. Costosepta subcompact to irregularly perforated. Columella trabecular. Synapticulae sparse, except near the wall. Endothecal dissepiments well-developed, subtabulate. Wall synapticulothecal, tending to be solid secondarily and thickened.

REMARKS. According to Alloiteau (1957: 174–176) the type specimen of the genus *Calamophyllia* Blainville, 1830, (with the type species *Calamophyllia striata* = *Calamites striée* Guettard, 1774) was lost. In addition, descriptions of the type material of this species given by Guettard (1774), Blainville (1830), Milne Edwards & Haime (1851*a*) and Milne Edwards (1857) differ significantly from each other. Therefore, the generic concept of the genus *Calamophyllia* Blainville is unclear. Instead of picking a specimen to create a neotype for the species *striata*, Alloiteau (1957) chose the form *Calamophyllia flabellata* de Fromentel, 1861, which apparently resembled the original illustration of *Calamophyllia striata* in Blainville (1830), to create the new genus *Calamophylliopsis* and considered the genus *Calamophyllia* Blainville as *incertae sedis*. Because up to now a neotype for *Calamophyllia striata* has not been selected, it is unclear to what generic concept the forms which have been assigned to the latter genus are supposed to correspond. Therefore, until a neotype for the species *striata* is established the name *Calamophyllia* should not be used.

Calamophylliopsis marini (Bataller, 1936) (Pl. 11, figs 6a, b)

v*1936 *Calamophyllia Marini*; Bataller: 6, figs 5–6.
1936 *Leptophyllia Astrei*; Bataller: 6, figs 7–10.
1937*b* *Leptophyllia vidali* Bataller, 1937; Bataller: 306, figs 1–4.
(v)1995 *Acrosmilia (Acrosmiliopsis) marini* (Bataller, 1936); Reig Oriol & Vilella: 38, figs 1a–d.
2000b *Acrosmiliopsis marini* (Bataller, 1936); Löser: 5.
2002 *Acrosmilia vidali* (Bataller, 1937); Baron-Szabo: 100.

DIMENSIONS. d = 5–8.5 mm; s = 72–85.

DESCRIPTION. Fragments of a (?) phaceloid colony; corallites slightly elliptical or subflabellate in outline; costosepta are compact with rare perforations, thin, straight or wavy, arranged in four complete and an incomplete fifth cycle in six systems; S1 and S2 reach the axial region, where trabecular prolongations of their inner ends may join or fuse with

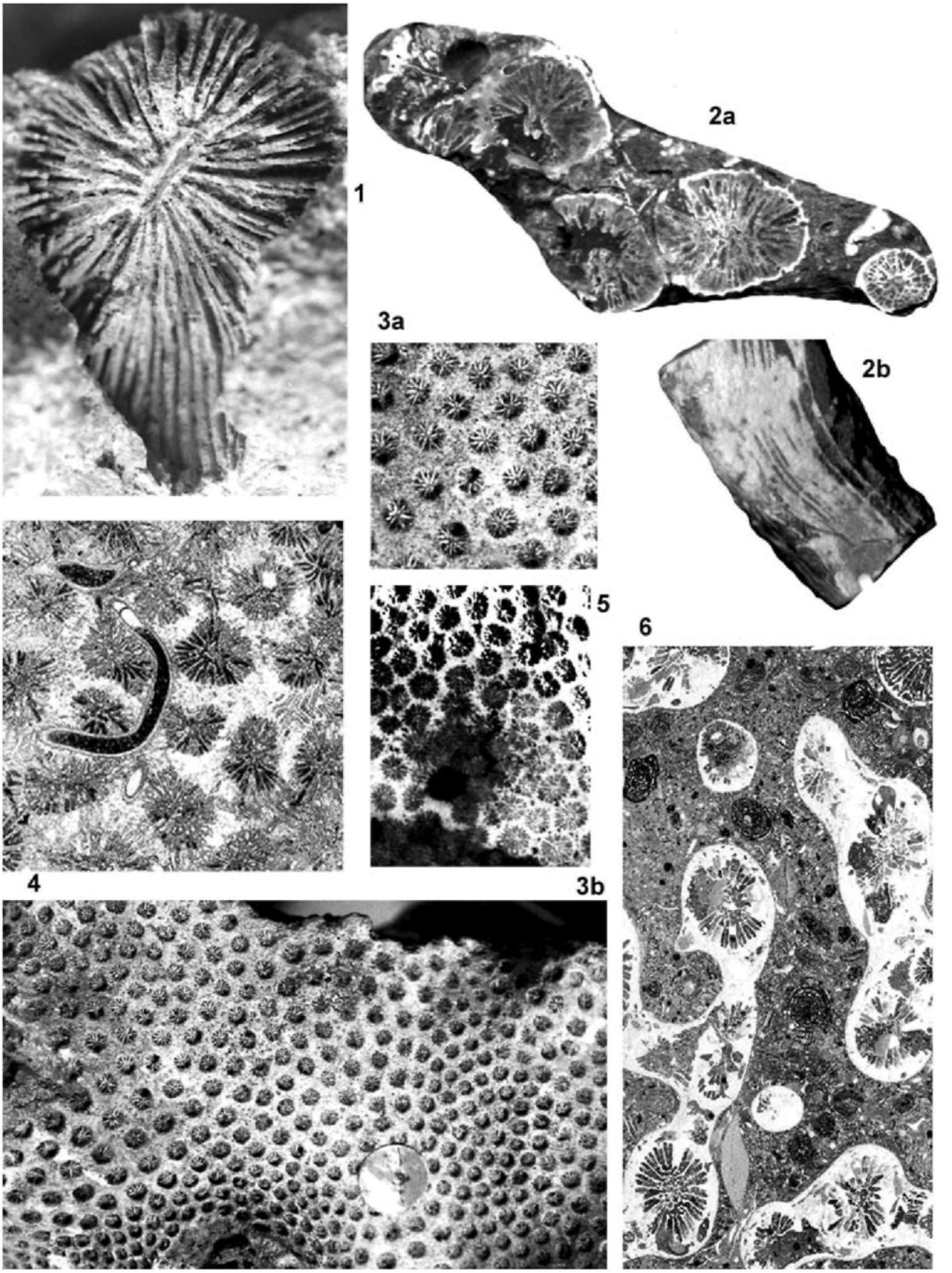


Plate 12 **Fig. 1** *Peplosmilia latona* (Felix, 1903*a*), (lectotype of *Placosmilia robusta* Umbrgove, 1925), cast, upper surface view, RGM 29036, Upper Maastrichtian–Lower Danian of the Netherlands, ×2.5. **Fig. 2** *Calamophylliopsis simonyi* (Reuss, 1854), holotype, Santonian of Austria (Gosau Group). **2a**, polished cross view, ×4.5; **2b**, polished longitudinal view, x 6.5. **Fig. 3** *Haimesastrea conferta* Vaughan, 1900, syntype, NMNH, M158311, Lower Eocene of the USA. **3a**, upper surface of colony, ×4; **3b**, ×2. **Fig. 4** *Stephanaxophyllia bicoronata* (Gregory, 1900), cross thin section, BMNH, AZ 456, Middle–Upper Maastrichtian of the UAE/Oman border region, ×3.5. **Fig. 5** *Columastraea dubia* Alloiteau, 1958, upper surface of colony, BMNH, AZ 47, Middle–Upper Maastrichtian of the UAE/Oman border region, ×5. **Fig. 6** *Calamophylliopsis simonyi* (Reuss, 1854), cross thin section, BMNH, AZ 580, Middle–Upper Maastrichtian of the UAE/Oman border region, ×2.5.

Figure 27 (?) *Calamophylliopsis vidali* (Bataller, 1956) based on the illustrations of the syntypes in Bataller (1959), Maastrichtian of Spain. **A, B**, upper surface of coralla, longitudinal view, ×1.

the trabecular columella; remaining septa irregularly alternate in length and thickness; endothecal dissepiments present throughout the corallite; wall synapticulothecal–septothecal; epithecal remains present.

TYPE LOCALITY OF SPECIES. Maastrichtian of Spain.

DISTRIBUTION. Maastrichtian of Spain, Paleocene of Austria (this paper).

NEW MATERIAL. Paleocene of Austria, Baron-Szabo coll., NMNH, USNM 1068598.

(?) *Calamophylliopsis vidali* (Bataller, 1956) (Fig. 27)

1892 *Calamophyllia Vidali*; Mallada: 159.
1937*a* *Calamophyllia Vidali* Mallada; Bataller: 153.
1947 *Calamophyllia Vidali* Mallada; Bataller; vol. 28, p. 336.
*1956 *Calamophyllia Vidali* Mallada; Bataller: vol. 67, p. 90, pl. 4, figs 3–4.
1959 *Calamophyllia Vidali* Bataller: 26, 2 text-figs on p. 26.
2000b *Calamophyllia Vidali* Bataller, 1959; Löser: 16.

DIMENSIONS. d (max) = 16 mm; d (min) = 13 mm; s = around 150.

DESCRIPTION. Fragments of a (?) phaceloid colony; corallites elliptical or subflabellate in outline; costosepta thin, arranged in five complete cycles and an incomplete sixth cycle in six systems; epithecal remains present.

REMARKS. Because the original description and illustration of the species *vidali* given by Bataller (1956) are not sufficient, the assignment is only provisional.

TYPE LOCALITY OF SPECIES. Maastrichtian of Spain.

DISTRIBUTION. Maastrichtian of Spain.

Calamophylliopsis simonyi (Reuss, 1854) (Pl. 12, figs 2a, b, 6)

v*1854 *Cladocora simonyi*; Reuss: 112, pl. 12, figs 5–7.
1857 *Cladocora ? simonyi*; Milne-Edwards: vol. 2, p. 598.
1861 *Cladocora ? simonyi*; de Fromentel: 150.
1903*a* *Cladocora simonyi* Reuss; Felix: 266, text-fig. 33.
1914 *Cladocora simonyi* Reuss 1854; Felix: pars 7, p. 171.
1930 *Cladocora simonyi* Reuss; Oppenheim: 360.
non1976 *Procladocora simonyi* (Reuss 1854); Turnšek *in* Turnšek & Buser: 56, 79, pl. 12, figs 1, 2.
non1978 *Procladocora simonyi* (Reuss 1854); Turnšek *in* Turnšek & Polšak: 151, 171, pl. 7, figs 1–7.
v1982 *Calamophylliopsis simonyi* (Reuss) 1854; Beauvais: vol. 2, p. 233, fig. 2.
?1987 *Calamophylliopsis* sp. (*C. crassicalami* n. sp.); Meyer: pl. 5, fig. 4.
?1995 *Acrosmilia (Acrosmiliopsis) almerai* n. sp.; Reig Oriol & Vilella: 38, figs 2a–b.
(v)1996 Hexakoralle, Morphotyp 5; Tragelehn: 198, pl. 60, figs 4–6.
2000b *Procladocora simonyi* (Reuss 1854); Löser: 69.
v2000 *Calamophylliopsis simonyi* (Reuss, 1854); Baron-Szabo: 108, pl. 9, fig. 4.
v2002 *Calamophylliopsis simonyi* (Reuss, 1854); Baron-Szabo: 56, pl. 41, fig. 1.

DIMENSIONS. d (adult) = 4–8 mm; d (juvenile) = 3–4 mm; s = 36–60.

DESCRIPTION. Phaceloid colony; corallites circular or slightly elliptical in outline; costosepta compact with rare perforations, thin, straight, generally arranged in four complete cycles in six systems; S1 extend to corallite centre where trabecular prolongations of their inner ends may join or fuse with the columella; S2 and S3 nearly equal in length and thickness; wall mainly septoparathecal.

TYPE LOCALITY OF SPECIES. Santonian of Austria (Gosau Group at Nefgraben).

DISTRIBUTION. Santonian of Austria (Gosau Group), Maastrichtian of the UAE/Oman border region and ?Spain, ?Danian of France (Vigny), Paleocene of Austria.

Family **COLUMASTREIDAE** Alloiteau, 1952*a*

DIAGNOSIS. Colonial, massive as in Faviidae and Heliastreidae. Corallites directly united by a septothecal or perithecal wall. Peritheca vesicular or cellular, sparsely developed, upper surface beaded. Costosepta compact, granulated, consisting of relatively small trabeculae, often arranged in two divergent systems. Columella and pali present.

Genus ***COLUMASTREA*** d'Orbigny, 1849

TYPE SPECIES. *Astrea striata* Goldfuss, 1826, Senonian of Austria (Gosau Group).

DIAGNOSIS. Colonial, massive, plocoid to subcerioid. Gemmation extracalicinal. Perithecal dissepiments vesicular to subtabulate. Costosepta compact, arranged radially, mostly non-confluent, but subconfluent in places. Septal margins

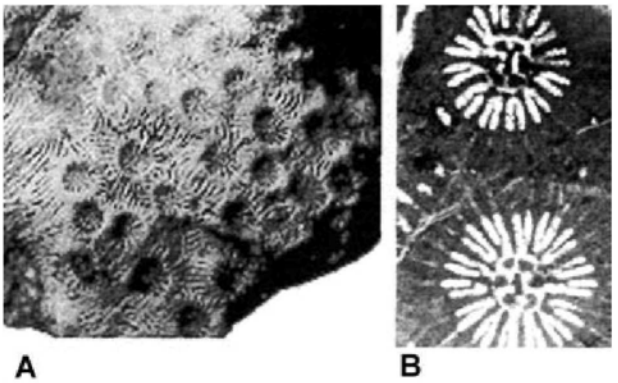


Figure 28 *Columastrea striata* (Goldfuss, 1826). **A**, syntype IPB, Goldfuss coll. no. 297, Senonian of Austria, upper surface of colony, ×2.5; **B**, cross thin section, GBA, Baron-Szabo coll., no. 147/II, Santonian of Austria, ×8.

finely granulated. Columella styliform. Pali present before first cycle septa, second cycle pali may be present on some septa. Endothecal dissepiments thin, subtabulate. Wall septothecal.

Columastraea dubia Alloiteau, 1958 (Pl. 12, fig. 5)

v*1958 (?)*Columastrea dubia* nov. sp.; Alloiteau: 186, pl. 25, fig. 2, pl. 28, fig. 3.
2000b *Columastrea dubia*, Alloiteau 1958; Löser: 20.
v2000 *Columastrea dubia* Alloiteau, 1958; Baron-Szabo: 103, pl. 3, fig. 5.
2002 *Columastrea dubia* Alloiteau, 1958; Baron-Szabo: 57.
2003 *Neocoenia lepida* (Reuss 1854); Götz: 5ff., pl. 1, fig. 5.

DIMENSIONS. d = 1.2–2.2 mm; dl = 1–1.6 mm, in juvenile corallite it can be 0.7 mm; c-c = 1.5–2.2 mm, juvenile corallites around 1 mm; s = 24, in juvenile corallites around 18.

DESCRIPTION. Massive-knobby, plocoid; calices rounded or elongated in outline; costosepta compact, non- or subconfluent, arranged in three cycles in six systems; S1 reach corallite centre, where their inner ends may fuse with the columella or terminate in claviform swellings, which can dissociate to form pali or paliform lobes; S2 nearly of same length, alternating in thickness.

TYPE LOCALITY OF SPECIES. Upper Campanian of Madagascar.

DISTRIBUTION. Upper Campanian of Madagascar and northern Spain, Upper Campanian–Maastrichtian of the UAE/Oman border region.

Columastrea striata (Goldfuss, 1826) (Fig. 28)

v*1826 *Astrea striata*; Goldfuss: 111, pl. 38, figs 11a–b.
1847 *Astrea striata* Goldfuss; Michelin: 301, pl. 71, figs 6a–b.
1847 *Astrea variolaris*; Michelin: 301, pl. 71, fig. 7.
1849*c* *Columastrea striata* (Goldfuss); Milne Edwards & Haime: 3. Ser., vol. 12, p. 183.
1850 *Phyllocoenia variolaris*; d'Orbigny: vol. 2, p. 204.
1850 *Columastrea striata*; d'Orbigny: vol. 2, p. 206.
1850 *Phyllocoenia corbarica*; d'Orbigny: vol. 2, p. 206.
1854 *Columastrea striata* (Goldfuss); Reuss: 98, pl. 14, figs 1–2.
1857 *Columastrea striata*; Milne Edwards: vol. 2, p. 26.
1857 *Columastrea striata* (Goldfuss); Pictet: 392, pl. 104, figs 20a–b.
1860 *Columastrea striata*; de Fromentel: 194.
1874 *Columnastraea Leymeriei* n. sp.; Vidal: 38, pl. 7, figs 45–45a.
1881 *Astrea striata* Goldfuss; Quenstedt: 897, pl. 178, figs 21–22.
1883 *Columastrea striata*; de Fromentel: 522, pl. 136, fig. 2, pl. 137, fig. 1.
1884 *Stephanastraea dumortieri*; de Fromentel: 537, pl. 142, fig. 3.
1886 *Stephanastraea mirabilis*; de Fromentel: 607, pl. 180, fig. 1.
1892 *Columnastraea Leymeriei* Vidal; Mallada: p. 160.
1892 *Columnastraea striata* E. H.; Mallada: 160.
1898 *Columastrea striata* (Goldfuss); Felix: 254, pl. 11, fig. 3.
1899 *Columastrea striata* (Goldfuss); Söhle: 41, pl. 2, figs 4–4a.
1899 *Hydnophoropsis thecalis*; Söhle: 41, pl. 4, fig. 2.
v1903*a* *Columnastrea striata* M. Edwards et J. Haime (Goldfuss sp.) 1826; Felix: 320, text-fig. 60.
?1910 ? *Columnastrea striata*, M. Edw. et J. Haime; Pratz: 304.
1914 *Columastrea striata* Goldfuss sp. 1826; Felix: pars 7, p. 238.
1930 *Columastrea striata* (Goldfuss); Oppenheim: 478, pl. 44, figs 2–2b.
1930 *Stephanocoenia formosissima* Sowerby sp.; Oppenheim: 474, pl. 36, figs 9–9a.
1937*a* *Columastrea Leymeriei* Vidal 1874; Bataller: 276, 2 text-figs on p. 276.
1937*a* *Columastrea striata* Goldfuss sp. 1826; Bataller: 277.
1939 *Columastrea striata* Goldfuss; Ciry: 237 and 246.
1952*a* *Columastrea striata* Golf. sp.; Alloiteau: 608, pl. 2, fig. 7.
1954 *Columastrea striata* (Goldfuss); Kolosváry: 112, pl. 13, figs 10–11, pl. 14, fig. 1.
1968 *Columastrea striata* (Goldfuss); Todorita-Mihailescu: 31, pl. 1, fig. 1.
1974 *Columastrea striata* (Goldfuss); L. & M. Beauvais: 484.
1978 *Columastrea striata* (Goldfuss 1826); Turnšek & Polšak: 148, 169, pl. 4, figs 1–2.
v1982 *Columastrea striata* (Goldfuss) 1826; Beauvais: vol. 1, p. 123, pl. 10, fig. 3.
1992 *Stephanaxophyllia villaltai* n. sp.; Reig Oriol: 13, pl. 1, fig. 9, pl. 3, figs 3–4.
1992 *Stephanaxophyllia reussi* Beauvais, 1982; Reig Oriol: 13, pl. 3, figs 1–2.
1994 *Columastrea striata* (Goldfuss); Reig Oriol: 19, pl. 4, fig. 1.
2000*a* *Columastrea striata* (Goldfuss 1826); Löser: 51, pl. 2, fig. 2.
2000b *Columastrea striata* (Goldfuss 1829); Löser: 20.

v2002 *Columastrea striata* (Goldfuss, 1826); Baron-Szabo: 57, figs 2, 4–6.
v2003 *Columastrea striata* (Goldfuss, 1826); Baron-Szabo: 123, pl. 3, fig. 1.

DIMENSIONS. d = 1.5–3 mm; d (lumen) = 1.2–2.5 mm; c-c = 2–4 mm; s = 24 + s4.

DESCRIPTION. Massive, plocoid to subcerioid colony; costosepta non-confluent to subconfluent, arranged in three complete cycles in six systems, regularly alternating; pali present before S1 and occasionally before S2; columella substyliform, generally well developed.

TYPE LOCALITY OF SPECIES. Senonian of Austria (Gosau Group).

DISTRIBUTION. Upper Cretaceous of Greece and Romania, Turonian–Senonian of Austria (Gosau Group), Lower Coniacian (Corbières) und Upper Santonian (Provence) of southern France, Senonian of Hungary, Santonian–Campanian of Croatia, ?Upper Campanian of Yugoslavia (Fruska Gora), Coniacian-Maastrichtian of northern Spain.

Genus ***STEPHANAXOPHYLLIA*** Alloiteau, 1957

TYPE SPECIES. *Stephanaxophyllia casterasi* Alloiteau, 1957, Upper Santonian of France (Corbières).

DIAGNOSIS. Colonial, plocoid to subcerioid. Gemmation extracalicinal and intracalicinal. Costosepta compact, non-confluent, dentate laterally. Columella variable, spongy-papillose, or formed by fused segments, appearing lamellar. Pali present before S1 and S2. Wall septothecal and parathecal, synapticulothecal developments occasionally present. Endothecal dissepiments numerous, thin, vesicular. Exothecal dissepiments subtabulate.

Stephanaxophyllia bicoronata (Gregory, 1900) (Pl. 12, fig. 4; Pl. 13, figs 6a, b)

v*1900 *Columnastraea bicoronata*, sp. nov.; Gregory: 32, pl. 2, figs 7–9.
v1957 *Stephanaxophyllia casterasi* gen. nov. sp. nov.; Alloiteau: 74, pl. 9, fig. 8.
(v)1982 *Stephanaxophyllia hofergrabenensis* nov. sp.; Beauvais: vol. 1, 128, pl. 10, fig. 5.
1986 *Stephanaxophyllia casterasi* Alloiteau, 1957; Tchéchmédjiéva: 67ff.
2000b *Columnastraea bicoronata* Gregory 1900; Löser: 21.
2000b *Stephanaxophyllia hofergrabenensis* Beauvais 1982; Löser: 73.
v2000 *Stephanaxophyllia casterasi* Alloiteau, 1957; Baron-Szabo: 103, pl. 3, figs 3, 6.
v2002 *Stephanaxophyllia casterasi* Alloiteau, 1957; Baron-Szabo: 58, pl. 43, figs 1–2, 4.

DIMENSIONS. d (lumen) = 2–3.5 mm, in late budding stages up to 6 mm; c-c = 3–5.5 mm; s (monocentric calices) = 24–36; size of the colony = 2.5–8 cm in diameter.

DESCRIPTION. Massive or knobby, plocoid colony; calices elliptical or irregularly polygonal in outline; gemmation extra- and intracalicinal, resulting in monostomatous to tristomatous conditions; costosepta compact, non-confluent, rarely subconfluent, developed in three complete cycles with the beginning of a fourth cycle in six systems; S1 and S2 nearly equal; columella papillose or formed by fused segments, appearing lamellar.

REMARKS. In having synapticulothecal developments and showing intracalicinal budding, the specimens documented by Baron-Szabo (2000) from the Upper Campanian–Maastrichtian of the UAE/Oman border more closely correspond to the characteristics of the type species of *Stephanaxophyllia* Alloiteau than to its generic concept given by Alloiteau (1957: 73), in which these characteristics are not mentioned. Moreover, in the description the budding mode is given as 'generally extracalicinal', whereas the holotype of the type species (Alloiteau 1957: pl. 9, fig. 8 and Baron-Szabo 2002: pl. 43, fig. 1) shows a larger number of dicentric corallites, indicating the strong influence of intracalicinal gemmation.

From the Upper Paleocene of Somalia (lower part of Auradu Limestone) Gregory (1900) described three specimens as *Columnastraea bicoronata*, two of which are cataloged as syntypes (R.5033 and R.5035) at the British Museum of Natural History, London. Re-investigation of the type material by the author revealed that the two specimens belong to different taxonomic groups. The specimen R.5035 closely corresponds to the Upper Cretaceous taxon *Stephanaxophyllia casterasi*. The second specimen (R.5033) shows close affinities to the genus *Agathiphyllia* and will therefore be dealt with in a later paper.

The species *bicoronata* represents a senior synonym of the species *casterasi* and therefore has priority. The specimen BMNH R.5035 is here chosen as the lecotype of the species originally described as *Columnastraea bicoronata*.

TYPE LOCALITY OF SPECIES. Upper Paleocene of Somalia (Auradu Limestone).

DISTRIBUTION. Santonian of Austria (Gosau Group), Upper Santonian of France, Upper Campanian of Bulgaria, Upper Campanian–Maastrichtian of the UAE/Oman border region, Upper Paleocene of Somalia (Auradu Limestone).

Genus ***HAIMESASTREA*** Vaughan, 1900 (= *Peruviastraea* Vaughan, 1922 (Type species. *Peruviastraea peruviana* Vaughan, Eocene of Peru [Negritos]).

TYPE SPECIES. *Haimesastrea conferta* Vaughan, 1900, Lower Eocene of the USA.

DIAGNOSIS. Colonial, massive, plocoid to subcerioid; gemmation extracalicinal, rarely intracalicinal; calicinal rims distinct; perithecal wall vesicular or dense; costosepta compact, dentate marginally, granulate laterally, non-confluent to subconfluent, sometimes confluent; pali or paliform lobes present before S1; columella weak, trabecular-papillose to sometimes forming substyliform segments; endothecal dissepiments sparse, subtabulate; wall septothecal to septoparathecal, generally solid.

Haimesastrea conferta Vaughan, 1900 (Pl. 12, figs 3a, b; Pl. 13, fig. 1)

v*1900 *Haimesastrea conferta* n. sp.; Vaughan: 145, pl. 15, figs 6–9, p. 16, figs 1–7a.

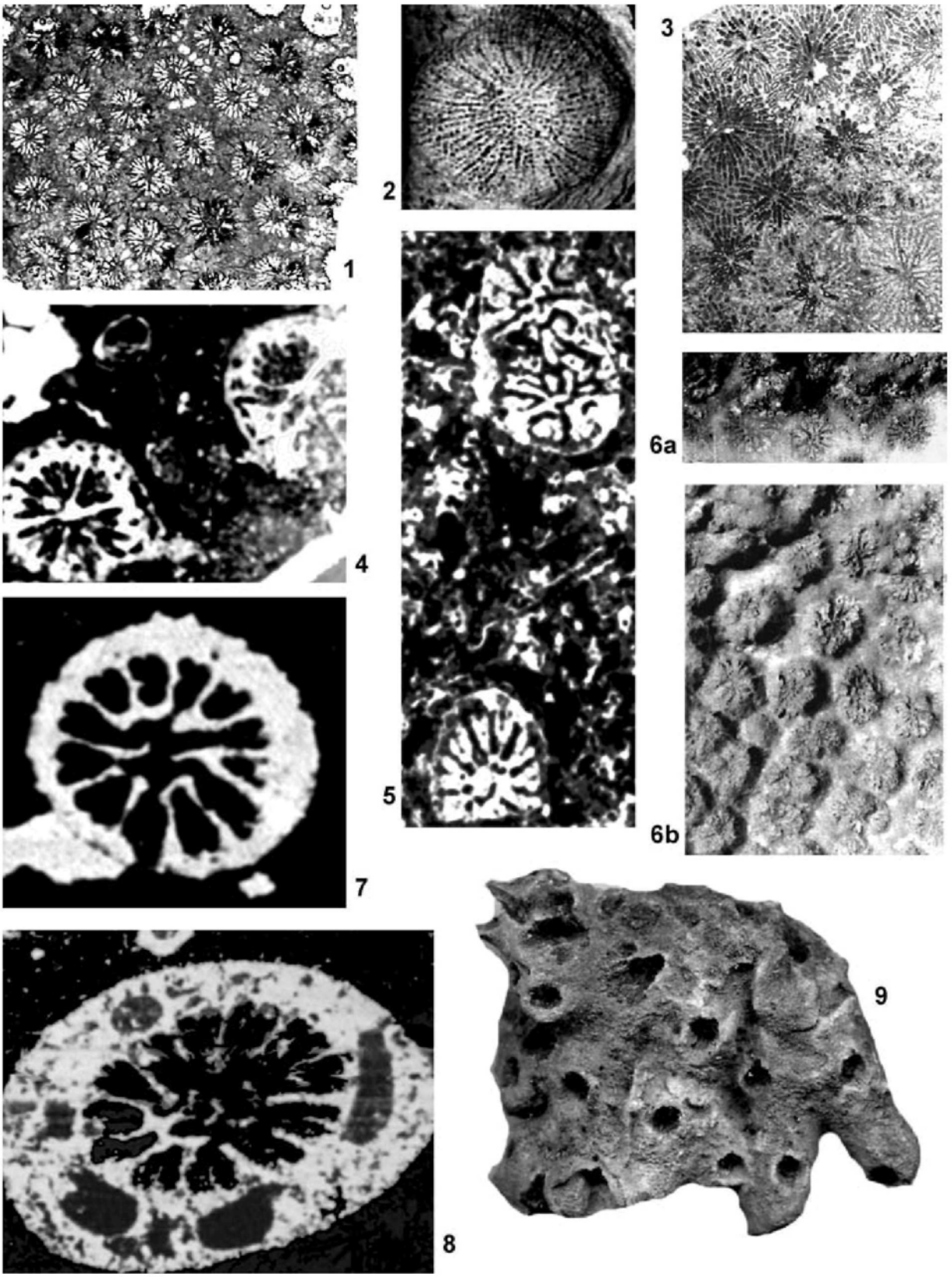


Plate 13 **Fig. 1** *Haimesastrea conferta* Vaughan, 1900, cross thin section, BSP, Stinnesbeck coll., CH-3, Campanian–Maastrichtian of Argentina, ×5. **Fig. 2** *Rhizangia sedgwicki* Reuss, 1854, upper surface, cross view, Coates coll. NMNH, no. 423b, Middle–Upper Maastrichtian of Jamaica, ×4. **Fig. 3** *Mesomorpha mammillata* (Reuss, 1854), cross thin section, BMNH, AZ 904, Middle–Upper Maastrichtian of the UAE/Oman border region, ×4. **Fig. 4** *Rhizangia padricensis* Turnšek, 1998, holotype, cross thin section, SAZU, Pa-28, Paleocene of Italy, ×12 (courtesy D. Turnšek). **Fig. 5** *Oculina conferta* Milne Edwards & Haime, 1850*a*, cross thin section, SAZU, So-8, Paleocene of Slovenia, ×12 (courtesy D. Turnšek).

1922 *Peruviastraea peruviana* sp. n.; Vaughan: 129, pl. 21, figs 6, 6a, 7, 7a.
1922 *Haimesastrea peruviana* sp. n.; Vaughan: 130, pl. 22, figs 2–2b.
1922 *Haimesastrea humilis* sp. n; Vaughan: 131, pl. 22, figs 3, 3a, 4, 4a.
1922 *Haimesastrea distans*, Vaughan, sp. n; Vaughan: 132, pl. 22, figs 5, 5a.
1922 *Haimesastrea conferta*, Vaughan; Vaughan: pl. 22, figs 1, 1a.
1925 *Haimesastrea humilis* Vaughan 1922; Felix: pars 28, p. 244.
1925 *Haimesastrea distans* Vaughan 1922; Felix: pars 28, p. 244.
1925 *Peruviastraea peruviana* Vaughan 1922; Felix: pars 28, p. 286.
1941 *Montastrea parinasensis*, sp. n.; Wells: 7 (307), pl. 1, fig. 2.
1941 *Haimesastrea distans* Vaughan; Wells: 15 (315), pl. 2, fig. 4.
1941 *Peruviastraea peruviana* Vaughan; Wells: 16 (316), pl. 2, fig. 5.
1974 *Haimesastrea (Haimesastrea) peruviana* Vaughan, 1922; Frost & Langenheim: 193, pl. 59, figs 1–5.
1977 *Haimesastrea conferta* Vaughan; Toulmin: 145. 182, pl. 1, fig. 7, pl. 10, figs 9–10.
v1988 *Haimesastrea peruviana* Vaughan 1922; Drobne *et al.*: 186, pl. 30, fig. 3.
1992 *Haimesastrea distans* Vaughan, 1922; Budd *et al.*: 593.
1992 *Haimesastrea humilis* Vaughan, 1922; Budd *et al.*: 593.
1992 *Peruviastraea peruviana* Vaughan, 1922; Budd *et al.*: 593.
(v)1996 Hexakoralle, Morphotyp 18; Tragelehn: 198, pl. 62, figs 8–9.
1997 *Haimesastrea conferta*; Stemann *in* Bryan *et al.*: 37.
1998 *Haimesastrea peruviana* Vaughan, 1922; Turnšek & Drobne: 134.
v2004 *Haimesastrea conferta* Vaughan, 1900; Baron-Szabo *et al.*: 79R.

DIMENSIONS. d = 1.3–2.6 mm; d (lumen) = 1–1.3 mm; c-c = 2–4.5 mm; s = 16–24.

DESCRIPTION. Colonial, massive, plocoid to subcerioid; gemmation extracalicinal, rarely intracalicinal; costosepta compact, subconfluent or confluent, arranged in three complete or incomplete cycles in six systems; columella trabecular or absent; paliform lobes irregularly present; endothecal and perithecal dissepiments thin, vesicular; perithecal wall subtabulate to cellulose, well-developed; wall septoparathecal with few pores; in areas of intense budding the calicinal diameter ranges between 1.3 and 2 mm.

TYPE LOCALITY OF SPECIES. Lower Eocene of the USA (Alabama).

DISTRIBUTION. Campanian–Maastrichtian (this paper) and Danian of Argentina, Maastrichtian of Peru (Quebrada Monte Grande), Danian of Slovenia (Dolenja Vas), Paleocene of Austria, Danian–Lower Eocene of the USA (Alabama), Eocene of Peru (Negritos), Middle Eocene of Mexico (San Juan Formation).

NEW MATERIAL. Campanian–Maastrichtian of Argentina, BSP, Stinnesbeck coll., sample no.: CH-3.

Family **RHIZANGIIDAE** d'Orbigny, 1851 (=Astrangiidae Verrill, 1869)

DIAGNOSIS. Colonial and solitary. Gemmation extracalicinal, from edge zone or stolon-like expansions of edge zone, polyps may or may not remain organically connected. Colonies commonly consisting of scattered corallites with no apparent connection, or united basally by coenosteum, or they form compact masses. Corallites small and low; septa composed of one fan system of simple or compound trabeculae. Irregular divergence of sclerodermites producing scattered lateral granulations and more or less marginal dentations. Columella spongy- or rarely solid-trabecular, or absent. Endothecal dissepiments thin.

Genus ***RHIZANGIA*** Milne Edwards & Haime, 1848*b*

TYPE SPECIES. *Astrea brevissima* Deshayes *in* Ladoucette, 1834, Tertiary (Bartonian) of France (see Milne Edwards & Haime 1848*b*).

DIAGNOSIS. Colonial, tympanoid, reptoid. Gemmation extracalicinal. Costosepta compact, strongly dentate laterally. Anastomosis present. Columella parietal–papillose. Synapticulae present. Endothecal dissepiments sparse or absent. Wall synapticulothecal.

Rhizangia padricensis Turnšek, 1998 (Pl. 13, fig. 4)

(v)1997 *Rhizangia* sp.; Vecsei & Moussavian: 129, pl. 35, fig. 4.
v*1998 *Rhizangia padricensis* n. sp. Turnšek; Turnšek & Drobne: 137, pl. 7, figs 2–4.

DIMENSIONS. d (lumen) = 1.5–2 mm; d = 1.5–2.5 mm; s = 24 (6s1 + 6s2 + 12s3).

DESCRIPTION. Colonial, reptoid; costosepta compact, strongly dentate laterally, arranged in three complete cycles in six systems; S1 thick, reaching corallite centre and often uniting; S2 and S3 thinner, alternating with S1; columella very variably developed (spongy-parietal or lamellar); wall

Fig. 6 *Stephanaxophyllia bicoronata* (Gregory, 1900), lectotype, BMNH R.5035, Upper Paleocene of Somalia (Auradu Limestone). **6a**, polished surface, cross view, slightly oblique, ×2; **6b**, upper surface of colony, ×2. **Fig. 7** *Oculina becki* (Nielsen, 1922), cross thin section, juvenile corallite, Institute of Paleontology, Erlangen, no. M 37, Danian of Denmark (Fakse), ×13.5 (courtesy M. Bernecker & O. Weidlich). **Fig. 8** *Oculina becki* (Nielsen, 1922), cross thin section, adult corallite, Institute of Paleontology, Erlangen, no. M 33, Danian of Denmark (Fakse), ×16 (courtesy M. Bernecker & O. Weidlich). **Fig. 9** *Oculina smithi* Vaughan, 1900, syntype, upper surface, cross view, NMNH, M158254, Paleocene of the USA, ×3.

synapticulothecal to septothecal; endothecal dissepiments sparse.

TYPE LOCALITY OF SPECIES. Paleocene of Italy (Padriciano, Adriatic Platform).

DISTRIBUTION. Paleocene of Italy and Slovenia.

Rhizangia sedgwicki Reuss, 1854 (Pl. 13, fig. 2)

*1854 *Rhizangia sedgwicki m.*; Reuss: 121, pl. 8, figs 9–11.
1857 *Rhizangia sedgwicki*; Milne Edwards vol. 2, p. 613.
1858–61 *Rhizangia sedgwicki*; de Fromentel: 153.
1877 *Rhizangia sedgwicki*; de Fromentel: 435, pl. 94, figs 2–2a.
1903*a* *Rhizangia sedgwicki* Reuss; Felix: 268.
1914 *Rhizangia sedgwicki* Reuss 1854; Felix: pars 7, p. 182.
1930 *Rhizangia sedgwicki* Reuss; Oppenheim: 373.
1957 *Rhizangia sedgwicki* Reuss; Suraru: 292.
(v)1982 *Rhizangia sedgwicki* Reuss 1854; Beauvais: vol. 2, p. 216, pl. 43, fig. 2.
2000b *Rhizangia sedgwicki*, Reuss 1854; Löser: 71.
v2002 *Rhizangia sedgwicki* Reuss, 1854; Baron-Szabo: 59, text-fig. 10 B.

DIMENSIONS. d = 9 mm; s = around 100 (6s1 + 6s2 + 12s3 + 24s4 + 48s5 + s6).

DESCRIPTION. Colonial, tympanoid, reptoid; costosepta compact, strongly dentate laterally, arranged in five complete cycles in six systems; septa of a beginning sixth cycle present; endothecal dissepiments sparse.

TYPE LOCALITY OF SPECIES. Santonian of Austria (Gosau Group at Neue Welt).

DISTRIBUTION. Turonian–Santonian of Austria (Gosau Group), Senonian of Romania, Middle–Upper Maastrichtian of Jamaica (new material).

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 423b (= Jerusalem Mountain Inlier); 436h (= Catadupa).

Genus ***ASTRANGIA*** Milne Edwards & Haime, 1848*b* (= *Prionastrea* Milne Edwards & Haime, 1848*b* (Type species. *P. abdita* Milne Edwards & Haime, 1848*b*, Recent, Atlantic))

TYPE SPECIES. *Astrangia michelini* Milne Edwards & Haime, 1848*b*, Recent, northern Atlantic (off New Jersey)(= *Madrepora poculata* Ellis & Solander, 1786) (see Milne Edwards & Haime 1848*b*; Peters *et al.* 1988).

DIAGNOSIS. Colonial, incrusting, subplocoid. Gemmation extracalicinal, corallites united basally by thin coenosteum. Septa irregularly perforated, dentate laterally. Columella papillose. Endothecal dissepiments thin.

Astrangia? *cretacea* (Bölsche, 1870) (Fig. 29)

*1870 *Astrea cretacea* Bölsche; Bölsche: 216.
?1933 *Siderastrea cretacea* (Bölsche); Wells: 144, pl. 12, fig. 13, pl. 15, fig. 26.

Figure 29 *Astrangia* ? *cretacea* (Bölsche, 1870), based on the illustration in Floris (1972), Upper Danian of Denmark (Greenland), upper surface of colony fragment, ×6.

?1958 *Astrangia (Coenangia) cretacea* (Bölsche) 1870; Squires: 2, figs 1–2.
?1972 *Astrangia (Coenangia)* ? sp. cf. *A. (C.) cretacea* (Bölsche, 1870); Floris: 29, pl. 1, figs 4–5.
?2002 *Astrangia cretacea* (Bölsche, 1870); Baron-Szabo: 60.
?2002 *Astrangia cretacea* (Bölsche 1870); Löser: 83 (older synonyms cited therein).

DIMENSIONS. d = 3–4 mm; s = 24.

DESCRIPTION. Colonial, subplocoid to polygonal; depth of corallites around 1 mm; septa developed in three complete cycles in six systems; S1 and S2 reach corallite centre, S3 reach half their length; wall septothecal, solid.

REMARKS. Bölsche (1870: 216) described the species *Astrea cretacea* from the Upper Cretaceous of the USA (New Jersey) without giving an illustration of the specimen. The description of this species does not indicate to what genus the species belongs in that the type of axial ends of the septa (paliform lobes present or absent), the endothecal development (Bölsche speaks of 'Querleisten' which could mean either dissepiments or synapticulae, or both), and the type of corallite wall are not explained in detail. The specimen could belong to either one of the genera *Astrangia, Coenangia, Platyhelia* or *Siderastrea*. The characteristics given above are based on the material documented by Floris (1972), which may or may not belong to the species *cretacea*. However, because these specimens occur in the Upper Danian of Denmark they represent additional information of scleractinian corals of the K/T-period and are therefore included here provisionally grouped with the taxon *Astrangia cretacea* as originally suggested by Floris himself.

TYPE LOCALITY OF SPECIES. Upper Cretaceous of the USA (New Jersey).

DISTRIBUTION. Upper Cretaceous of the USA (New Jersey and Texas), Upper Danian of Denmark (Greenland).

Astrangia expansa Vaughan, 1900 (Fig. 30)

v*1900 *Astrangia expansa* sp. nov.; Vaughan: 133, pl. 14, figs 3–5.
1925 *Astrangia expansa* Vaughan 1900; Felix: pars 28, p. 108.

DIMENSIONS. d = 3–6 mm; s = up to 48.

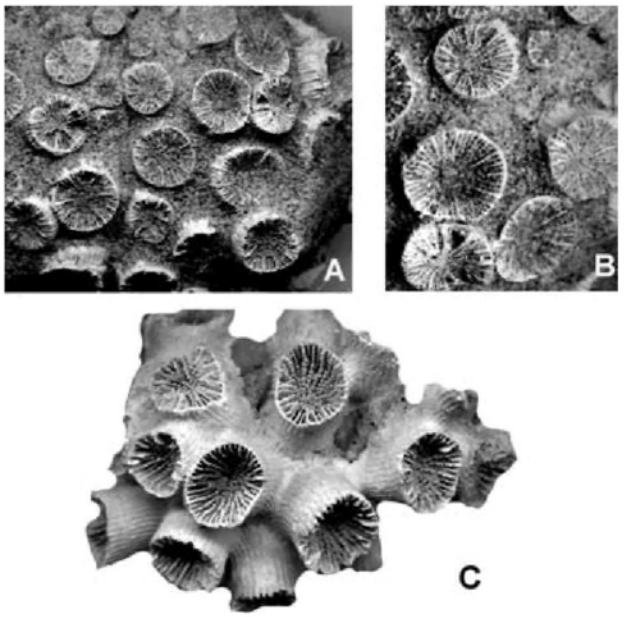


Figure 30 *Astrangia expansa* Vaughan, 1900. **A, B**, palaeontological collection of the Universidad Autónoma de Baja California, Tellez coll., no. 11315, Paleocene of Mexico (Sepultura Formation), upper surface of colony; **A**, ×1.7; **B**, ×3; **C**, NMNH, M158281, syntype, Eocene of the USA (Mississippi), upper surface of colony, ×2.

DESCRIPTION. Colonial, submassive to subramose, subplocoid to polygonal corallites; corallites projecting; depth of corallites 1–4 mm; septa developed in three to four complete cycles in six systems; S1 and S2 nearly equal; S1–S3 reach corallite centre; wall septothecal, solid, thin.

TYPE LOCALITY OF SPECIES. Eocene of the USA (Mississippi).

DISTRIBUTION. Paleocene of Mexico, Eocene of the USA.

Family **OCULINIDAE** Gray, 1847

DIAGNOSIS. Colonial. Colony formation by extratentacular (or rarely intratentacular) budding. Corallites externally thickened by extensive, non-costate, granulated or smooth, dense (rarely vesicular) coenosteum. Septa exsert, formed by one fan system of simple trabeculae, margins minutely dentate, laterally granulose or spinose. Pali generally developed. Columella papillose, trabecular, or absent. Endothecal dissepiments, when developed, subtabular, thin, or replaced by stereome.

Subfamily **OCULININAE** Gray, 1847

DIAGNOSIS. Mostly ahermatypic oculinids forming dendroid colonies; corallites united basally by dense coenosteum.

Genus ***OCULINA*** Lamarck, 1816

TYPE SPECIES. *Oculina virginea* Lamarck, 1816 (non *Madrepora virginea* Linnaeus, 1758, nec Ellis & Solander, 1786) (= *Oculina diffusa* Lamarck, 1816), Recent, Atlantic Ocean (subsequent designation Milne Edwards & Haime 1850*b*).

DIAGNOSIS. Ramose colonies formed by alternate budding, corallites tending to spiral around branches; ahermatypic and hermatypic. Coenosteum dense, striated. Pali before first two cycles in an irregular crown. Columella papillose.

Oculina becki (Nielsen, 1922) (Pl. 13, figs 7, 8)

v*1922 *Amfihelia, Becki*, n. sp.; Nielsen: 31, pl. 4, figs 26–32. [topotypes studied].
(v)1972 *Oculina becki* (Nielsen, 1922); Floris: 31, pl. 1, figs 6–17.
1980 *Oculina becki* (Nielsen, 1922); Floris: 533.
(v)1990 *Oculina becki* (Nielsen, 1922); Bernecker & Weidlich: 113, pl. 26, fig. 5, pl. 29, figs 9–12.
(v)1996 Hexakoralle, Morphotyp 3; Tragelehn: 198, pl. 59, figs 6–10.

DIMENSIONS. d = 2–5 mm; s = 24.

DESCRIPTION. Depth of corallites 1–2 mm; 24 septa, 12 of which are nearly equal, are arranged in three complete cycles in six systems; in newly formed corallites 12 septa occur; 12 pali form an irregular crown around the columella; pali often poorly developed.

TYPE LOCALITY OF SPECIES. Danian of Denmark (Fakse).

DISTRIBUTION. Danian of Denmark (Fakse and Greenland), Paleocene of Austria.

Oculina conferta Milne Edwards & Haime, 1850*a* (Pl. 13, fig. 5)

*1850*a* *Oculina conferta*; Milne Edwards & Haime: 27, pl. 2, fig. 2.
1857 *Oculina conferta*; Milne Edwards: vol. 2, p. 109.
1860 *Oculina conferta*; de Fromentel: 176.
1881 *Oculina conferta*; Quenstedt: 970, pl. 180, fig. 48.
1925 *Oculina conferta* M. Edw. et J. Haime 1850; Felix: pars 28, p. 222 (older synonyms cited therein).
(v)1997 *Oculina* new sp.; Stemann *in* Bryan *et al.*: 33, text-fig. 2A.
v1998 *Oculina conferta* Milne Edwards & Haime, 1850; Turnšek & Drobne: 136, pl. 5, figs 1–4.

DIMENSIONS. d = up to 2 mm; s = around 24.

DESCRIPTION. Dendro-phaceloid; corallites bud off nearly rectangular; septa compact, developed in irregular septal cycles, covered by spiniform and rounded granules laterally; costae absent; pali irregularly present; wall septothecal.

TYPE LOCALITY OF SPECIES. Lower Eocene of England (London Clay).

DISTRIBUTION. Paleocene of Slovenia (Adriatic Platform) and the USA (Alabama), Lower Eocene of England.

Oculina smithi Vaughan, 1900 (Pl. 13, fig. 9)

v*1900 *Oculina* (?) *Smithi*, new species; Vaughan: 123, pl. 12, figs 10–11.
1925 *Oculina* (?) *Smithi* Vaughan 1900; Felix: pars 28, p. 224.
1977 *Oculina* ?*smithi* Vaughan; Toulmin: 146, pl. 1, fig. 8.

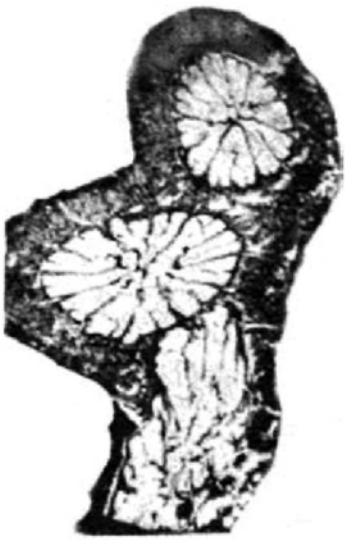


Figure 31 *Bantamia condocostata* Squires, 1958, based on the illustration in Squires, 1958, ?Upper Cretaceous–Lower Tertiary of New Zealand, upper surface cross view, oblique, ×4.

1994 *Oculina smithi* Vaughan, 1900; Filkorn: 72.
1997 *Oculina ?smithi*; Stemann *in* Bryan *et al.*: 37, Table 3.

DIMENSIONS. d = 2–3.5 mm; s = 24 + s.

DESCRIPTION. Subdendroid–subramose; corallites bud off at an angle of around 70° or tend to spiral around thick branches; septa generally very short and reduced, developed in three cycles in six irregular systems, covered by spiniform and rounded granules laterally; costae absent; pali irregularly present; wall septothecal, thick.

TYPE LOCALITY OF SPECIES. Paleocene of the USA (Alabama).

DISTRIBUTION. Paleocene of the USA (Alabama).

Genus ***BANTAMIA*** Yabe & Eguchi, 1943

TYPE SPECIES. *Bantamia gerthi* Yabe & Eguchi, 1943, Miocene of Java.

DIAGNOSIS. Colonial, fasciculate to dendroid. Gemmation extracalicinal. Branching angle usually more than 45°. Corallites cylindrical, laterally free. Costosepta thin, smooth laterally. Rudimentary pseudocolumella formed by trabecular extensions of axial septal ends. Wall septothecal, often secondarily thickened. Endothecal dissepiments tabulate, delicate, well-developed.

Bantamia condocostata Squires, 1958 (Fig. 31)

v*1958 *Bantamia ? condocostata* n. sp.; Squires: 40, pl. 6, figs 9–12.
2000b *Bantamia condocostata*, Squires 1958; Löser: 14.
v2002 *Bantamia condocostata* Squires, 1958; Baron-Szabo: 64, text-fig. 14.

DIMENSIONS. d = 4–9 mm; c-c = about 6 mm; s = 24.

DESCRIPTION. Dendroid–subfasciculate, corallites subcircular to elliptical in outline; costosepta thin, arranged in three complete cycles in six systems, alternating in length and thickness; S1 reach axial region, where they might fuse; S3 very short and thorn-like; ridges on stereome corresponding to well-developed costosepta buried by the stereome.

TYPE LOCALITY OF SPECIES. ?Upper Cretaceous–Lower Tertiary of New Zealand.

DISTRIBUTION. ?Upper Cretaceous–Lower Tertiary of New Zealand.

Family **CURTOSERIIDAE** Melnikova, 1996

DIAGNOSIS. Radial elements consisting of compact septa built of subvertically standing trabeculae. Lateral sides of septa ornamented with numerous robust pointed cone-shaped granules. Typical 'anastomosis' observed in septa arrangement – with 'diads' and 'triades' forming as a result of the fusion of the inner ends of third-order septa with adjacent first- and second-order septa. Interseptal apparatus as vesicular dissepiments. Columella styliform.

Genus ***MESOMORPHA*** Pratz, 1882 (= *Ahrdorffia* Trauth, 1911 (Type species. *Porites stellulata* Reuss, 1854, Senonian of Austria [Gosau Group]).

TYPE SPECIES. *Porites mammillata* Reuss, 1854, Santonian of Austria (Gosau Group).

DIAGNOSIS. Colony massive, subthamnasterioid. Gemmation intracalicinal. Septa compact, subconfluent or confluent, sometimes anastomosing. Distal margin of septa ornamented with delicate denticles. Lateral surface of septa with spiniform granulae. Synapticulae abundant. Columella styliform. Endothecal dissepiments abundant. No wall between the calices. Septa composed of simple trabeculae.

Mesomorpha mammillata (Reuss, 1854) (Pl. 13, fig. 3)

v*1854 *Porites mammillata* m.; Reuss: 129, pl. 10, figs 9–10.
1854 *Porites stellulata* m.; Reuss: 129, pl. 13, figs 9–10.
?1860 *Litharaea Goldfussi*; Milne Edwards: vol. 3, p. 189.
1860 *Porites stellulata* Reuss (1854); Milne Edwards: vol. 3, p. 189.
1860 *Coscinaraea mammillata*; Milne Edwards: vol. 3, p. 204.
1882 *Mesomorpha mammillata* (Reuss); Pratz: 114.
v1903*a* *Mesomorpha mammillata* Pratz (Reuss sp.); Felix: 225, text-figs 17–18.
1911 *Ahrdorffia stellulata* Reuss; Trauth: 97.
1914 *Mesomorpha mammillata* Reuss sp. 1854; Felix: pars 6, p. 111, pars 7, p. 185.
1914 *Ahrdorffia stellulata* Reuss sp. 1854; Felix: pars 7, p. 249.
1957 *Ahrdorffia mammillata* (Reuss); Alloiteau: pl. 4, fig. 10.
v1982 *Mesomorpha mammillata* (Reuss) 1854; Beauvais: vol. 2, p. 61, pl. 26, fig. 5 (older synonyms are cited therein).

v1982 *Mesomorpha stellulata* (Reuss) 1854; Beauvais: vol. 2, p. 63, pl. 26, figs 6a–b (older synonyms are cited therein).
v2000 *Mesomorpha mammillata* (Reuss, 1854); Baron-Szabo: 119, pl. 10, figs 2, 8.
?*2000b* *Litharaea goldfussi*, Milne-Edwards 1860; Löser: 48.
2000b *Mesomorpha mammillata* (Reuss 1854); Löser: 51.
v2001 *Mesomorpha mammillata* (Reuss, 1854); Baron-Szabo: 262, figs 1E, 3E.
v2002 *Mesomorpha mammillata* (Reuss, 1854); Baron-Szabo: 65, pl. 44, figs 7–8.
?*2002* *Goniopora goldfussi* (Milne Edwards, 1860); Baron-Szabo: 128.

DIMENSIONS. d = 2–2.5 mm, in later budding stages the corallite diameter can reach up to 3.5 mm, juvenile corallites are around 1.5 mm; c-c = 2–4 mm; s = 18–24, in late budding stages the number of septa may reach 30.

DESCRIPTION. Massive, thamnasterioid; corallites polygonal in outline; septa compact, confluent, sub- or non-confluent, nearly equal in thickness, and finely granulated laterally. About 10 septa reach the centre of the calice, where they meet and fuse with the columella. Anastomosis is a common feature. The columella is styliform. Synapticulae are very abundant and occur throughout the whole colony. Endotheca consists of numerous thin, slightly arched or cellular dissepiments.

REMARKS. In the specimens of the Middle–Upper Maastrichtian of the UAE/Oman border region (Baron-Szabo 2000), the majority of corallites are in the condition of multiplication, resulting in a larger corallite diameter and a larger number of septa. However, in calices that are not influenced by budding the calicinal diameter is 2 mm and the number of septa is around 20, thus closely agreeing with the type material of *Mesomorpha mammillata* (Reuss). Another similar species is represented by the form *M. forojuliensis* d'Archiardi, 1875, from the Eocene of Italy, with a corallite diameter of around 3 mm, but the number of septa can reach up to 60 in late budding stages.

Due to the lack of an illustration accompanying the original description and the absence of a designated type specimen, the taxonomic position of the species *Litharaea Goldfussi* Milne Edwards, 1860 from the Upper Maastrichtian of the Netherlands has been uncertain. However, in creating the new species Milne Edwards (1860: vol. 3, p. 189) clearly states that pali are absent, which excludes this species from the *Litharaea–Goniopora* group. Moreover, he unmistakably draws a connection to *P. stellulata* Reuss, which strongly suggests a relation to the genus *Mesomorpha*: 'Il nous paraît probable que le fossile décrit et figuré par M. Reuss, sous le nom de Porites stellulata (Mém. De l'Acad. De Vienne, 1854, t. VII, p. 129, pl. 13, fig. 9 et 10), appartient à cette division générique. En effet, nous n'y apercevons aucun indice de l'existence de palis. Il a été trouvé dans la formation crétacée de Gosau.'

TYPE LOCALITY OF SPECIES. Santonian of Austria (Gosau Group at Zimmergraben).

DISTRIBUTION. Upper Turonian–Senonian of Austria, Lower Coniacian (Corbières, Aude) and Upper Santonian of France, Middle–Upper Maastrichtian of the UAE/Oman border region, Upper Maastrichtian of the ?Netherlands.

Family **MEANDRINIDAE** Gray, 1847 (= Family Dendrogyridae Alloiteau, 1952*a*; = ?Family Diplocteniopsidae Zlatarski, 1968)

DIAGNOSIS. Solitary and colonial. Colony formation by intratentacular budding. Wall septothecal or rarely parathecal, costate. Septa formed by one fan system of simple trabeculae, exsert, margins minutely dentate. Columella lamellar or trabecular. Endothecal dissepiments well-developed. Exothecal dissepiments in some forms.

Subfamily **MEANDRININAE** Vaughan & Wells, 1943 (= Family Meandriidae Alloiteau, 1952*a*)

DIAGNOSIS. Solitary and colonial. Colony formation by intratentacular polystomodaeal intramural budding. Colonies pedunculated or free. Walls septothecal and solid, or parathecal, covered with beaded costae, rarely epithecate. Septa laminar, composed of one fan system of simple, very small trabeculae, upper margins minutely dentate, finely granulated laterally. Columella a thin lamella, usually continuous, very deep in the calice. Endotheca thin and vesicular. Exotheca developed in some genera.

Genus ***AULOSMILIA*** Alloiteau, 1952*a* (= *Placocyathus* Milne Edwards & Haime, 1848*c* (Type species. *P. nysti* Milne Edwards & Haime, 1848*c*, Cretaceous of Belgium).

TYPE SPECIES. *Trochosmilia archiaci* de Fromentel, 1867, Santonian of France (Corbières).

DIAGNOSIS. Solitary, trochoid, compressed, or flabellate. Costosepta compact, arranged in two or three irregular systems, marginally granular. Columella lamellar. Endothecal dissepiments abundant. Wall septothecal and septoparathecal. Epithecal wall can be present.

REMARKS. Specimens which have been assigned to the genus *Aulosmilia* generally show great overlap regarding the dimensions of their skeletal elements. Based on recent studies on the ontogenetical development of forms in this group (Baron-Szabo 2003) greater weight is given to the arrangement of the septal apparatus to separate species (e.g. in cycles as e.g. in *A. cuneiformis* and *A. protectans* or size orders as e.g. in *A. aspera*).

Aulosmilia aspera (Sowerby, 1832) (Pl. 14, fig. 1)

v*1832 *Turbinolia aspera*; Sowerby: 417, pl. 37, fig. 1.
1848*c* *Placocyathus Nysti*; Milne Edwards & Haime: vol. 2, p. 328.
1851*b* *Placosmilia ? Nysti*; Milne Edwards & Haime: 45.
1857 *Placosmilia ? Nysti*; Milne Edwards: vol. 2, p. 150.
pars1857 *Montlivaultia rudis*; Milne Edwards: vol. 2, p. 314.
1863 *Placosmilia arcuata* Milne Edwards & Haime; de Fromentel: 219, pl. 19, figs 1–4.

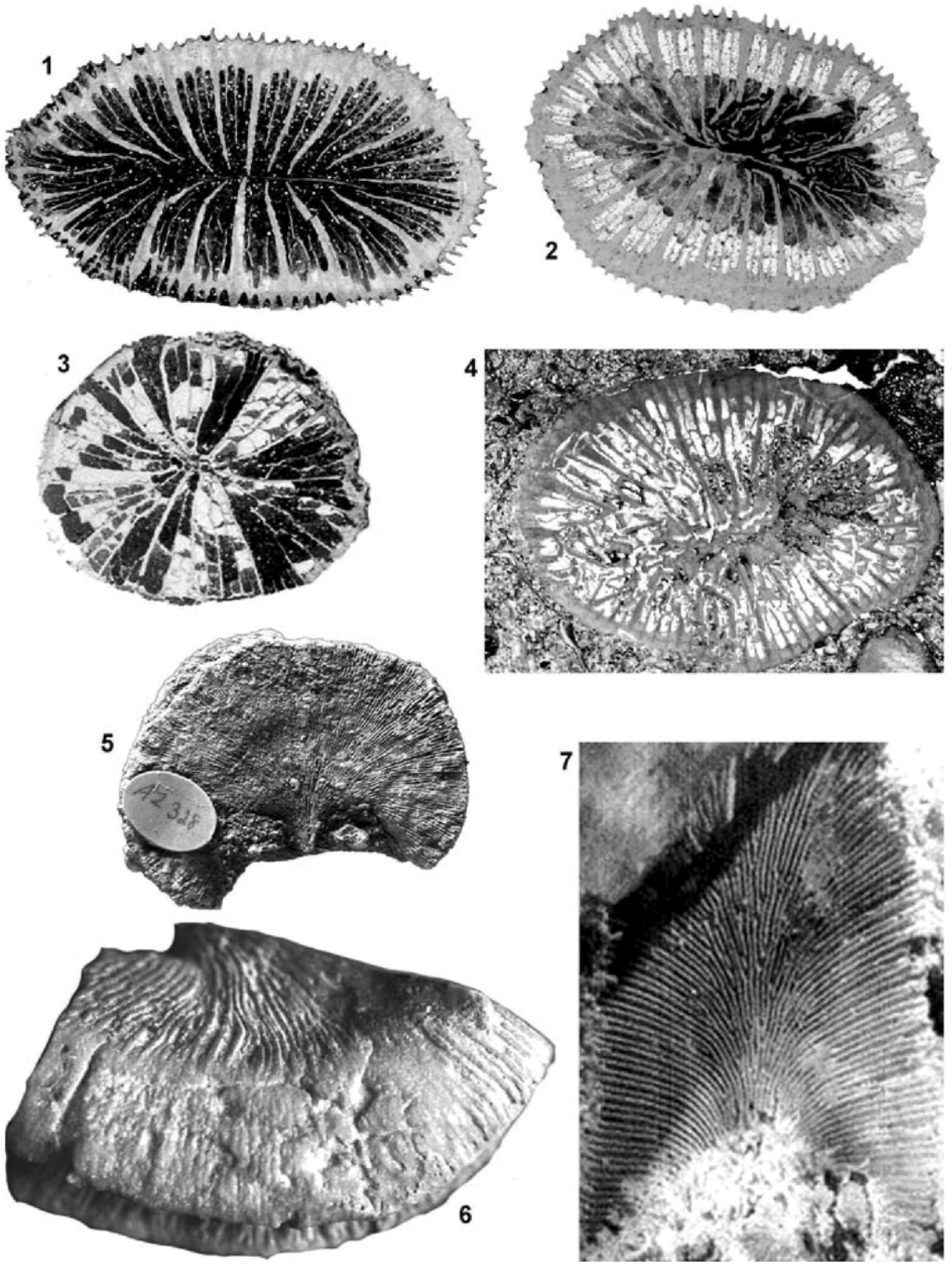


Plate 14 **Fig. 1** *Aulosmilia aspera* (Sowerby, 1832), cross thin section, Coates coll. NMNH, no. J-71-128A, Middle–Upper Maastrichtian of Jamaica, ×3.5. **Fig. 2** *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848*c*), cross thin section, Coates coll. NMNH, no. J-71-14b, Maastrichtian of Jamaica, ×3.5. **Fig. 3** *Phragmosmilia lineata* (Goldfuss, 1826), cross thin section, BMNH, AZ 60, Middle–Upper Maastrichtian of the UAE/Oman border region, ×4. **Fig. 4** *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848*c*), cross thin section, GBA, HG3-A, Paleocene of Austria, ×4.5. **Fig. 5** *Diploctenium lunatum* (Bruguière, 1792), upper surface, longitudinal view, BMNH, AZ 328, Middle–Upper Maastrichtian of the UAE/Oman border region, ×2. **Fig. 6** *Diploctenium cordatum* Goldfuss, 1827, holotype, upper surface, lateral view, IPB, Goldfuss coll., no. 288, Upper Maastrichtian of the Netherlands, ×3. **Fig. 7** *Diploctenium plumum* Goldfuss, 1827, holotype, cast, upper surface view, IPB, Goldfuss coll., no. 176b, Upper Maastrichtian of the Netherlands, ×5.

v1867 *Trochosmilia Archiaci*; de Fromentel: 265, pl. 61, fig. 2, pl. 72, fig. 1.
parsv1903*a* *Placosmilia cuneiformis* Milne Edwards & Haime; Felix: 337, text-figs 61–63.
pars1914 *Trochosmilia Archiaci* de Fromentel 1862; Felix: pars 7, p. 213.
pars1914 *Trochosmilia chondrophora* Felix 1903; Felix: pars 7, p. 213.
1914 *Placosmilia Nysti* E. H. sp. 1848; Felix: pars 7, p. 223.
1930 *Placosmilia decora* n. sp.; Oppenheim: 528, pl. 26, fig. 2.
1970 *Aulosmilia* sp.; Hassan & Salama: 81, pl. 1, fig. 2.
1974 *Aulosmilia aspera* (Sowerby); Beauvais & Beauvais: 485.
(v)1982 *Aulosmilia aspera* (Sowerby) 1833; Beauvais: vol. 1, p. 218, pl. 18, figs 6a–c, pl. 19, figs 2a–h.
1987 *Aulosmilia aspera* (Sowerby); Kuzmicheva: 61.
v1998 *Aulosmilia aspera* (Sowerby); Baron-Szabo: 139, pl. 3, fig. 5, text-fig. 4.
v1999 *Aulosmilia cuneiformis* (Milne Edwards & Haime); Baron-Szabo: 449, pl. 5, fig. 1.
v1999 *Aulosmilia aspera* (Sowerby); Baron-Szabo: 449, pl. 6, fig. 5.
2000b *Aulosmilia aspera* (Sowerby 1832); Löser: 14.
v2002 *Aulosmilia aspera* (Sowerby); Baron-Szabo: pl. 45, figs 1–4.
2002 *Placosmilia nysti* Milne Edwards & Haime, 1848; Baron-Szabo: 52.
v2003 *Aulosmilia aspera* (Sowerby); Baron-Szabo: 127, pl. 10, figs 1–6, pl. 11, figs 1–6, pl. 12, figs 1–6.

DIMENSIONS. d (max) = 22–25 mm; d (min) = 13–16 mm; s = 96–110.

DESCRIPTION. Solitary, trochoid, elongated in outline. Costosepta compact, thin, long, arranged in three cycles in 24 systems. Twenty-four septa reach the center of the corallite, where they become slightly curved or flexuous. Septal inner ends cuneiform or terminate into claviform thickenings, sometimes fusing with the columella. S2 distinctly thinner, reach about half the length of S1. S3 very thin, short. Columella lamellar, thin. Endothecal dissepiments vesicular, mainly occur in peripheral region of corallum. Wall septothecal.

REMARKS. Milne Edwards & Haime (1848*c*: 328) described the holotype of *Placocyathus nysti*, later assigned to the genus *Placosmilia* by the same authors, as a compressed corallum having a thick wall, a well-developed lamellar columella and five complete septal cycles in a corallite with a diameter of 15 × 10 mm. According to the original description, it can be assumed that *Placosmilia (Placocyathus) nysti* rather represents a solitary form, which would exclude it from the colonial genus *Placosmilia*. Moreover, the presence of a thick wall differs from the latter genus as well, but corresponds to the genus *Aulosmilia*. Considering recent investigation on the ontogenetical stages of *Aulosmilia* carried out by Baron-Szabo (2003), the form *Placosmilia nysti* fits well into the ontogenetical series of *Aulosmilia aspera*. However, because the holotype of *Placosmilia nysti* could not be studied, its new assignment is only tentative.

TYPE LOCALITY OF SPECIES. Turonian–Campanian of Austria (Gosau Group).

DISTRIBUTION. Cretaceous of Belgium, Turonian–Campanian of Austria (Gosau Group), Middle Coniacian and Upper Santonian of southern France (Corbières, Provence), Campanian of northern Spain, Middle–Upper Maastrichtian of Jamaica (this paper) and of the UAE/Oman border region, Paleocene of Egypt.

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica, NMNH, Coates coll. sample nos.: J-71-128A (=Ducketts Land Settlement); 590a (= probably Maldon Inlier).

Aulosmilia cuneiformis (Milne Edwards & Haime, 1848*c*) (Pl. 14, figs 2, 4)

*1848*c* *Placosmilia cuneiformis*; Milne Edwards & Haime: vol. 4, p. 234.
v1870 *Placosmilia cuneiformis* Milne Edwards & Haime; Duncan: vol. 2, p. 27, pl. 10, figs 1–5.
parsv1903*a* *Placosmilia cuneiformis* M. Edw. et H.; Felix: 337, ?text-figs 61–63.
pars1914 *Placosmilia cuneiformis* E. H. 1849; Felix: pars 6 and 7, p. 129–130, 222.
v1936 *Trochosmilia guerini*; Bataller: 10, figs 23–27.
parsv1936 *Trochosmilia manduleyi*; Bataller: 10, figs 28, ?30, ?31, non 29, non 32.
v1936 *Trochosmilia marini*; Bataller: 10, figs 33–37.
1936 *Trochocyathus Besairiei* (nov. sp.); Alloiteau: 10, pl. 6, figs 20–23.
v1957 *Placosmilia cuneiformis* Milne Edwards & Haime; Alloiteau: 56.
(v)1978 *Aulosmilia cuneiformis* (Milne-Edwards et Haime 1849); Turnšek: 71, 104, pls. 1–2.
?1984 *Flabellum pugaensis* sp. nov.; Pal *et al.*: 61, pl. 3, figs 24–25.
non1996 *Aulosmilia cuneiformis* (Milne Edwards & Haime); Metwally: 384, figs 3f–g.
1996 *Aulosmilia compressa* (Lamarck); Metwally: 384, figs 4a–b.
v1997 *Aulosmilia cuneiformis* (Milne-Edwards & Haime, 1849); Baron-Szabo: 74, pl. 9, fig. 6.
v1999 *Aulosmilia cuneiformis* (Milne-Edwards & Haime, 1849); Baron-Szabo: 449, pl. 5, fig 1.
2000b *Aulosmilia cuneiformis* (Milne-Edwards & Haime 1848); Löser: 14.
v2002 *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848); Baron-Szabo: 66, pl. 45, figs 5–7.

DIMENSIONS. d (min) = 13–22 mm; d (max) = 18–26 mm; s = 96 to around 140; h = up to 45 mm.

DESCRIPTION. Solitary, trochoid to subflabellate; costosepta compact, long, arranged in five cycles in six systems; in larger specimens the beginning of a sixth cycle is present; septa alternate in length and thickness; 24 septa reach the centre of the corallite, where they become slightly curved or flexuous; septal axial ends cuneiform to rhopaloid; columella lamellar, thin, continuous or discontinuous; endothecal dissepiments vesicular, mainly occurring in the peripheral region of corallum.

REMARKS. The specimen described and illustrated as *Aulosmilia cuneiformis* (Milne Edwards & Haime) from the Upper Maastrichtian of the Oman Mountains in Metwally (1996) seems to rather correspond to the genus *Phyllosmilia*.

TYPE LOCALITY OF SPECIES. Santonian of France (Corbières).

DISTRIBUTION. Cenomanian of England, Turonian–Campanian of Austria (Gosau Group), Coniacian–Santonian of southern France, Santonian–Campanian of Croatia and Slovenia, Senonian of Germany, Upper Senonian of Madagascar, Campanian–Maastrichtian of ?India (Ladakh), Maastrichtian of Jamaica (this paper) and northern Spain, Upper Maastrichtian of UAE (Oman Mountains), Paleocene of Austria (this paper).

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll. sample nos.: J-71-14b (=Road Sunderland-Black Shop); Paleocene of Austria, GBA, sample no.: HG3-A.

Genus ***PHRAGMOSMILIA*** Alloiteau, 1952*a*

TYPE SPECIES. *Trochosmilia inconstans* de Fromentel, 1862, Upper Santonian of France (Aude).

DIAGNOSIS. Solitary, trochoid, compressed, elliptical or subcircular in outline. Calicinal pit elongated. Costosepta compact, radial, in subequal systems. Granulated laterally. Columella lamellar, thin. Endothecal dissepiments vesicular, numerous. Wall septothecal. Multilamellar epitheca present.

Phragmosmilia lineata (Goldfuss, 1826) (Pl. 14, fig. 3)

v*1826 *Turbinolia lineata*; Goldfuss: 108, pl. 37, figs 18a–b.
1848*c* *Turbinolia lineata*; Milne Edwards & Haime: vol. 9, p. 335.
1851*b* *Trochocyathus lineatus*; Milne Edwards & Haime: 23.
v1862 *Trochosmilia inconstans*; de Fromentel: 266, pl. 30, figs 1–1b, pl. 33, figs 1–1d.
v1982 *Phragmosmilia inconstans* (de Fromentel) 1862; Beauvais: vol. 1, p. 226.
v1982 *Phragmosmilia lineata* (Goldfuss) 1826; Beauvais: vol. 1, p. 227, pl. 20, fig. 1 (older synonyms cited therein).
1986 *Phragmosmilia inconstans*; Tchéchmédjiéva: 60ff.
v1998 *Phragmosmilia lineata* (Goldfuss, 1826); Baron-Szabo: 138, pl. 2, fig. 5.
2000b *Phragmosmilia inconstans* (de Fromentel 1862); Löser: 61.
2000b *Phragmosmilia lineata* (Goldfuss 1826); Löser: 61.
v2000 *Phragmosmilia lineata* (Goldfuss, 1826); Baron-Szabo: 112, pl. 6, fig. 2.
v2002 *Phragmosmilia inconstans* (Fromentel, 1862); Baron-Szabo: 66, pl. 46, fig. 1–2.
v2002 *Phragmosmilia lineata* (Goldfuss, 1826); Baron-Szabo: 66, pl. 46, fig. 3–6.

DIMENSIONS. Specimen of the Middle–Upper Maastrichtian of the UAE/Oman border region: d = 12 × 15 mm; s = *ca.* 80; specimens of the Maastrichtian of Spain e.g.: d = 30 × 40 mm; s = around 140; d = 27 × 36 mm, s = around 120.

DESCRIPTION. The corallum is simple, trochoid, subcircular or elliptical in outline; costosepta straight or wavy, arranged in five complete cycles in six systems in adult stages, regularly or irregularly alternating in thickness; granules and vertical carinae laterally; up to three cycles of septa extend to the axial region, where their inner ends may fuse with the columella; columella thin, lamellar, discontinuous; endothecal dissepiments very abundant, vesicular.

REMARKS. In the holotype of *Phragmosmilia lineata* the number of septa is around 30 measured at the base of the corallum, which has a calicinal diameter of 4 × 6 mm. In its most adult stage the corallite diameter is 19 × 23 mm, bearing 96 septa arranged in five cycles in six systems. It is suggested that the specimens from the Upper Santonian of France, the Middle–Upper Maastrichtian of the UAE/Oman border region, and the Maastrichtian of northern Spain represent different ontogenetical stages of the same species.

TYPE LOCALITY OF SPECIES. Turonian–Campanian of Austria (Gosau Group).

DISTRIBUTION. Turonian and Upper Campanian of Bulgaria, Turonian–Campanian of Austria (Gosau Group), Upper Santonian of France, Campanian of northern Spain (Catalonia), Middle–Upper Maastrichtian of the UAE/Oman border region.

Genus ***PHYLLOSMILIA*** Fromentel, 1862

TYPE SPECIES. *Turbinolia basochesi* Defrance, 1828, Upper Santonian of France (Figuères).

DIAGNOSIS. Solitary, compressed-flabellate, with costae forming continuous outer ridges. Costosepta compact, arranged in two or three size orders, bilaterally, granulated. Columella lamellar, continuous. Endothecal dissepiments thin, vesicular, forming a stereozone. Epitheca present. Wall septothecal.

Phyllosmilia cf. didymophila (Felix, 1903*a*) (Fig. 32)

pars v*1903*a* *Trochosmilia didymophila* nov. sp.; Felix: 332–334, pl. 24, fig. 3 non fig. 6.
1914 *Trochosmilia didymophila* Felix 1903; Felix: pars 7, p. 214.
1936 *Phyllosmilia catalaunica* Bataller; Bataller: 11, figs 40–44.
1937*a* *Phyllosmilia catalaunica* Bataller; Bataller: 251, fig. on p. 251.
1945 *Phyllosmilia catalaunica* Bataller; Bataller: 58, fig. on p. 99.
1980 *Phyllosmilia catalaunica* Bataller; Vidal: 49–50, pl. 9, figs 1–3.
1982 *Phyllosmilia didymophila* (Felix) 1903; Beauvais: vol. 1, pp. 156–157, pl. 13, fig. 7.
cf.1996 *Aulosmilia cuneformies* (Milne-Edwards & Haime); Metwally: 384, figs 3f–g.
v1998 *Phyllosmilia didymophila* (Felix, 1903); Baron-Szabo: 143, pl. 7, fig. 2.
2000b *Phyllosmilia catalaunica*, Bataller 1936; Löser: 62.
2000b *Phyllosmilia didymophila* (Felix 1903); Löser: 62.

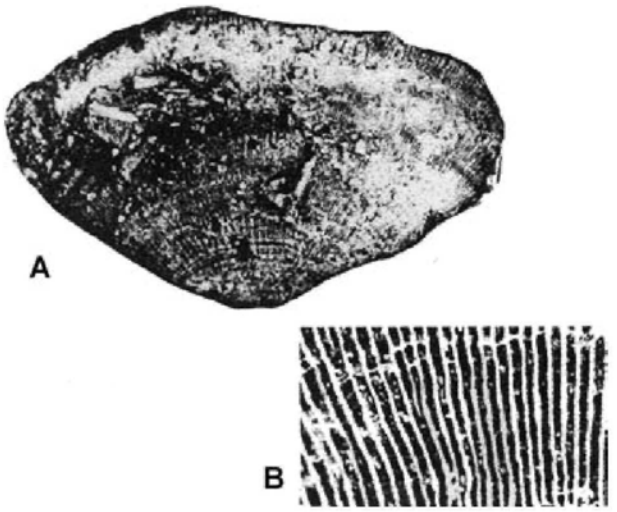


Figure 32 *Phyllosmilia* cf. *didymophila* (Felix, 1903*a*) based on the illustrations in Metwally (1996). **A**, Upper Maastrichtian of the Oman Mountains, upper surface longitudinal view, ×1.7; **B**, close-up, ×3.

2002 *Phyllosmilia didymophila* (Felix, 1903); Baron-Szabo: 68.
v2003 *Phyllosmilia didymophila* (Felix, 1903); Baron-Szabo: 129, pl. 13, figs 1–6, pl. 14, figs 1–12, pl. 15, figs 1–6.

DIMENSIONS. d (max) = 40 mm; s/mm = 12–17/5; h = 27 mm.

DESCRIPTION. Flabelliform corallum; calice long and narrow; costosepta equal in thickness; columella thin.

REMARKS. Up to now, representatives of *Phyllosmilia didymophila* (Felix, 1903*a*) have not been reported from the Maastrichtian. However, the specimen documented in Metwally (1996: figs 3f–g, also see www.schweizerbart.de) as *Aulosmilia cuneiformis* (Milne Edwards & Haime) from the Maastrichtian of the Oman Mountains corresponds very well with the genus *Phyllosmilia* and seems related to the type of *Phyllosmilia didymophila*. Because the description in Metwally (1996) lacks information on the dimension of the minimum diameter and septal size orders, its specific assignment is provisional.

TYPE LOCATION OF SPECIES. Santonian of Austria (Gosau Group at Grabenbach).

DISTRIBUTION. Coniacian–Campanian of northern Spain (Catalonia), Santonian of Austria (Gosau Group), Upper Maastrichtian of the Oman Mountains.

Genus ***DIPLOCTENIUM*** Goldfuss, 1827

TYPE SPECIES. *Diploctenium cordatum* Goldfuss, 1827, Maastrichtian of the Netherlands (St. Pietersberg, Maastricht).

DIAGNOSIS. Colonial, pedunculated, flabelloid. Calicular series inclined or curved towards the base, in some cases the ends of the series meet or even pass each other. Costosepta compact, finely granulated laterally. Costae bifurcating and trifurcating. Columella lamellar, continuous. endothecal dissepiments few in number, vesicular. Wall septothecal, forming a stereozone.

REMARKS. Bendukidze (1956, 1965) studied the stages of ontogeny of specimens of *Diploctenium lunatum* (Bruguière). She concluded that skeletal elements and their dimensions in this species are directly dependent upon environment. Moreover, within the same specimen each stage of ontogeny closely corresponds to a different nominal species of *Diploctenium*. These results completely agree with investigations on ontogenetical stages of specimens of *Diploctenium* from the Santonian of Austria (Gosau Group) carried out by Baron-Szabo (2003). Based on the results of these investigations it can be concluded that stable specific characters are reflected in the density of septa and number of septal orders in relation to the width of the calicinal series.

Diploctenium cordatum Goldfuss, 1827 (Pl. 14, fig. 6)

pars*v1827 *Diploctenium cordatum*; Goldfuss: vol. 1, p. 51, pl. 15, figs 1a–e, non pl. 37, figs 16 a–c.
1828 *Diploctenium cordatum*; Morren: 51.
1849*b* *Diploctenium cordatum*; Milne Edwards & Haime: vol. 4, p. 249.
1851–52 *Diploctenium cordatum* Goldfuss; Bronn: 2, p. 164, pl. 29, figs 10 a–c.
1857 *Diploctenium cordatum*; Milne Edwards: vol. 2, p. 169.
1857 *Diploctenium cordatum*; Pictet: vol. 4, p. 384, pl. 104, fig. 6.
1858–61 *Diploctenium cordatum*; de Fromentel: 96.
1881 *Diploctenium cordatum*; Quenstedt: 842, pl. 176, fig. 36.
1914 *Diploctenium cordatum* Goldfuss, 1826; Felix: pars 7, p. 225.
1925 *Diploctenium cordatum* Goldf.; Umbgrove: 117.
?1996 *Diploctenium conjungens* Reuss; Metwally: 386, figs 4 d–f.
1999 *Diploctenium cordatum*; Leloux: 193, fig. 2.
2000b *Diploctenium cordatum*, Goldfuss 1826; Löser: 31.
2002 *Diploctenium cordatum* Goldfuss, 1827; Baron-Szabo: 68.

DIMENSIONS. Height of corallum from stem to upper surface = 22 mm; d (min) = 8 mm; d (max) = 31 mm; s/mm = 15–16/5.

DESCRIPTION. Flabelloid corallum; costosepta straight or slightly bent, arranged in four size orders, alternating in length and thickness; axial ends of oldest septa are claviform; columella lamellar, thin.

TYPE LOCALITY OF SPECIES. Upper Maastrichtian of the Netherlands (St. Pietersberg).

DISTRIBUTION. Upper Maastrichtian (-?Danian) of the Netherlands, Upper Maastrichtian of the ?Oman Mountains.

Diploctenium ferrumequinum Reuss, 1854 (Pl. 15, fig. 6)

pars v*1854 *Diploctenium ferrum equinum*; Reuss: 89, pl. 1, fig. 13, non fig. 14.

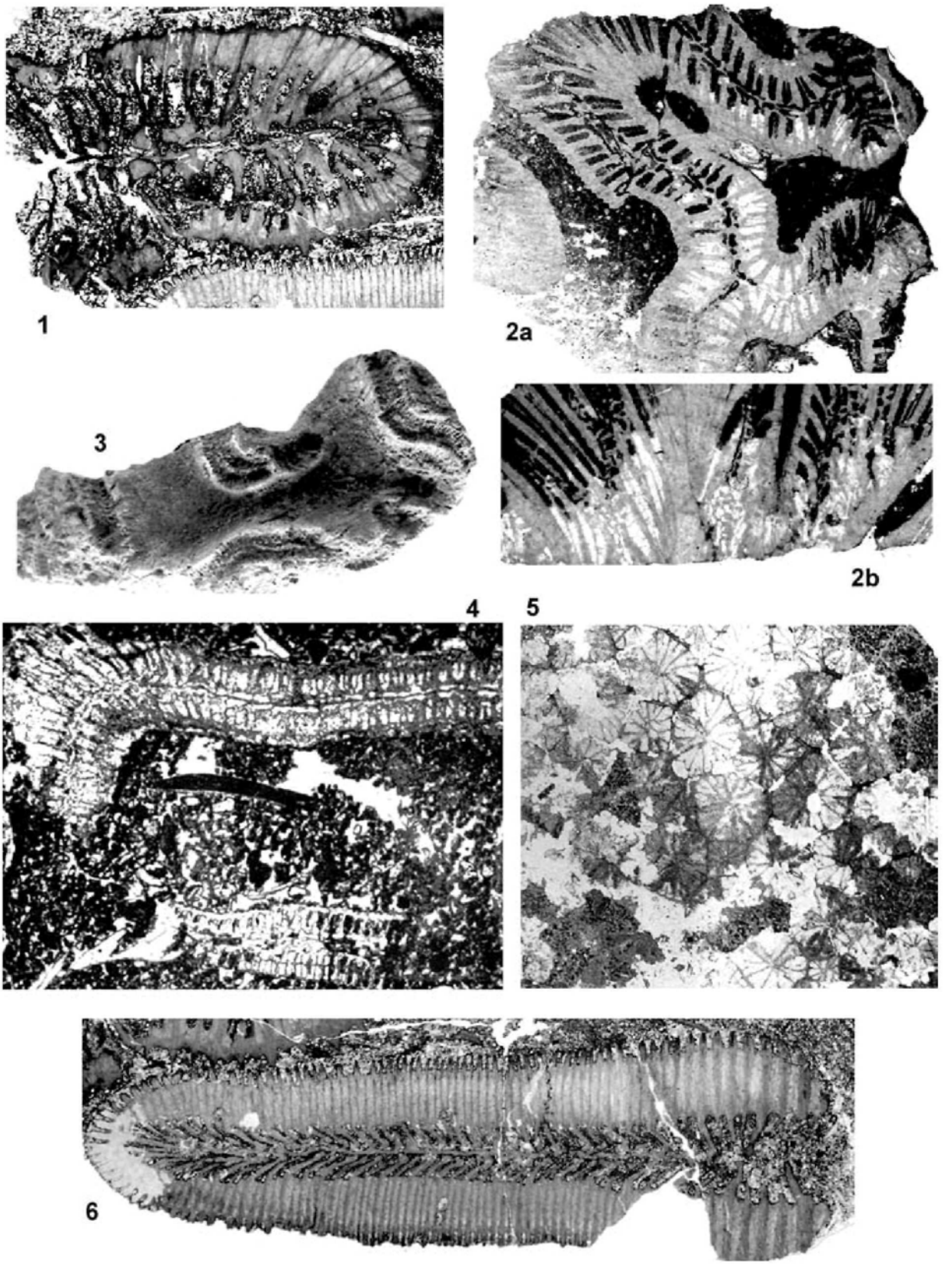


Plate 15 **Fig. 1** *Flabellosmilia* cf. *bisinuatum* (Reuss, 1854), cross thin section, GBA, HG3-CII, Paleocene of Austria, ×4. **Fig. 2** *Pachygyra princeps* Reuss, 1854, Coates coll. NMNH, no. J-71-1303, Upper Maastrichtian of Jamaica. **2a**, cross thin section, ×4; **2b**, longitudinal cross section, ×4. **Fig. 3** *Pachygyra savii* d'Achiardi, 1866, topotype, Paleontological Institute, Pisa d'Achiardi 1875 coll., not cataloged, Middle Eocene of Italy, ×2.5. **Fig. 4** *Pachygyra savii* d'Achiardi, 1866, cross thin section of sample D6303 as figured in Schuster (1996: pl. 18, fig. 2a), Lower Paleocene of Egypt, ×3. **Fig. 5** *Glenarea cretacea* Počta, 1887, cross thin section, BMNH, AZ 429, Middle–Upper Maastrichtian of the UAE/Oman border region, ×2.5. **Fig. 6** *Diploctenium ferrumequinum* Reuss, 1854, cross thin section, GBA, HG3-CI, Paleocene of Austria, ×4.5.

v1854 *Diploctenium pavoninum*; Reuss: 91, pl. 1, fig. 5.
1857 *Diploctenium ferrum equinum*; Milne Edwards: vol. 2, p. 168.
1857 *Diploctenium pavoninum*; Milne Edwards: vol. 2, p. 170.
1858–61 *Diploctenium ferrum equinum* Reuss; de Fromentel: 96.
1858–61 *Diploctenium pavoninum*; de Fromentel: 96.
1881 *Diploctenium lunatum* (Bruguière); Quenstedt: vol. 4, p. 843, pl. 176, fig. 37.
1885 *Diploctenium lunatum* (Bruguière); Quenstedt: 1011, pl. 82, fig. 2.
1899 *Diploctenium ferrum equinum* Reuss; Felix: 381.
v1903*a* *Diploctenium ferrum equinum* Reuss; Felix: 351.
v1903*a* *Diploctenium pavoninum* Reuss; Felix: 351.
1914 *Diploctenium ferrum equinum* Reuss 1854; Felix: pars 7, p. 225.
1930 *Diploctenium ferrum equinum* Reuss; Oppenheim: 530, pl. 41, figs 13–13a.
1937*b* *Diploctenium ferrum equinum* Reuss; Bataller: 308.
1952*c* *Diploctenium ferrum equinum* Reuss; Alloiteau: 545, pl. 20, fig. 14.
(v)1978 *Diploctenium ferrumequinum* Reuss 1854; Turnšek: 48 (108), pl. 6, figs 5–6.
v1982 *Diploctenium ferrum equinum* Reuss 1854; Beauvais: vol. 1, p. 162, pl. 13, fig. 8, pl. 14, fig. 2.
v1982 *Diploctenium reussi* nov. sp.; Beauvais: vol. 1, p. 171, pl. 14, fig. 6.
v1982 *Diploctenium pavoninum* Reuss 1854; Beauvais: vol. 1, p. 173, pl. 14, fig. 7.
2000b *Diploctenium ferrumequinum*, Reuss 1854; Löser: 31.
2000b *Diploctenium pavoninum*, Reuss 1854; Löser: 31.
v2002 *Diploctenium ferrumequinum* Reuss, 1854; Baron-Szabo: 69, pl. 48, figs 8–9.
v2003 *Diploctenium ferrumequinum* Reuss, 1854; Baron-Szabo: 130, pl. 16, figs 1–9.

DIMENSIONS. d (max, adult) = 60 mm; d (min, adult) = 8–11 mm; height of corallum from the extremities to upper surface = up to 60 mm; height of corallum from stem to upper surface = 17 mm; s/mm (adult) = 20–24/10; s/mm (juvenile) = 28–40/10.

DESCRIPTION. Flabelliform, conical-compressed in juvenile stages, hoof-shaped in adult stages; costosepta arranged in two size orders, regularly alternating; axial ends of oldest septa claviform or rhopaloid.

TYPE LOCALITY OF SPECIES. Upper Santonian of Austria (Gosau Group at Nefgraben).

DISTRIBUTION. Senonian of Croatia, Santonian–Campanian of Austria (Gosau Group), Upper Santonian of southern France (Corbières, Provence), Upper Santonian and Lower Maastrichtian of northern Spain (Catalonia), Paleocene of Austria (this paper).

NEW MATERIAL. Paleocene of Austria, GBA, sample no.: HG3-C-I.

Diploctenium plumum Goldfuss, 1827 (Pl. 14, fig. 7)

1799 *Polypier en forme de feuille*; Faujas-Saint-Fond: 191, pl. 35, figs 3–4.
v*1827 *Diploctenium pluma*; Goldfuss: vol. 1, p. 51, pl. 15, figs 2a–c.
1828 *Diploctenium pluma*; Morren: 51.
1849*b* *Diploctenium pluma*; Milne Edwards & Haime: vol. 4, p. 250.
1851*b* *Diploctenium pluma*; Milne Edwards & Haime: 150.
1851–52 *Diploctenium pluma* Goldfuss; Bronn: 2, p. 165.
1857 *Diploctenium pluma*; Milne Edwards: vol. 2, p. 170.
1864 *Diploctenium pluma*; de Fromentel: 252.
1914 *Diploctenium pluma* Goldfuss, 1826; Felix: pars 7, p. 227.
1925 *Diploctenium pluma* Goldf.; Umbgrove: 117.
1999 *Diploctenium pluma*; Leloux: 193, fig. 2.
2000b *Diploctenium pluma*, Goldfuss 1826; Löser: 31.
v2002 *Diploctenium pluma* Goldfuss, 1827; Baron-Szabo: 69, pl. 48, fig. 3.

DIMENSIONS. Height of corallum from stem to upper surface = 16 mm; height of corallum from the extremities to upper surface = 20 mm; d (min) = 5 mm; d (max) = 14 mm; s/mm = 20–25/5.

DESCRIPTION. Flabelliform corallum; costosepta thin, numerous, arranged in three size orders, regularly alternating; columella well-developed, lamellar, continuous.

TYPE LOCALITY OF SPECIES. Upper Maastrichtian of the Netherlands.

DISTRIBUTION. Upper Maastrichtian of the Netherlands.

Diploctenium lunatum (Bruguière, 1792) (Pl. 14, fig. 5)

*1792 *Madrepora lunata*; Bruguière: vol. 1, p. 461, pl. 24, figs 5–6.
pars v1827 *Diploctenium cordatum*; Goldfuss: 105, pl. 37, fig. 16, non pl. 15, figs 1a–c.
1849*b* *Diploctenium lunatum* (Bruguière); Milne Edwards & Haime: 3e sér., vol 10, p. 248.
1850 *Diploctenium golfussianum*; d'Orbigny: vol. 2, p. 276.
1851*b* *Diploctenium lunatum*; Milne Edwards & Haime: 50.
1846 *Diploctenium lunatum*; Michelin: 289, pl. 65, fig. 8.
1854 *Diploctenium lunatum* Michelin; Reuss: 88, pl. 1, figs 7–12.
1863 *Diploctenium lunatum*; de Fromentel: 248, pl. 14, fig. 3.
non1881 *Diploctenium lunatum* (Bruguière); Quenstedt: 843, pl. 176, fig. 37.
non1885 *Diploctenium lunatum* (Bruguière); Quenstedt: 1011, pl. 82, fig. 2.
1892 *Diploctenium lunatum* (Bruguière); Mallada: 160.

v1903*a* *Diploctenium lunatum* Bruguière sp. 1792; Felix: 347, fig. 65.
1930 *Diploctenium angusterimatum* (Bruguière); Oppenheim: 533, pl. 41, figs 10, 10a.
1937*a* *Diploctenium lunatum* Bruguière sp. 1792; Bataller: 243.
1941 *Diploctenium lunatum* (Bruguière); Alloiteau: 51, pl. 21, figs 1–3.
1952*c* *Diploctenium lunatum* (Bruguière); Alloiteau: 542, fig. 4.
1954 *Diploctenium Pachecoi*; Bataller: 83.
1956 *Diploctenium lunatum* (Bruguière) Michelin; Bendukidze: 112–113, pls 4–5.
1959 *Diploctenium Pachecoi* Bataller 1953; Bataller: 32, text-fig. on p. 32.
1965 *Diploctenium lunatum* (Bruguière) Michelin; Bendukidze: 20–24, pl. 2–4.
1982 *Diploctenium lunatum* (Bruguière); Beauvais: vol. 1, p. 164–167 (older synonyms cited therein).
v1998 *Diploctenium lunatum* (Bruguière); Baron-Szabo: 143, pl. 7, fig. 3.
2000b *Diploctenium lunatum* (Bruguière 1792); Löser: 31.
v2000 *Diploctenium lunatum* (Bruguière, 1792); Baron-Szabo: 110, pl. 5, figs 5, 7.
2002 *Diploctenium golfussianum*, d'Orbigny, 1850; Baron-Szabo: 69.
2002 *Diploctenium lunatum* (Bruguière, 1792): Baron-Szabo: 69.

DIMENSIONS. Height of corallum from stem to upper surface = 17–28 mm; height of corallum from the extremities to upper surface = 12–46 mm; d (min) = 3–9 mm; d (max) = 20–130 mm; s/mm = 12–15/5.

DESCRIPTION. Flabelliform corallum, sometimes strongly arched so that ends of calicinal series meet, forming a disc-like corallum; costosepta straight, developed in two to three size orders; S1 extend to, and may fuse with, the columella; S2 nearly equal in thickness, but slightly alternating in length; axial ends of septa can be slightly thickened; columella thin, lamellar; generally continuous.

TYPE LOCALITY OF SPECIES. Upper Santonian of southern France (Corbières).

DISTRIBUTION. Upper Cretaceous of Romania, Santonian–Campanian of Austria (Gosau Group), Turonian and Santonian–Maastrichtian of northern Spain (Catalonia), Upper Santonian of southern France (Provence and Corbières), Upper Maastrichtian of the UAE/Oman border region.

Genus ***FLABELLOSMILIA*** Oppenheim, 1930

TYPE SPECIES. *Flabellum bisinuatum* Reuss, 1854, Santonian of Austria (Gosau Group).

DIAGNOSIS. Solitary. Flabelliform, free. Elongated opposing end costae present. Costosepta compact, exsert, finely granulated laterally. Columella lamellar, thin, continuous, in early ontogenetical stages continuous or discontinuous. Endothecal dissepiments vesicular. Wall septothecal.

Flabellosmilia* cf. *bisinuatum (Reuss, 1854) (Pl. 15, fig. 1)

v*1854 *Flabellum bisinuatum*; Reuss: 81, pl. 16, figs 11–12.
v1854 *Flabellum subcarinatum*; Reuss: 81, pl. 20, figs 5–6.
v1903*a* *Flabellum bisinuatum* Reuss; Felix: 352.
v1903*a* *Flabellum subcarinatum* Reuss; Felix: 352.
1914 *Flabellum bisinuatum* Reuss 1854; Felix: pars 7, p. 232.
1914 *Flabellum subcarinatum* Reuss 1854; Felix: pars 7, p. 232.
1930 *Flabellosmilia bisinuatum* (Reuss); Oppenheim: 539, pl. 41, figs 3–4.
1930 *Flabellosmilia subcarinatum* (Reuss); Oppenheim: 540, pl. 41, figs 3, 4, 4a.
1943 *Flabellosmilia subcarinatum* (Reuss); Vaughan & Wells: 327, pl. 35, figs 4, 4a.
1956 *Flabellosmilia subcarinatum* (Reuss); Wells: F414, figs 314, 1a, 1b.
v1982 *Flabellosmilia bisinuatum* (Reuss) 1854; Beauvais: vol. 1, p. 176, pl. 14, fig. 8.
2002 *Flabellosmilia subcarinatum* (Reuss 1854); Löser: 307 (older synonyms cited therein).
v2002 *Flabellosmilia bisinuatum* (Reuss, 1854); Baron-Szabo: 69, pl. 49, figs 1–5.
v2003 *Flabellosmilia bisinuatum* (Reuss, 1854); Baron-Szabo: 131, pl. 17, figs 1–7, pl. 18, figs 1–8.

DIMENSIONS. d (max, adult) = up to 40 mm (in the type and topotype series of the species); d (min, adult) = up to 17 mm (in the type and topotype series of the species); h = up to 30 mm (in the type and topotype series of the species); s/mm (adult) = 10–14/5; s/mm (juvenile) = 12–16/5 (in the type and topotype series of the species).

DESCRIPTION. Flabellate corallum with a minimum diameter of 13 mm and a maximum diameter of ?40 mm; costosepta straight or slightly wavy, developed in three to four size orders, alternating in length and thickness.

REMARKS. Only a single fragmentary specimen was obtained from the Paleocene of Austria. The dimensions of its skeletal elements, as far as can be observed, completely correspond to those in the type material of the species *Flabellosmilia bisinuatum* which are presented above (Baron-Szabo 2003).

TYPE LOCALITY OF SPECIES. Santonian–Lower Campanian of Austria (Gosau Group at Zimmergraben).

DISTRIBUTION. Coniacian of Armenia, Santonian–Lower Campanian of Austria (Gosau Group), Campanian–Maastrichtian of Slovakia, Paleocene of Austria (this paper).

NEW MATERIAL. Paleocene of Austria, GBA, sample no. HG3-C-II.

(?) ***Flabellosmilia vaughani*** (Stephenson, 1916) (Fig. 33)

v*1916 *Trochocyathus ? vaughani*, sp. nov.; Stephenson: 752, pl. 48, figs 5–6.
1933 *Platytrochus vaughani* (Stephenson); Wells: 122, pl. 12, fig. 4, pl. 14, figs 13–14.
1936 *Flabellosmilia Santasusanai* Bataller; Bataller: 11, text-fig on p. 11.

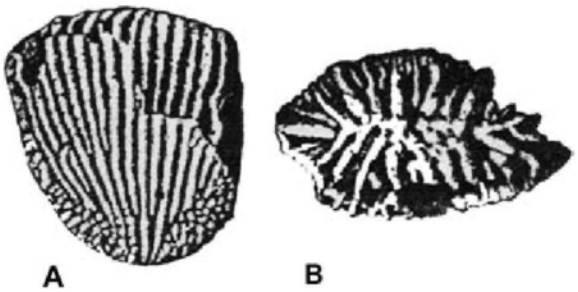


Figure 33 (?) *Flabellosmilia vaughani* (Stephenson, 1916), holotype, NMNH I147655, Maastrichtian of the USA, upper surface; **A**, longitudinal view, ×7.5; **B**, cross view, ×9.5.

v1994 *Tropidocyathus seymouriensis* n. sp.; Filkorn: 51, figs 17 (1–4).
v1994 *Tropidocyathus minimus* n. sp.; Filkorn: 54, figs 18 (1–4).
1997 ?*Tropidocyathus seymouriensis* Filkorn, 1994; Cairns: 16.
1997 ?*Tropidocyathus minimus* Filkorn, 1994; Cairns: 16.
2000b *Tropidocyathus minimus*, Filkorn 1995; Löser: 85.
2000b *Flabellum santasusanai*, Bataller 1936; Löser: 36.
2000b *Trochocyathus vaughani*, Stephenson 1916; Löser: 82.
2000b *Tropidocyathus seymouriensis*, Filkorn 1995; Löser: 85.
2002 *Flabellosmilia santasusanai* Bataller, 1936; Baron-Szabo: 69.

DIMENSIONS. d (min) = 4.2–6.5 mm; d (max) = 7.2–10.9 mm; d (min)/d (max) = 0.50–0.67; s = 48 in oldest ontogenetical stages; h = 4.5–9 mm.

DESCRIPTION. Subcuneiform to subflabellate corallum; costosepta compact, straight or slightly bent, developed in four complete cycles (adult stage) in six systems; S1 and S2 nearly equal with septa of remaining cycles, regularly alternating in adult stages (as seen in *seymouriensis*), septa of all cycles generally alternating in length and thickness in earlier ontogenetical stages (as seen in *minimus*); axial ends of oldest septa cuneiform to rhopaloid, giving off trabecular extensions which fuse with columella; columella sublamellar, made of twisted segments.

REMARKS. The possible re-assignment of the specimens described by Filkorn (1994) as *Tropidocyathus* to a different genus was first discussed by Cairns (1997). He noticed the presumable absence of palar structures. Re-investigation of the type material of the species *seymouriensis* and *minimus* revealed that they show characteristics typical of *Flabellosmilia*: septothecal wall, development of endothecal vesicular dissepiments, absence of pali, presence of elongated opposing end costae and finely granulated septal flanks. The axial structure appears different from the lamellar columella characteristic of *Flabellosmilia*. However, in the Antarctic material the columella is formed by short lamellar segments that are fused with trabecular extensions of the axial ends of the oldest septa. This feature can be observed in ontogenetically early stages of specimens of *Flabellosmilia* (see Baron-Szabo 2003). Therefore, the assignment to the genus *Flabellosmilia* is suggested. Moreover, based on recent studies of the ontogenetical development of this genus (Baron-Szabo 2003) it can be stated that the two species *seymouriensis* and *minimus* most probably belong to the same species but represent different ontogenetical stages.

Wells (1933: 121) divided the American species of *Platytrochus* into two groups, one, that includes the type species (*Turbinolia stokesi* Lea from the Claibornian of Alabama), having broad costae with several rows of granulations (*stokesi*-group) and the other, that includes forms with more or less subacute costae with beaded or nearly simple margins (*claibornensis*-group). The difference between the two groups is here considered more significant than Wells intended them to be. The *stokesi*-group is regarded as the 'real' *Platytrochus* with costal granulations typical of the turbinoliids, whereas the *claibornensis*-group is believed to more closely correspond to the meandriniid type as in *Flabellosmilia*, maybe forming an intermediate group between the two genera (Baron-Szabo, unpublished results).

TYPE LOCATION OF SPECIES. Maastrichtian of the USA (Maryland, Monmouth Formation, *Exogyra costata* zone).

DISTRIBUTION. Upper Santonian of northern Spain, Maastrichtian of Antarctica (López de Bertodano Formation, Seymour Island) and the USA.

Genus ***PACHYGYRA*** Milne Edwards & Haime, 1848*a*

TYPE SPECIES. *Lobophyllia labyrinthica* Michelin, 1846, Upper Santonian of France (Aude) (see Milne Edwards & Haime 1848*a*).

DIAGNOSIS. Colonial, massive, meandroid. Gemmation intracalicinal, resulting in sinuous calicinal series, separated by perithecal walls and ambulacrae. Calicinal centres indistinct. Costosepta compact, finely granulated laterally. Anastomosis present. Columella lamellar, generally continuous. Wall septothecal. Perithecal and endothecal dissepiments thin, subtabulate.

Pachygyra krameri Oppenheim, 1930

*1930 *Pachygyra krameri* n. sp.; Oppenheim: 448, pl. 13, figs 1–1a.
1982 *Pachygyra krameri* Oppenheim 1930; Beauvais: vol. 1, p. 189.
(v)1997*a* *Strotogyra meandra* n. sp.; Reig Oriol: 9, pl. 1, figs 3–4, pl. 2, fig.
2000b *Pachygyra krameri*, Oppenheim 1930; Löser: 58.
2002 *Pachygyra krameri* Oppenheim, 1930; Baron-Szabo: 70.

DIMENSIONS. d (series, wall–wall) = 2–4 mm; d (ambulacrae) = up to 11 mm; s/mm = 20/10.

DESCRIPTION. Colonial, massive, meandroid to subflabelliform; gemmation intracalicinal, resulting in sinuous calicinal series, separated by perithecal walls that form ambulacrae; costosepta arranged in two to three size orders; columella lamellar, generally continuous.

REMARKS. The original description of the species *meandra* by Reig Oriol (1997*a*) differs from the illustrations of the type material in that in the figure d (calicinal series) ranges between 1.7–3 mm and the septal density is 20 in 10 mm

(Reig Oriol stated the calicinal width to be 2 mm and the septal density to be 40 in 10 mm). Moreover, in forming a massive, meandroid colony with calcinal series separated by perithecal walls and ambulacrae, the type differs from the generic concept of *Strotogyra* but very closely agrees with *Pachygyra*.

TYPE LOCALITY OF SPECIES. Santonian–Lower Campanian of Austria (Gosau Group at Zimmergraben).

DISTRIBUTION. Santonian–Lower Campanian of Austria (Gosau Group), Campanian–Lower Maastrichtian of northern Spain (Toralla).

Pachygyra princeps Reuss, 1854 (Pl. 15, figs 2a, b)

(v)*1854 *Pachygyra princeps*; Reuss: 93, pl. 3, figs 1–3.
1857 *Pachygyra princeps*; Milne Edwards: vol. 2, p. 212.
1858–61 *Pachygyra princeps*; de Fromentel: 157.
1880 *Diploria flexuosissima*, D'Ach.; Duncan: 39, pl. 6, figs 11–12.
1903*a* *Pachygyra princeps* Reuss; Felix: 310.
1914 *Pachygyra princeps* Reuss 1854; Felix: pars 7, p. 149.
1930 *Pachygyra princeps* Reuss; Oppenheim: 449.
1930 *Pachygyra pusulifera* n. sp.; Oppenheim: 450, pl. 33, fig. 8.
1937*a* *Pachygyra princeps* Reuss; Bataller: 92, fig. on p. 92.
1943 *Pachygyra princeps* Reuss; Vaughan & Wells: 327, pl. 35, figs 10–10a.
1956 *Pachygyra princeps* Reuss; Wells: F415, fig. 314,2.
(v)1982 *Pachygyra princeps* Reuss 1854; Beauvais: vol. 1, p. 188, pl. 16, fig. 1, pl. 17, fig. 1.
1982 *Pachygyra pusulifera* Oppenheim 1930; Beauvais: vol. 1, p. 190.
v1998 *Orbignygyra* sp.; Turnšek & Drobne: 136, pl. 6, figs 2–3.
2000b *Pachygyra princeps*, Reuss 1854; Löser: 58.
2000b *Pachygyra pusulifera*, Oppenheim 1930; Löser: 58.
2002 *Pachygyra princeps* Reuss, 1854; Baron-Szabo: 70.
2002 *Pachygyra pusulifera* Oppenheim, 1930; Baron-Szabo: 70.

DIMENSIONS. d (series) = 1.5–5 mm, generally around 3.5–5 mm; d (ambulacrae) = up to 2 mm (in the Maastrichtian material), up to 15 mm in the holotype of the species; s/mm = 24–35/10.

DESCRIPTION. Colonial, massive, meandroid to subflabelliform; gemmation intracalicinal, resulting in sinuous calicinal series, separated by perithecal walls that form ambulacrae; costosepta arranged in three irregularly occurring size orders; columella lamellar, generally continuous; wall septothecal; perithecal and endothecal dissepiments thin, subtabulate.

TYPE LOCALITY OF SPECIES. Upper Santonian of Austria (Gosau Group at Nefgraben).

DISTRIBUTION. Coniacian–Santonian of Austria (Gosau Group), France (Corbières), and northern Spain (Catalonia), Upper Maastrichtian of Jamaica (this paper), Danian of Pakistan (Jhirk, Sind), Paleocene of Italy (Adriatic platform).

NEW MATERIAL. Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample no.: J-71-13-o3 (= Vaughnsfield).

Pachygyra savii d'Achiardi, 1866 (Pl. 15, figs 3, 4)

*1866 *Pachygyra savii*; d'Achiardi: 40, pl. 3, figs 12 a–b.
1866 *Pachygyra arbuscola*; d'Achiardi: 41, pl. 3, figs 13a–b.
v1874 *Pachygyra savii* D'Ach.; Reuss: 9, pl. 40, figs 4–8.
v1875 *Pachygyra savii*; d'Achiardi: 156.
1881 *Pachygyra savii*; Quenstedt: 993, pl. 181, fig. 48.
1901*a* *Pachygyra Savii* d'Ach.; Oppenheim: 174.
1912 *Pachygyra Savii* d'Ach.; Oppenheim: 129, pl. 11, figs 9–9 b.
1925 *Pachygyra Savii* Reuss 1872; Felix: pars 28, p. 37 (older synonyms cited therein).
1992 *Pachygyra savii* d'Achiardi; Darga: 80, pl. 16, fig. 6.
?1993 *Stratogyra savii* (D'Achiardi, 1866); Carbone *et al.*: 227.
(v)1996 *Pachygyra savii* (D'Achiardi, 1866); Schuster: 79, pl. 18, fig. 2.
(v)1996 Hexakoralle, Morphotyp 4; Tragelehn: 198, pl. 60, figs 1–3.

DIMENSIONS. d (series) = 1–3.5 mm, generally around 1.8–3 mm; d (ambulacrae) = 2.5–8 mm; s/mm = around 30/10.

DESCRIPTION. Massive, meandroid to subflabelliform; gemmation intracalicinal, resulting in sinuous calicinal series, separated by perithecal walls which form ambulacrae; costosepta arranged in three to four irregularly occurring size orders; columella lamellar; wall septothecal.

TYPE LOCALITY OF SPECIES. Middle Eocene of Italy (San Giovanni Ilarione).

DISTRIBUTION. Danian of Egypt, Paleocene of Austria, Upper Paleocene–Lower Eocene of ?Somalia, Middle Eocene of Italy, Upper Eocene of Germany (Bavaria).

Genus ***GLENAREA*** Počta, 1887 (= *Lithostrotionoides* Alloiteau, 1952*b* (Type species. *Lithostrotionoides tissieri* Alloiteau, 1952*b*, Paleocene of Senegal)

TYPE SPECIES. *Glenarea cretacea* Počta, 1887, Cenomanian of the Czech Republic (Bohemia).

DIAGNOSIS. Colonial, massive and cerioid. Gemmation intracalicinal–septal. Calices polygonal in outline. Septa thin, compact, granulated. Columella lamellar, irregularly developed. Wall paraseptothecal. Endothecal dissepiments numerous, subtabulate or vesicular.

Glenarea cretacea Počta, 1887 (Pl. 15, fig. 5; Pl. 16, figs 3a, b)

(v)*1887 *Glenarea cretacea*; Počta: 25, text-figs 9, 10.
v1952*b* *Lithostrotionoides tissieri* (n.gen-n.sp.); Alloiteau: 14, pl. 1, fig. 7, text-fig. 1.
non1974 *Glenarea cretacea* Počta; Turnšek *in* Turnšek & Buser: 20, 100, pl. 10, fig. 2.

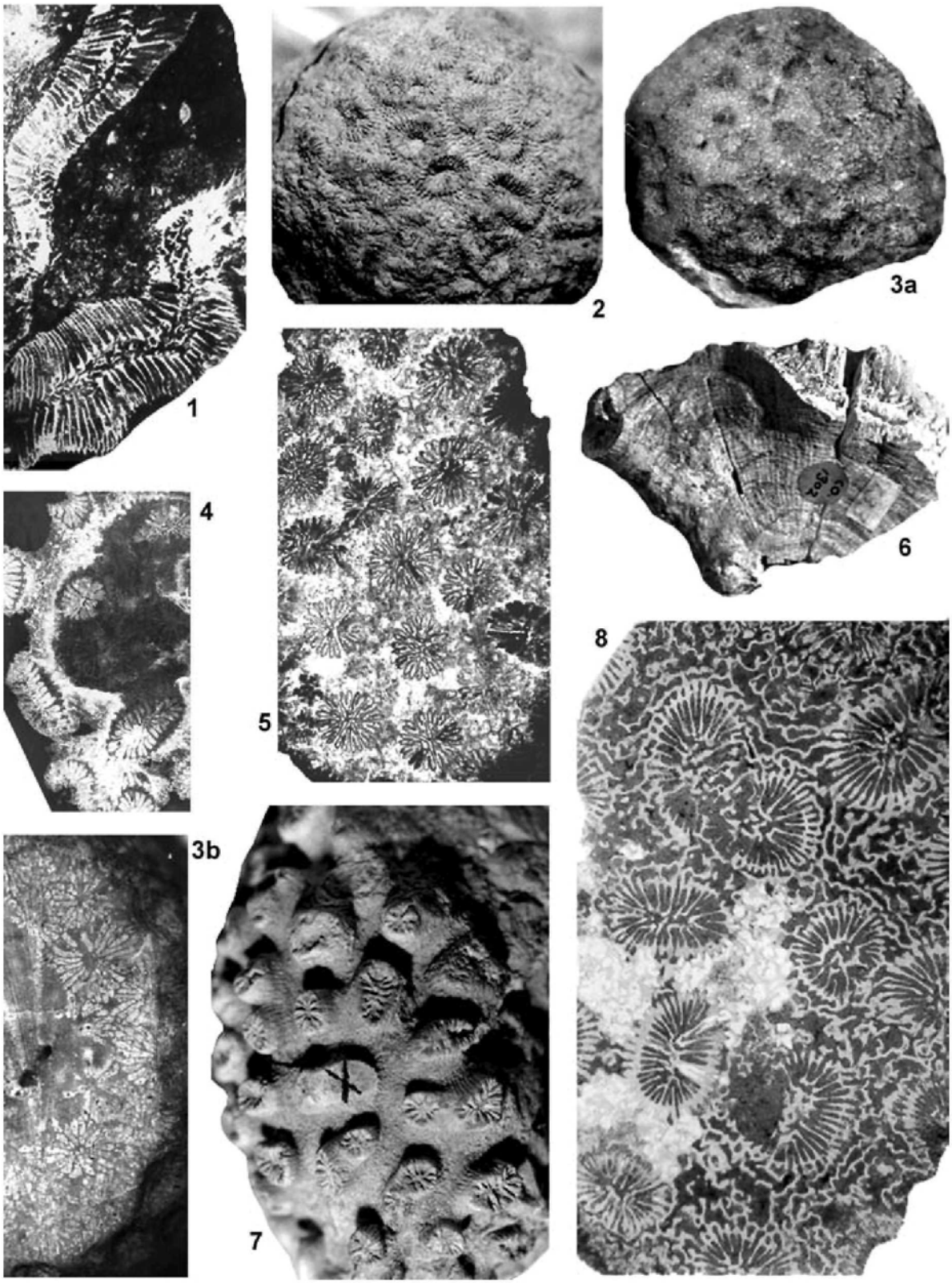


Plate 16 **Fig. 1** *Tortoflabellum* cf. *marwicki* Squires, 1962, cross thin section, Coates coll. NMNH, no. 424c, Maastrichtian of Jamaica (Jerusalem Mountain Inlier), ×3. **Fig. 2** *Dichocoenia anomalos* (Wells, 1934*a*), holotype, upper surface of colony, NMNH, I74480, Campanian of Jamaica (Catadupa), ×2.5. **Fig. 3** *Glenarea cretacea* Počta, 1887 (holotype of *Lithostrotionoides tissieri* Alloiteau, 1952), NMHN, Tessier coll., Mo5333, Paleocene of Senegal. **3a**, upper surface of colony, ×2.5; **3b**, polished cross cut, ×3.5. **Fig. 4** *Barysmilia trechmanni* (Wells, 1934*a*), cross thin section, Coates coll. NMNH, no. 558f, Middle–Upper Maastrichtian of Jamaica, ×2.5. **Fig. 5** *Reussicoenia edwardsi* (Reuss, 1854), cross thin section, Coates coll. NMNH, no. 500, Middle–Upper Maastrichtian of Jamaica, ×4.5. **Fig. 6** *Tortoflabellum* cf. *marwicki* Squires, 1962, holotype, Squires coll., CO 1302, G.S. 733, Altonian of New Zealand (Hokianga South Head), ×1.5. **Fig. 7** *Barysmilia trechmanni* (Wells, 1934*a*), holotype, upper surface, NMNH, I74480, Maastrichtian of Jamaica, ×2. **Fig. 8** *Dichocoenia anomalos* (Wells, 1934*a*), cross thin section, Coates coll. NMNH, no. 545d, Middle–Upper Maastrichtian of Jamaica, ×5.

v1991 *Glenarea cretacea* Počta; Eliášová: 99, pl. 1, figs 1a, b.
v1997 *Glenarea cretacea* Počta, 1887; Eliášová: 258.
2000b *Glenarea cretacea*, Počta 1887; Löser: 38.
v2000 *Glenarea cretacea* Počta, 1887; Baron-Szabo: 111, pl. 4, fig. 2.
v2002 *Glenarea cretacea* Počta, 1887; Baron-Szabo: 71, pl. 51, figs 1, 3.

DIMENSIONS. d (max) = 2.5–7 mm; d (min) = 1.5–4.5 mm; s = 12–24, s/mm = 3–4/ 2.

DESCRIPTION. Corallum massive, hemispherical and cerioid, with corallites directly united by their walls, polygonal or slightly rounded in outline. Gemmation due to intracalicinal budding,, comparable to the 'septal division' (*sensu* Morycowa & Roniewicz 1990). Costosepta compact, straight, thin, non-confluent, nearly equal in thickness and radially arranged in two to three cycles in six systems. In corallites influenced by gemmation a bilateral or irregular septal development is present. Four to 12 septa reach the axial region, where their inner ends may extend to, and fuse with, the columella or neighbouring septa. First and second cycle septa can be nearly equal in length. Remaining septa regularly alternate in length. Anastomosis is seen frequently. Septal flanks finely granulated. Columella short, lamellar. Wall septothecal and septoparathecal. Endotheca consists of thin vesicular dissepiments. Microstructure is poorly preserved, but in some septa simple minitrabeculae, forming wavy mid-septal lines are observed.

TYPE LOCALITY OF SPECIES. Upper Cenomanian–Lower Turonian of the Czech Republic (Bohemia).

DISTRIBUTION. Upper Cenomanian–Lower Turonian of the Czech Republic, Middle–Upper Maastrichtian of the UAE/Oman border region, Paleocene of Senegal.

Subfamily **EUPHYLLIINAE** Alloiteau, 1952*a*

DIAGNOSIS. Columella absent or rudimentary and parietal.

Genus ***RENNENSISMILIA*** Alloiteau, 1952*a* (= *Meandrosmilia* Alloiteau, 1952*a* (Type species. *Trochosmilia flabellum* Fromentel, 1863, Santonian of France); = ? *Paraphyllum* Alloiteau, 1956 (Type species. *Epismilia africana* Fromentel, 1863, Cenomanian of Algeria).

TYPE SPECIES. *Rennensismilia didyma* Alloiteau, 1952*a*, Upper Santonian of France (Aude).

DIAGNOSIS. Solitary, turbinate to flabellate. Costosepta compact, bilaterally arranged, granulated. Columella absent. Endothecal dissepiments vesicular, mainly peripheral. Wall parathecal or paraseptothecal. Epitheca present.

Rennensismilia inflexa (Reuss, 1854) (see Pl. 18, figs 7a, b, 8, Fig. 34)

v*1854 *Trochosmilia inflexa*; Reuss: 86, pl. 5, figs 3–5.
1864 *Trochosmilia inflexa*; de Fromentel: 270–271, pl. 39, figs 1, 1a–b.
1873 *Trochosmilia inflexa* Reuss; Stoliczka: 15, pl. 2, figs 1–4.

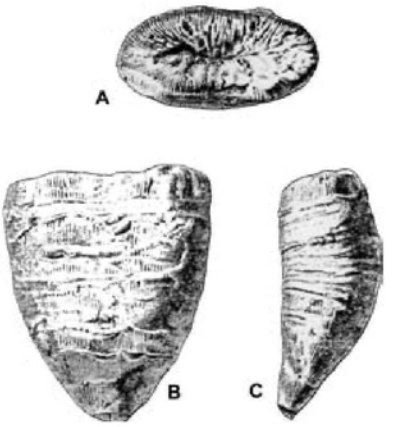


Figure 34 *Rennensismilia inflexa* (Reuss, 1854), as figured in Nötling (1897) (figured as *Trochosmilia protectans* Nötling, 1897), Maastrichtian of Pakistan. **A**, upper surface, cross view, ×1.5; **B, C**, upper surface, lateral views of corallum, ×1.5.

1897 *Trochosmilia protectans*, spec. nov.; Nötling: 9, pl. 1, figs 7–10b.
1903a *Trochosmilia inflexa* Reuss; Felix: 326.
1903a *Trochosmilia chondrophora* nov. sp.; Felix: pl. 24, fig. 12.
1914 *Trochosmilia inflexa* Reuss 1854; Felix: pars 7, p. 216.
1914 *Trochosmilia protectans* Nötling 1897; Felix: pars 7, p. 217.
?1942 *Diploctenium Zuffardii* sp. nov.; Maccagno: 789, pl. 1, figs 4.
1954 *Trochosmilia chondrophora* Felix; Kolosváry: 101, pl. 9, figs 11–13.
?1954 *Coelosmilia niobe* n. sp.; Kolosváry: 105, 127, pl. 11, figs 16–17.
1961 *Trochosmilia chondrophora* Felix; Suraru: 660, pl. 7, figs 27–28.
(v)1978 *Rennensismilia chondrophora* (Felix, 1903); Turnšek: 79 and 110, pl. 10, figs 1–5.
1981 *Trochosmilia protectans* Nötling; Abed & El Asa'ad: 274, pl. 1, figs 1a–c.
1984 *Trochosmilia inflexa* Reuss, 1854; Pal *et al.*: 59, pl. 1, figs 9–10.
1992 *Rennensismilia chondrophora* (Felix, 1903); Turnšek: 167, fig. 2.
non1996 *Aulosmilia protectans* (Nötling); Metwally: 386, figs 4c–d.
v1998 *Rennensismilia chondrophora* (Felix, 1903); Baron-Szabo: 140, pl. 3, figs 3–4.
v1999 *Rennensismilia inflexa* (Reuss, 1854); Baron-Szabo: 447, pl. 2, fig. 5, pl. 3, fig. 5, pl. 4, fig. 1.
2000b *Aulosmilia protectans* (Nötling 1897); Löser: 14.
2000b *Ellipsosmilia inflexa* (Reuss 1854); Löser: 33.
2000b *Rennensismilia chondrophora* (Felix 1903); Löser: 70.
2002 *Rennensismilia chondrophora* (Felix, 1903); Baron-Szabo: 71.
v2002 *Rennensismilia inflexa* (Reuss, 1854); Baron-Szabo: 71, pl. 52, figs 4–5, pl. 53, fig. 1.

DIMENSIONS. d (min) = 12–25 mm; d (max) = 21–47 mm; s = 96–192; d (min)/d (max) = 0.45–0.73; h = up to 30 mm.

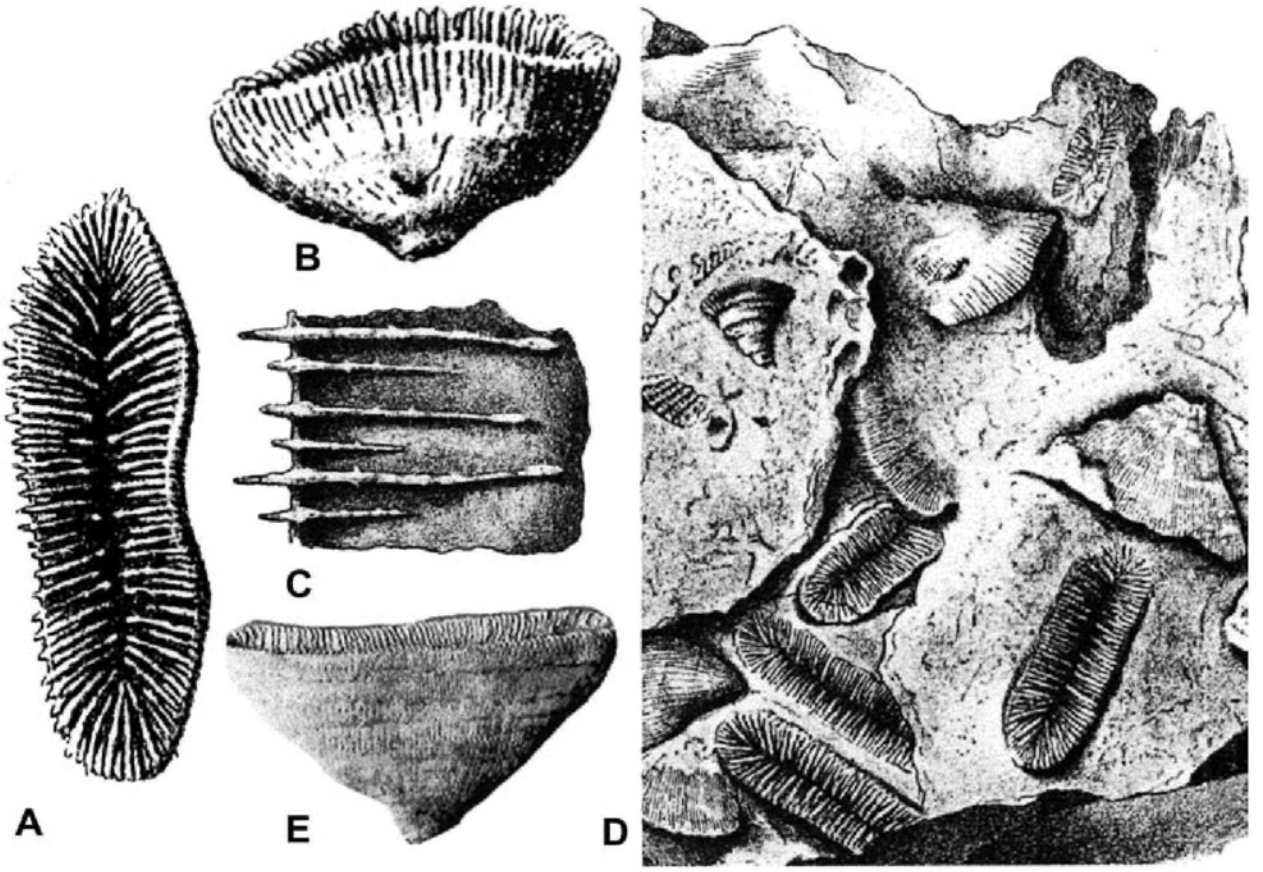


Figure 35 **A–C**, *Rennensismilia complanata* (Goldfuss, 1826), as figured in Duncan (1880), Paleocene of Pakistan (as *Trochosmilia medlicotti* Duncan, 1880); **A**, upper surface cross view, ×4; **B**, upper surface lateral view, ×2.5; **C**, close-up of **A**, ×13; **D**, sketch of *Rennensismilia complanata* (Goldfuss, 1826), as figured in Duncan (1880), Paleocene of Pakistan (as *Smilotrochus blanfordi* Duncan, 1880), upper surface of several coralla, ×0.8; **E**, *Rennensismilia complanata* (Goldfuss, 1826), holotye, IPB, Goldfuss coll., no. 184, Upper Santonian of France, ×1.8.

DESCRIPTION. Turbinate to flabellate, slightly elongate or elliptical in outline; costosepta, long, regularly alternate, wavy or flexuous toward the axial region, arranged in five cycles in six systems in a corallite diameter of around 12 × 20 mm; inner ends of S1-S3 septa terminate into claviform or rhopaloid thickenings; endothecal dissepiments vesicular, sparse.

TYPE LOCALITY OF SPECIES. Turonian–Campanian of Austria (Gosau Group).

DISTRIBUTION. Turonian of France and southern India (Trichinopoly Group), Turonian–Campanian of Austria (Gosau Group), Santonian–Campanian of Slovenia, Senonian of Romania, Coniacian–Maastrichtian of Hungary, Campanian of northern Spain, Campanian–Lower Maastrichtian of central Saudi Arabia, Campanian–Maastrichtian of India (Ladakh), Maastrichtian of Croatia, Madagascar, Pakistan, and ?Somalia.

Rennensismilia complanata (Goldfuss, 1826) (Fig. 35)

v*1826 *Turbinolia complanata nobis*; Goldfuss: 53, pl. 15, fig. 10.
1849*b* *Trochosmilia complanata*; Milne Edwards & Haime: 238.
1854 *Trochosmilia complanata* M. Edw. et H.; Reuss: 85, pl. 2, figs 3–4.
1854 *Trochosmilia dumortieri*; Haime: 2. ser., vol. 11, p. 206, pl. 2, fig. 2.
1857 *Trochosmilia dumortieri*; Milne Edwards: vol. 2, p. 162.
1858–61 *Trochosmilia dumortieri*; de Fromentel: 99.
v1863 *Trochosmilia didyma*; de Fromentel: 273, pl. 34, fig. 1.
1880 *Smilotrochus Blanfordi, Duncan*; Duncan: 20, pl. 1, figs 18–21.
1880 *Trochosmilia Medlicotti, Duncan*; Duncan: 29, pl. 3, figs 2–5.
1903*a* *Trochosmilia complanata* M. Edwards et J. Haime (Goldfuss sp.); Felix: 328.
v1903*a* *Trochosmilia didyma* M. Edwards et J. Haime (Goldfuss sp.); Felix: 330, pl. 18, fig. 11.
pars1914 *Trochosmilia didyma* Goldfuss sp. 1826; Felix: pars 7, p. 214.
1914 *Trochosmilia dumortieri* J. Haime 1854; Felix: pars 7, p. 215.
1925 *Trochosmilia Medlicotti* Duncan 1880; Felix: pars 28, p. 214.

pars1930 *Trochosmilia boissyana* Michelin.; Oppenheim: 487, pl. 26, figs 3–4 non 5.
1934b *Trochosmilia raymondi*, n. sp.; Wells: 148 (4), pl. 1, figs 1–2.
v1952a *Rennensismilia didyma* (=*Trochosmilia didyma* de From., 1863); Alloiteau: 637, pl. 5, figs 4a–b.
v1957 *Rennensismilia didyma* de From., 1863; Alloiteau: pl. 1, fig. 9.
?*1974* *Phyllosmilia complanata*; Beauvais & Beauvais: 485.
(v)1978 *Rennensismilia complanata* (Goldfuss 1826); Turnšek: 77, 109, pl. 7, figs 1–4, pl. 8, figs 1–3.
(v)1982 *Rennensismilia corbariensis* nom. nov.; Beauvais: vol. 1, p. 238, pl. 20, figs 9a–c.
(v)1982 *Rennensismilia dumortieri* (J. Haime) 1854; Beauvais: vol. 1, p. 240, pl. 20, fig. 11a–b.
1986 *Rennensismilia didyma*; Tchéchmédjiéva: 61 ff.
1992 *Rennensismilia didyma* (Goldfuss 1826); Turnšek: 167, fig. 2.
v1999 *Rennensismilia complanata* (Goldfuss, 1826); Baron-Szabo: 447, pl. 6, fig. 3, text-fig. 5.
2000b *Rennensismilia didyma*, Alloiteau 1952; Löser: 70.
v2002 *Rennensismilia didyma* (Fromentel, 1863); Baron-Szabo: 71, pl. 52, figs 3, 6.
v2002 *Rennensismilia complanata* (Goldfuss, 1826); Baron-Szabo: 71, pl. 53, fig. 4.

DIMENSIONS. d (min) = 7–28 mm; d (max) = up to 58 mm; s = up to around 300; s/mm = 20/10, in places reaching 25/10; d (min)/d (max) = 0.18–0.45; h = up to 50 mm.

DESCRIPTION. Flabellate corallum, very elliptical-compressed in outline in juvenile stages, becoming irregularly widened in later adult stages; costosepta long, regularly alternate, straight, wavy or flexuous toward the axial region, arranged in three to four size orders; inner ends of S1–S2 septa often terminate into claviform or rhopaloid thickenings; endothecal dissepiments vesicular.

REMARKS. The forms in the synonymy list above are characterised by (1) a septal density of generally 20 septa in 10 mm, reaching 25 septa in 10 mm in places, (2) flabellate growth of corallum in smaller specimens (with ratio of d (min)/d (max) of 0.18–0.29), in older specimens the flabellate growth is restricted to the lower part of the corallum (up to around 20 mm in height), larger specimens show flabellate growth in lower part and irregularly widened corallum in parts higher than around 20 mm (with ratio of d (min)/d (max) of 0.25–0.45) and (3) septa developed in three to four size orders. The forms *complanata*, *blanfordi* and *raymondi* are interpreted to represent more juvenile stages of the forms *didyma*, *dumortieri* and *medlicotti*. This idea is supported by the fact that both smaller and larger images have been documented from the same localities: Turonian–Campanian of Austria, Santonian of France and Paleocene of Pakistan.

TYPE LOCALITY OF SPECIES. Upper Santonian of France (Aude).

DISTRIBUTION. Turonian–Campanian of Austria (Gosau Group), Santonian of Croatia and Slovenia, Santonian–Lower Campanian of France, Upper Campanian of Bulgaria, Maastrichtian of Croatia, Paleocene of Pakistan, Eocene of Cuba.

Genus ***TORTOFLABELLUM*** Squires, 1958

TYPE SPECIES. *Tortoflabellum flemingi* Squires, 1958, Miocene of New Zealand.

DIAGNOSIS. Corallum colonial, flabello-meandroid. Gemmation intratentacular, intramural–polystomodaeal. Corallites indistinct to subdistinct. Costosepta compact, sparsely granulated laterally. Columella deep, formed by fusion of inner ends of septa. Wall parathecal. Epitheca present.

Tortoflabellum* cf. *marwicki Squires, 1962 (Pl. 16, figs 1, 6)

v*1962 *Tortoflabellum marwicki*; Squires: 148, pl. 1, figs 4–5.
v2002 *Tortoflabellum* cf. *marwicki* Squires; Baron-Szabo: pl. 53, fig. 2.

DIMENSIONS. d = 3–9 mm, generally 5–9 mm; s/mm = 7–10/2.

DESCRIPTION. Flabello-meandroid colony, with long sinuous calicular series. Gemmation is due to intracalicinal budding. Septa are very thin, straight, compact, with delicate granulations laterally. According to their length and thickness, three generations of septa can be distinguished. Septa of the first generation extend to the centre of the calicular series, where their inner ends terminate into claviform or ?rhopaloid thickenings, producing trabecular prolongations that fill the axial region. Septa of the second generation are distinctly thinner, reaching about half or three-quarters the length of the oldest ones. In places septa of the third generations are present. Endotheca formed by very thin, vesicular dissepiments. Frequently, epithecal rudiments can be seen.

REMARKS. The Jamaican specimen figured on Plate 16, fig. 1 agrees with *Tortoflabellum marwicki* Squires by having sinuous calicinal series that lack forking and the same diameter of the corallum (5–10 mm in the type specimen and 5–9 mm in the Jamaican specimen), but differs from it by a slightly greater density of septa. In the holotype of *Tortoflabellum marwicki* Squires the septal density is 5–7 per 2 mm.

TYPE LOCALITY OF SPECIES. Lower–Middle Miocene (Altonian) of New Zealand.

DISTRIBUTION. Middle–Upper Maastrichtian of Jamaica, Lower–Middle Miocene (Altonian) of New Zealand.

Subfamily **DICHOCOENIINAE** Vaughan & Wells, 1943

DIAGNOSIS. Colonial, plocoid to meandroid when massive, subcircular to flabelloid when fasciculate. Hermatypic. Columella trabecular and well developed. Heavy coenosteum between corallites.

Genus ***DICHOCOENIA*** Milne Edwards & Haime, 1848*a*

TYPE SPECIES. *Astrea porcata* Lamarck, 1816, Recent, Indopacific (see Milne Edwards & Haime 1848*a*).

DIAGNOSIS. Colonial, massive plocoid to meandoid or subfasciculate-flabellate. Gemmation intracalicinal and extracalicinal. Corallites occasionally form short meandroid series. Permanent condition monocentric to tricentric. Corallites or calicinal series embedded in a granulose coenosteum. Ambulacrae present. Costosepta compact, finely granulated laterally. Columella trabecular, subpapillose. Endothecal dissepiments thin. Wall parathecal.

Dichocoenia anomalos (Wells, 1934*a*) (Pl. 16, figs 2, 8)

v*1934*a* *Favioseris anomalos* new species; Wells: 82, pl. 4, figs 19–20.
2000b *Ovalastrea anomalos,* Wells 1934; Löser: 57.
2002 *Ovalastrea (Favioseris) anomalos* (Wells); Mitchell: 6ff., table 1.
v2002 *Dichocoenia anomalos* (Wells, 1934); Baron-Szabo: pl. 54, figs 1–2.

DIMENSIONS. d (max) = 3.5–7 mm, in late budding stages it can reach about 10 mm; d (min) = 2.5–5 mm, in late budding stages it can reach about 7 mm; c-c = 5–10 mm, in areas of intense budding c-c is around 3 mm; s = 24–40, in late budding stages the number of septa may be larger, in juvenile corallite the number of septa is around 16.

DESCRIPTION. Colonial, massive, columniform, lamellar, subfrondescent, plocoid or subfasciculate; corallites produced intracalicinally have the tendency to stay closer to each other than polyps formed extracalicinally; corallites circular, elliptical or very elongated in outline, mainly monocentric; dicentric or, rarely, tricentric condition temporary; costosepta compact, rather thin, generally arranged in three complete cycles in six systems, radially or bilaterally, finely granulated laterally; in calices that are not distorted by fission septa regularly alternate in length; columella lamellar, straight, twisted or discontinuous; wall parathecal, occasionally septoparathecal; epicostal lamellae frequently developed, occurring as thick concentric rings around older calices; endothecal dissepiments delicate, vesicular; exothecal dissepiments numerous, subtabulate or vesicular.

REMARKS. Species of *Dichocoenia* Milne Edwards & Haime are mainly restricted to the Cenozoic period. *Dichocoenia anomalos* (Wells, 1934*a*) is distinguished from Tertiary and recent representatives (e.g. *D. caloosahatcheensis* Weisbord, 1974, *D. eminens* Weisbord, 1974, *D. stokesii* Milne Edwards & Haime, 1848*a*) by its distinctly smaller skeletal structures as well as by minor development of tricentric corallites.

TYPE LOCALITY OF SPECIES. Campanian of Jamaica (Catadupa).

DISTRIBUTION. Campanian–Maastrichtian (new material) of Jamaica.

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 545d; J-71-34u2 (= Rio Minho).

Family **PHYLLOCOENIIDAE** Alloiteau, 1952*a*

DIAGNOSIS. Colonial, massive. Gemmation extracalicinal. Corallites cylindrical to elliptical, generally united by a perithecal wall. Septa costate, compact, formed by simple divergent trabeculae, dentate marginally, granulate laterally. Endothecal dissepiments vesicular, thin. Columella essential or parietal and rudimentary. Wall parathecal.

Figure 36 *Phyllocoenia cribraria* (Michelin, 1840), based on the illustration in de la Revilla & Quintero (1966), ?Lower Maastrichtian of Spain, upper surface of colony, ×1.5.

Genus ***PHYLLOCOENIA*** Milne Edwards & Haime, 1848*a*
(= *Phyllocoeniopsis* Chevalier, 1954 (Type species. *Astrea cribraria* Michelin, 1840, Coniacian of France [Uchaux]).

TYPE SPECIES. *Astrea radiata* Michelin, 1842 (= *Phyllocoenia irradians* Milne Edwards & Haime, 1848*a*), Tertiary of Italy.

DIAGNOSIS. Colonial, massive, plocoid. Gemmation extracalicinal. Costosepta compact, radially arranged, coarsely granulated laterally. Columella rudimentary–spongy. Perithecal wall well-developed. Endothecal dissepiments thin, very abundant. Wall parathecal.

Phyllocoenia cribraria (Michelin, 1840) (Fig. 36)

*1840 *Astraea cribraria*; Michelin: 21, pl. 5, fig. 4.
1850 *Phyllocoenia cribraria*; d'Orbigny: vol. 2, p. 206.
1857 *Heliastraea cribaria*; Milne Edwards: vol. 2, p. 461.
1914 *Orbicella cribraria* Michelin sp. 1841; Felix: pars 7, p. 166 (older synonyms cited therein).
1937*b* *Heliastraea cribaria* Michelin sp. 1841; Bataller: 303.
(v)1941 *Heliastraea cribaria* (Mich. sp.) M.-Edw. et Haime; Alloiteau: 30, 42, pl. 5, figs 12–13.
1945 *Heliastraea cribaria* Michelin sp. 1841; Bataller: 32.
1954 *Phyllocoeniopsis cribraria*; Chevalier: 113.
1966 *Heliastraea cribaria,* Michelin; de la Revilla & Quintero: 15, pl. 1, fig. 3.
2000b *Phyllocoeniopsis cribraria* (Michelin, 1841); Löser: 61.
2002 *Phyllocoenia cribaria* (Michelin, 1840); Baron-Szabo: 74.

DIMENSIONS. d (max) = 7.5–8.5 mm; c-c = 5–8 mm; s = 40–44.

DESCRIPTION. Plocoid colony; corallites irregularly circular in outline; costosepta non-confluent to subconfluent, arranged in four incomplete cycles in six systems; perithecal wall subtabulate.

TYPE LOCALITY OF SPECIES. Coniacian of France (Vaucluse).

DISTRIBUTION. Coniacian of France, Santonian and ?Lower Maastrichtian of Spain.

Genus ***REUSSICOENIA*** M. Beauvais, 1982

TYPE SPECIES. *Ulastrea edwardsi* Reuss, 1854, Senonian Austria (Gosau Group).

DIAGNOSIS. Colonial, massive, plocoid. Gemmation extracalicinal. Costosepta compact, nonconfluent, arranged radially and bilaterally, spinose laterally, moniliform marginally. Columella spongy-papillose or formed by twisted segments. Synapticulae absent. Perithecal dissepiments sparse. Endothecal dissepiments vesicular, forming a stereozone. Wall parathecal-septoparathecal, thick.

Reussicoenia edwardsi (Reuss, 1854) (Pl. 16, fig. 5; see Pl. 18, fig. 6)

*1854	*Ulastraea Edwardsi*; Reuss: 115, pl. 16, figs 1–3.
1857	*Heliastaea ? Edwardsi*; Milne Edwards: vol. 2, p. 468.
1858–61	*Heliastaea Edwardsi*; de Fromentel: 208.
1867	*Heliastaea Edwardsi*; de Fromentel: 570, pl. 164, fig. 1.
v1900	*Columnastraea Phillipsiae*, sp. nov.; Gregory: 33, pl. 2, fig. 10.
1914	*Orbicella Edwardsi* Reuss sp. 1854; Felix: pars 7, p. 166.
1937*b*	*Ulastraea Edwardsi* Reuss; Bataller: 303.
1945	*Ulastraea Edwardsi* Reuss; Bataller: 33.
(v)1982	*Reussicoenia edwardsi* (Reuss) 1854; Beauvais: vol. 1, p. 138, pl. 11, fig. 3, pl. 13, fig. 1, pl. 63, fig. 2.
1992	*Reussicoenia edwardsi* (Reuss, 1854); Turnšek: 167, fig. 2.
(v)1994	*Reussicoenia edwardsi* (Reuss); Liao & Xia: 152, pl. 58, figs 3–5, pl. 59, figs 1–5.
2000b	*Columnastraea phillipsiae*, Gregory; Löser: 21.
2000b	*Reussicoenia edwardsi* (Reuss 1854); Löser: 71.
2001	*Reussicoenia edwardsi* (Reuss); Löser & Liao: 666–667.
2002	*Reussicoenia edwardsi* (Reuss, 1854); Baron-Szabo: 73, text-fig. 16.

DIMENSIONS. d = 3–6 mm; d (lumen) = 1.5–4.5 mm; c-c = 2.5–5 mm; s = 26–40.

DESCRIPTION. Massive, plocoid colony; costosepta arranged in three complete and an incomplete fourth cycle, in six systems; S1 and S2 generally reach corallite centre, trabecular extensions of their axial ends fusing with columella; septa alternate in thickness.

TYPE LOCALITY OF SPECIES. Senonian of Austria (Gosau Group).

DISTRIBUTION. Senonian of Austria (Gosau Group), Campanian of Croatia, Campanian–Maastrichtian of Tibet (Gamba and Yadong), ?Lower Maastrichtian of northern Spain, Middle–Upper Maastrichtian of Jamaica (this paper), Upper Paleocene of Somalia (lower part of Auradu Limestone).

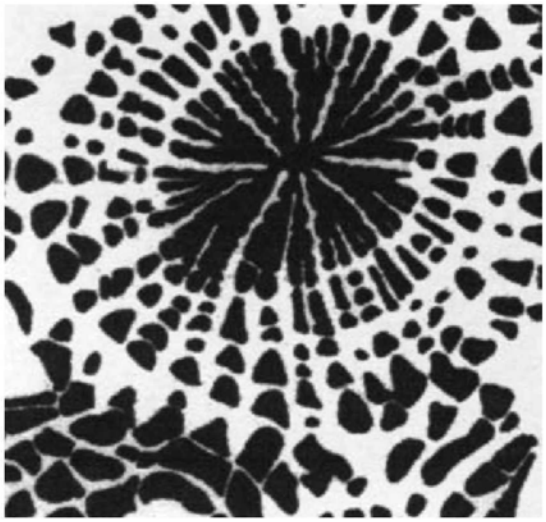


Figure 37 *Provinciastraea moravica* var. *mazaugui* Chevalier, 1954, based on the illustration in Chevalier (1954), Santonian of France; cross thin section; ×8.

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 481; 500; (= Ducketts Land Settlement); J-71-34r2 (= Rio Minho).

Genus ***PROVINCIASTREA*** Chevalier, 1954

TYPE SPECIES. *Provinciastrea moravica* var. *mazaugui* Chevalier, 1954, Santonian of France.

DIAGNOSIS. Colonial, massive, plocoid. Gemmation extracalicinal. Costosepta compact, non-confluent, hexamerally arranged, dentate laterally. Columella absent. Perithecal dissepiments vesicular. Endothecal dissepiments vesicular, abundant. Wall parathecal.

Provinciastrea moravica* var. *mazaugui Chevalier, 1954 (Fig. 37)

1911	cf. *Orbicella moravica*; Trauth: 52, pl. 2, fig. 1.
*1954	*Provinciastrea moravica* Trauth 1911, nov. var.; Chevalier: 120, pl. 1, fig. 1, text-figs 9–11.
2000b	*Provinciastrea moravica* var. *mazaugui*, Chevalier 1954; Löser: 69.
2002	*Provinciastrea moravica* var. *mazaugui* Chevalier, 1954; Baron-Szabo, p. 75, text-fig. 18.

DIMENSIONS. d = 3–5 mm; c-c = 8–10 mm; s = 40.

DESCRIPTION. Plocoid colony; corallites circular or irregularly elliptical in outline; costosepta developed in three to four cycles in six irregular systems.

REMARKS. In having a parathecal wall, non-confluent and compact costosepta and endothecal dissepiments developed as in *Provinciastrea*, the specimen described from the Upper Eocene of Panama as *Montastrea ? rotunda* Budd, 1992 *in* Budd *et al.* (1992) shows resemblance with the genus *Provinciastrea*, but differs from *Provinciastrea* by the presence of columellar structures.

TYPE LOCALITY OF SPECIES. Santonian of France.

DISTRIBUTION. Senonian of Slovakia, Santonian of France.

Suborder **RHIPIDOGYRINA** Roniewicz, 1976

DIAGNOSIS. Solitary and colonial. Costosepta composed of thin, ramified trabeculae. Apophysal and lonsdaleoid septa present, smooth distally, granular laterally. Septothecate and paraseptothecate. Columella lamellar or rudimentary, styliform or absent. Endothecal and perithecal dissepiments present. Gemmation intracalicinal and extracalicinal. Microstructure neorhipidacanth.

Family **RHIPIDOGYRIDAE** Koby, 1905

DIAGNOSIS. Simple and colonial, fixed. Colony formation by various modes of intratentacular budding, except in *Cymosmilia*. Corallites usually united by solid peritheca whose surface is granulated. Costae prominent only near calices or during early stages. Septa exsert, thick, not numerous, with smooth upper margins. Endotheca present but thin and sparse. Columella lamellar, thin, continuous, deep in calice or calicular series. Epitheca absent. Microstructure as for the suborder.

REMARKS. This family is marked by the heavy corallum, granular perithecal surface, rudimentary costae and lamellar columella.

Genus ***BARYSMILIA*** Milne Edwards & Haime, 1848*a*

TYPE SPECIES. *Dendrophyllia brevicaulis* Michelin, 1841, Turonian of France (Vaucluse) (see Milne Edwards & Haime 1848*a*).

DIAGNOSIS. Colonial, massive or subfasciculate (no lateral connection between some of the corallites), plocoid or subplocoid to subcerioid. Gemmation intracalicinal and extracalicinal, resulting in permanent monocentric to tricentric conditions. Costosepta compact, non-confluent, dentate and granulated laterally. Columella lamellar or rudimentary. Endothecal dissepiments vesicular to cellular. Exothecal dissepiments large, vesicular. Wall septothecal or septoparathecal.

Barysmilia iberica Baron-Szabo, 1998 (Pl. 17, figs 3a, b)

v*1998 *Barysmilia iberica* n. sp.; Baron-Szabo: 144, pl. 6, figs 1–3.
2000b *Barysmilia iberica*, Baron-Szabo 1998; Löser: 15.
v2000 *Barysmilia iberica* Baron-Szabo, 1998; Baron-Szabo: 114, pl. 8, figs 1, 3.
v2002 *Barysmilia iberica* Baron-Szabo, 1998; Baron-Szabo: 83, pl. 60, figs 1–3.

DIMENSIONS. d (max) = 1.8–3.5 mm; d (min) = 1.8–2.2 mm, in juvenile corallites around 1.3 mm; c-c = 2–3 mm; s = 14–26 (in late budding stages the number of septa may be larger); size of the colony = 5–20 cm in diameter.

DESCRIPTION. Massive–subfasciculate, plocoid or subplocoid colony; costosepta compact, non-confluent, arranged in two to three cycles in five, six, seven, or eight equal or unequal systems; S1 and S2 differ in thickness but can be equal in length, usually extending to calicinal centre; columella lamellar, thin; endothecal dissepiments thin, tabulate to vesicular.

TYPE LOCALITY OF SPECIES. Campanian of northern Spain, Torallola, Puimanyons Olisthostrome.

DISTRIBUTION. Campanian of northern Spain (Catalonia), Middle–Upper Maastrichtian of the UAE/Oman border region.

Barysmilia irregularis (Reuss, 1854) (Pl. 17, fig. 2)

v*1854 *Placocoenia irregularis*; Reuss: 100, pl. 9, fig. 9.
1857 *Favia ? irregularis*; Milne Edwards: vol. 2, p. 437.
1861 *Favia ? irregularis*; de Fromentel: 173.
1899 *Favia ammergensis*; Söhle: 45, pl. 9, figs 5, 5a.
1899 *Placocoenia irregularis* Reuss; Söhle: 51, pl. 9, figs 4, 4a, 4b.
1903*a* *Placocoenia irregularis* Reuss; Felix: 300, pl. 20, fig. 14, pl. 25, fig. 4, text-fig. 51.
1914 *Placocoenia irregularis* Reuss 1854; Felix: pars 7, p. 155.
1930 *Placocoenia irregularis* Reuss; Oppenheim: 408, pl. 34, fig. 3.
1930 *Stenosmilia proletaria* n. sp.; Oppenheim: 437, pl. 43, fig. 3.
?1945 *Placocoenia irregularis* Reuss 1854; Bataller: 23.
(v)1957 *Dichocoeniopsis proletaria* (Oppenheim); Alloiteau: 265, pl. 16, figs 6–7.
v1982 *Barysmilia irregularis* (Reuss) 1854; Beauvais: vol. 1, p. 183, pl. 14, fig. 10, pl. 15, fig. 1.
2000b *Barysmilia irregularis*, Reuss 1854; Löser: 15.
v2000 *Barysmilia irregularis* (Reuss, 1854); Baron-Szabo: 112, pl. 7, fig. 1.
2002 *Barysmilia irregularis* (Reuss, 1854); Baron-Szabo: 83.

DIMENSIONS. d (max) (monocentric calices) = 3–5 mm; d (min) (monocentric calices) = 2–3.5 mm; maximum diameter in late budding stages = up to 8 mm; c-c = 4–7 mm; s (monocentric calices) = 15–27, up to about 50 in tricentric corallites.

DESCRIPTION. Massive–subfasciculate, plocoid or subplocoid colony; costosepta, compact, non-confluent, arranged in two or three, sometimes four cycles, in five, six, seven, or eight systems, irregularly occurring in the manner that e.g. the first cycle consists of five septa, followed by six septa of the second cycle; development of younger septal cycles always influenced by corallite division; S1 and S2 differ in thickness but can be equal in length, usually extending to calicinal centre; columella lamellar or formed by twisted segments; in areas of incomplete separation of polyps several calices can be directly united by their walls.

TYPE LOCALITY OF SPECIES. Upper Santonian of Austria (Gosau Group at Nefgraben).

DISTRIBUTION. Lower Coniacian of France (Corbières), ? Senonian of northern Spain, Santonian–Campanian of

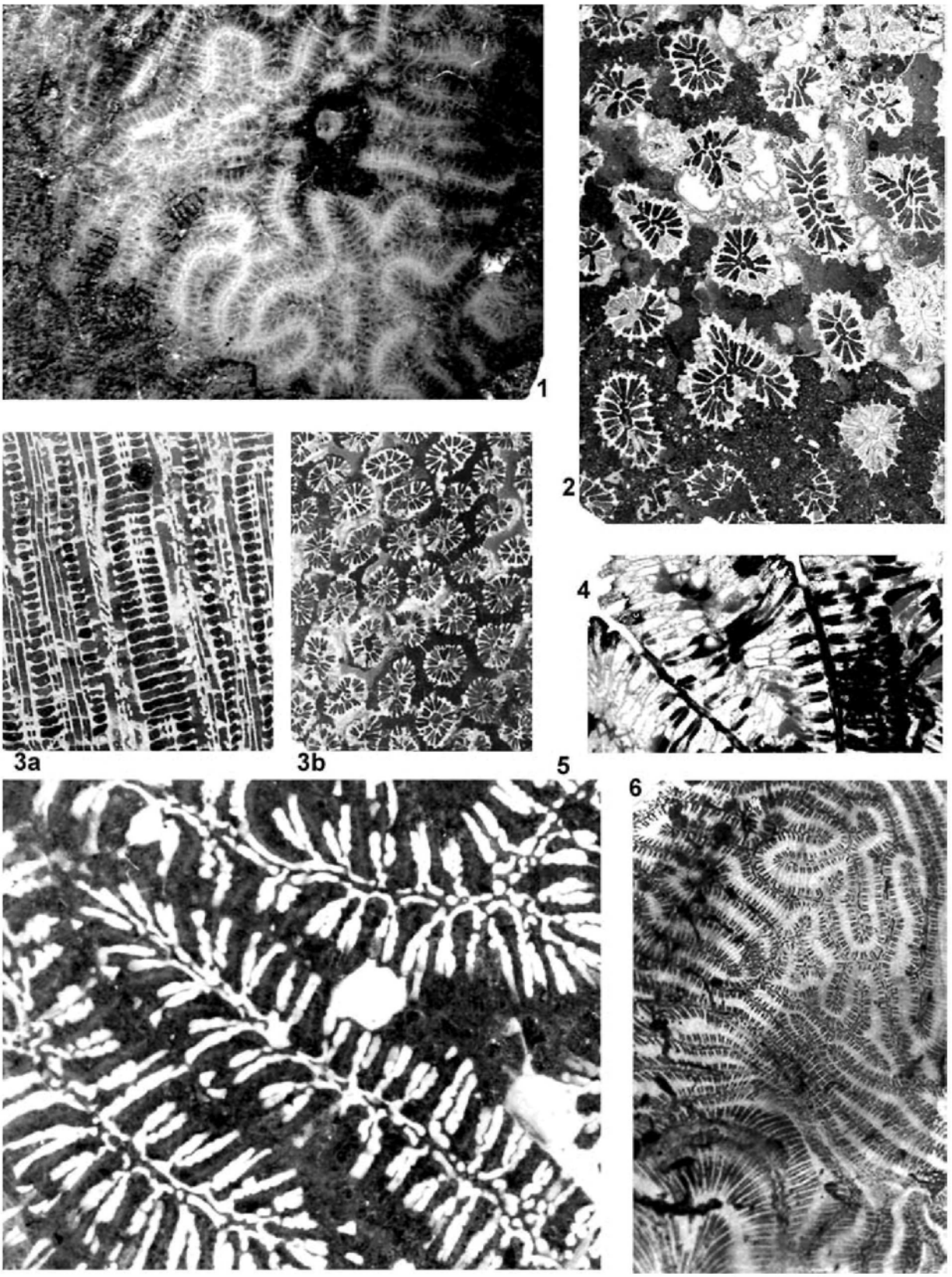


Plate 17 **Fig. 1** *Orbignygyra tenella* (Goldfuss, 1826), (holotype of *Diplothecophyllia basseae* Alloiteau, 1952), polished upper surface, NMNH, coll. Basse de Menard, R. 10841, Thanetian of Madagascar, ×2. **Fig. 2** *Barysmilia irregularis* (Reuss, 1854), cross thin section, BMNH, AZ 455, Middle–Upper Maastrichtian of the UAE/Oman border region, ×7.5. **Fig. 3** *Barysmilia iberica* Baron-Szabo, 1998, BMNH, AZ 361, Middle–Upper Maastrichtian of the UAE/Oman border region. **3a**, longitudinal thin section, ×3; **3b**, cross thin section, ×2.5. **Fig. 4** *Psilogyra telleri* Felix, 1903*a*, cross thin section, Coates coll. NMNH, no. 393, Middle–Upper Maastrichtian of Jamaica (Jerusalem Mountain Inlier), ×4. **Fig. 5** *Orbignygyra latisinuata* (Felix, 1903*a*), cross thin section, Coates coll. NMNH, no. 590d, Maastrichtian of Jamaica, ×7. **Fig. 6** *Orbignygyra tenella* (Goldfuss, 1826), holotype, polished cross cut, IPB, Goldfuss coll., no. 211, Turonian–Campanian of Austria (Gosau Group), ×2.

Austria (Gosau Group), Middle–Upper Maastrichtian of the UAE/Oman border region.

Barysmilia trechmanni (Wells, 1934*a*) (Pl. 16, figs 4, 7)

v*1934*a* *Dichocoenia trechmanni* new species; Wells: 75, pl. 2, figs 7, 8.
2000b *Dichocoenia trechmanni*, Wells 1934; Löser: 28.
2002 *Ovalastrea trechmanni* (Wells); Mitchell: 6ff., table 1.
v2002 *Barysmilia trechmanni* (Wells, 1934); Baron-Szabo: 83, pl. 59, figs 2–3.
2003 *Barysmilia trechmanni* (Wells, 1934); Filkorn: 1.

DIMENSIONS. Maximum diameter of the calice = 3.5–7 mm, in late budding stages it can reach about 10 mm; minimum diameter of the calice = 2.5–5 mm, up to 7 mm in late budding stages; c-c = 5–10 mm, 3 mm in areas of intense budding; s = 24–40, in late budding stages the number of septa may be larger, in early stages it may be down to 16.

DESCRIPTION. Colonial, massive or subfasciculate (no lateral connection between some of the corallites), plocoid or subplocoid. Gemmation intracalicinal and extracalicinal, resulting in permanent monocentric to tricentric conditions. Costosepta compact, non-confluent, dentate and granulated laterally. Columella lamellar or rudimentary. Endothecal dissepiments vesicular to cellular. Exothecal dissepiments large, vesicular. Wall septothecal or septoparathecal.

TYPE LOCALITY OF SPECIES. Maastrichtian of Jamaica.

DISTRIBUTION. Maastrichtian of Jamaica (new material) and Mexico (Ocozocuautla Formation).

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 414; J-66-49a; J-71-4d (= Jerusalem Mountain Inlier); 431c; J-66-23 (= Catadupa railway); 456a; 484a; 484b; 484c; 484d; 484e; 484f; 484g; 484h; 485a; 485b; 485c; 485d; 485e; 485f; 485g; 485h; 485i; 485j; 485q; 490b; 490c; 496d; 496e; 496i; 497f; 497g; 497h; 497i; 500a; 502b; 525a; J4129 (= Ducketts Land Settlement); 532a; 572-4; 572-16; 572-17; 572-18; 572-19; 572-20; 572-21; 572-22; 572-23; 572-24; 572-25; 572-26; 572-27; 572-29; 572-30; 572-31; 572-32; 572-33; 572-34; 572-35; 572-38; 572-39; 572-40; 572-42; 572-43; 572-44; 572-45; 572-46; 572-47; 572-48; 572-49; 572-51; 572-52; 572-54; 572-55; 572-56; 572-58; 572-59; 572-60; 572-61; 572-62; 572-63; 572-64; 572A-01-II; 572A-02; 572A-03; 572A-04; 572A-05; 572A-06; 572A-07; 572A-08; 572A-09; 572A-10; 572A-11; 572A-12; 572A-13; 572A-14; 572A-15; 572A-28; 572A-36; 572A-37; 572A-50; 572A-53; 572A-57; J-71-13a; J-71-13b; J-71-13c; J-71-13d; J-71-13e; J-71-13f; J-71-13g; J-71-13h; J-71-13i; J-71-13j; J-71-13k; J-71-13L; J-71-13m; J-71-13n-I; J-71-13o; J-71-13p; J-71-13q; J-71-13r; J-71-13s; J-71-13t; J-71-13u; J-71-13v; J-71-13w; J-71-13x; J-71-13y; J-71-13z; J-71-13a2; J-71-13b2; J-71-13c2; J-71-13d2; J-71-13e2; J-71-13f2; J-71-13g2; J-71-13h2; J-71-13i2; J-71-13j2; J-71-13k2; J-71-13L2; J-71-13m2; J-71-13n2; J-71-13o2; J-71-13p2; J-71-13q2; J-71-13r2; J-71-13s2; J-71-13t2; J-71-13u2; J-71-13v2; J-71-13b3; J-71-13c3; J-71-13d3; J-71-13e3; J-71-13f3; J-71-13g3; J-71-13m3; J-71-13n3; J-71-13t3; J-71-13A-2a; J-71-13A-2b; J-71-13A-2c; J-71-13A-2d; J-71-13A-2e; J-71-13A-2f; J-71-13A-2g; J-71-13A-2h; J-71-13A-2i; J-71-13A-2j; J-71-13A-2s; J-71-13B (lower)o; J-71-13B (lower)p (= Vaughnsfield); 537; 539a; 540a; 540b; 540c; 564c; 573a; 573b; 573c; 573d; 573e; 573f; J-66-50a; J-66-50b; J-66-50c; J-66-50d; J-66-50e; J-66-50f; J-66-50g; J-66-50h; J-66-50i; J-66-50j; J-71-11-Ba; J-71-11-Bb;J-71-11-Eb; J-71-11-Ec; J-71-17d; J-71-17g; J-71-17h; J-71-17j; J-71-17k; J-71-18d (= Shaw Castle, Maldon Formation); 545d; 545e; 545g; 545k; 545t; 549a; 552; 554; 555a; 555b; 555c; 555d; 555e; 555f; 558a; 558b; 558c; 558d; 558e; 558f; 562a; 562b; 562c; 562d; 562e; 562f; 576a; 576c; 577a; 577b; 577c; J-71-34a; J-71-42-17e; J-71-42-17f (= Rio Minho); J3444m; (= Welcome Hall); J3824a; J3824a2; (= Road Hermitage-St. Leonhard); J4439a; J4439b; J4439c; J4439d; J4439e (= Nine Turns-Coffee Piece); J4547 (= Tweedside-Frankfield); 579 (= Chatsworth School, near St. James); 566a; 566b; 566c; 566d; 568f-I; 569b; 570d; 588a; 588b; 588c; 589a; 594a; 595b; 595d-I; 595f; 598; 599a; 599b; 599c; 599d; 599e; JAG18.9a; JAG18.9b (= probably Cambridge railway area).

Genus ***ORBIGNYGYRA*** Alloiteau, 1952*a* (= *Diplothecophyllia* Alloiteau, 1952*a* (Type species. *D. basseae* Alloiteau, 1952*a*, Thanetian of Madagascar).

TYPE SPECIES. *Diploria neptuni* d'Orbigny, 1850, Turonian of France (Aude) (see Alloiteau 1952*a*).

DIAGNOSIS. Colonial. massive, meandroid. Gemmation intracalicinal-terminal, producing wavy and ramified calicinal series, separated by tectiform collines. Calicinal centres indistinct. Costosepta compact, strongly beaded laterally. Ambulacrae irregularly present. Perithecal dissepiments vesicular. Columella lamellar, discontinuous. Wall parathecal and septothecal.

REMARKS. Because the genus *Diplothecophyllia*, here interpreted as synonymous with *Orbignygyra*, was described by Alloiteau (1952*a*) several pages earlier than *Orbignygyra* (*Diplothecophyllia* on p. 609; *Orbignygyra* on p. 635) it should have priority over the latter. However, because up the present paper (see illustrations of the holotype on Pl. 17 fig. 1) *Diplothecophyllia* represented a very poorly known taxon, which was previously only mentioned in the two works by Alloiteau (1952*a*, 1957) himself, the name *Orbignygyra* is given priority over *Diplothecophyllia*. After it was first described, forms of *Orbignygyra* have been documented in numerous publications (e.g. Turnšek & Buser 1976; Beauvais 1982; Baron-Szabo 2000, 2002, 2003). Therefore, based on common usage, the author is in favour of the continued use of the latter.

Orbignygyra latisinuata (Felix, 1903*a*) (Pl. 17, fig. 5)

1845 *Meandrina tenella*; Michelin: 293, pl. 66, fig. 5 (non Goldfuss).
v1854 *Meandrina saltzburgiana* Milne Edwards & Haime; Reuss: 109, pl. 15, figs 12, 13.
*1903*a* *Diploria latisinuata* nov. sp.; Felix: 276, pl. 20, fig. 16.

1914 *Diploria latisinuata* Felix 1903; Felix: pars 7, p. 180.
1937*a* *Diploria latisinuata* Felix 1903; Bataller: 161, text-fig. on p. 162.
2000b *Orbignygyra latisinuata* (Felix 1903); Löser: 57.
v2000 *Orbignygyra salisburgensis* (Milne Edwards & Haime, 1849); Baron-Szabo: 114, pl. 8, fig. 42, pl. 9, fig. 46.
v2002 *Orbignygyra salisburgensis* (Milne Edwards & Haime, 1849); Baron-Szabo: 84, pl. 61, figs 1–3.

DIMENSIONS. d (series) = 4–8 mm; d (ambulacrum) = 0.5–3 mm; s/mm 15–18/10; size of the colony = 15–25 cm in diameter.

DESCRIPTION. Corallum massive, meandroid; corallites indistinct or subdistinct, arranged in short sinuous series; gemmation intracalicinal; ambulacrae present irregularly; costosepta compact, non-confluent, arranged in three size orders; first order septa extend to central region of the series; their inner ends claviform or rhopaloid, generally, sometimes fusing with the columella; second order septa slightly alternate in length and thickness; youngest septa distinctly thinner and shorter; lateral surfaces of septa are covered with rounded granules; columella lamellar, discontinuous; wall septothecal and parathecal; endotheca dissepiments vesicular, mainly occurring in the peripheral areas of calicinal series.

REMARKS. Re-examination of the type material (Baron-Szabo 2002) revealed that some specimens assigned to the species *Orbignygyra salisburgensis* (Milne Edwards & Haime) differ from the latter in having distinctly larger dimensions of the calicinal series but lower density of septa. In *O. salisburgensis* (Milne Edwards & Haime 1849*b*) the size of the calicinal series d (series) is around 2 mm and the septal density ranges between 8 and 12 in 2 mm.

The taxon *Meandrina tenella* Michelin (1845) represents a younger homonym of *Meandrina tenella* Goldfuss (1826).

TYPE LOCALITY OF SPECIES. Santonian of Austria (Gosau Group at Nefgraben).

DISTRIBUTION. Santonian of Austria (Gosau Group) and Spain, Middle–Upper Maastrichtian of Jamaica (this paper) and the UAE/Oman border region.

NEW MATERIAL. Middle–Upper Maastrichtian of Jamaica, NMNH, Coates coll., sample no.: 590d (=probably Maldon Inlier).

Orbignygyra tenella (Goldfuss, 1826) (Pl. 17, figs 1, 6)

v*1826 *Meandrina tenella* nobis; Goldfuss: vol. 1, p. 63, pl. 21, fig. 4.
v1849*b* *Meandrina ? saltzburgiana*; Milne Edwards & Haime: vol. 9, 3. ser., p. 284.
1849*b* *Diploria crasso-lamellosa*; Milne Edwards & Haime: vol. 11, 3. ser., p. 291.
v1851*b* *Meandrina saltzburgiana*; Milne Edwards & Haime: 90.
1854 *Diploria crasso-lamellosa* Milne Edwards & Haime; Reuss: 109, pl. 15, figs 10–11.
v1854 *Meandrina saltzburgensis* Milne Edwards & Haime; Reuss: 109, pl. 15, figs 12–13.
1857 *Diploria crasso-lamellosa*; Milne Edwards: vol. 2, p. 404.
1857 *Meandrina salisburgensis*; Milne Edwards: vol. 2, p. 394
1858–61 *Meandrina ? tenella*; de Fromentel: 167.
1877 *Dendrogyra salisburgensis*; de Fromentel: 440.
1903a *Diploria crasso-lamellosa* M. Edwards et J. Haime; Felix: 275, text-fig. 37.
?v1903*a* *Leptoria konincki* (Milne Edwards & Haime); Felix: 276–277, text-figs 38–39.
nonv1903*a* *Dendrogyra salisburgensis* (Milne Edwards & Haime); Felix: 306–307, text-figs 54–55, pl. 22, fig. 14.
1914 *Dendrogyra salisburgensis* (Milne Edwards & Haime); Felix: pars 6, p. 89.
1921 *Diploria Meridionalis*, n. sp.; Vidal: 12, pl. 8, figs 4–5.
1930 *Leptoria konincki* var. *salisburgensis* Milne Edwards & Haime; Oppenheim: 384, pl. 43, fig. 1.
1937*a* *Diploria meridionalis* Vidal 1921; Bataller: 162, 2 text-figs on p. 163.
v1952*a* *Diplothecophyllia Basseae*; Alloiteau: 609 (nom. nud.).
?1954 *Dendrogyra salisburgensis* (Milne Edwards & Haime); Kolosšary: 70, pl. 3, fig. 1.
v1957 *Diplothecophyllia Basseae* nov. gen. nov. sp.; Alloiteau: 251, pl. 5, figs 14–15.
1966 *Diploria meridionalis*, Vidal; de la Revilla & Quintero: 14, pl. 1, fig. 1.
(v)1976 *Meandroria konincki* (Milne Edwards & Haime); Turnšek & Buser: 57, 79–80, pl. 13, figs 1–4, pl. 14, figs 1–3.
(v)1980 *Meandroria konincki* (Milne Edwards & Haime); Vidal: 47–48, pl. 12, figs 1–2.
non(v)1982 *Orbignygyra salisburgensis* (Milne Edwards & Haime); Beauvais: vol. 1, p. 204, pl. 16, figs 4–5, pl. 53, fig. 4.
(v)1982 *Orbignygyra crasso-lamellosa* (Milne Edwards & Haime); Beauvais: vol. 1, p. 206–207, pl. 17, fig. 2, pl. 18, fig. 1.
(v)1982 *Meandroria tenella* (Goldfuss); Beauvais: vol. 1, pp. 210–212, pl. 18, figs 2–3, pl. 19, fig. 1.
1985 *Meandroria tenella* (Goldfuss, 1826): Tchéchmédjiéva: 33, pl. 3, fig. 4.
1986 *Meandroria tenella* (Goldfuss, 1826); Tchéchmédjiéva: 66ff.
v1989 *Meandroria tenella* (Goldfuss); Höfling: 57.
(v)1997 *Meandroria konincki* (Milne Edwards & Haime); Turnšek: 124, figs 124A–F.
1998 *Meandroria tenella* (Goldfuss 1826); Löser: 80, pl. 1, fig. 3.
2000b *Diploria meridionalis*, Vidal 1921; Löser: 32.
2000b *Meandroria tenella* (Goldfuss 1826); Löser: 51.
2000b *Diplothecophyllia basseae*, Alloiteau 1952; Löser: 32.
2000b *Orbignygyra crassolamellosa* (Milne-Edwards & Haime 1849); Löser: 57.

2002 ? *Dictuophyllia basseae* (Alloiteau, 1952); Baron-Szabo: 27.
v2002 *Orbignygyra tenella* (Goldfuss, 1826); Baron-Szabo: 84, pl. 61, figs 1–3.
v2002 *Orbignygyra crassolamellosa* (Milne Edwards & Haime, 1849) (= *O. tenella*); Baron-Szabo: 84, pl. 61, fig. 1–3.
v2003 *Orbignygyra tenella* (Goldfuss, 1826); Baron-Szabo: 133, pl. 8, fig. 2.

DIMENSIONS. c-c (wall–wall) = 1.5–3.5 mm; d (ambulacrum) = 0.5–3 mm; s/mm = 30–40/10, in areas where third order septa present the septal density is higher.

DESCRIPTION. Corallum massive, meandroid, corallites indistinct or subdistinct, arranged in short sinuous series; ambulacrae irregularly present; costosepta compact, non-confluent, granulated laterally, arranged in two size orders, in some areas third order septa present; irregularly alternating in length and thickness; columella lamellar, discontinuous; wall septothecal and parathecal; endotheca dissepiments vesicular, mainly occurring in the peripheral areas of calicinal series.

REMARKS. Due to the lack of a columella and the presence of reduced costae the specimens in Felix (1903*a*) and Beauvais (1982) assigned to the species *salisburgensis* (Milne Edwards & Haime) most probably represent forms of the genus *Psilogyra* Felix.

TYPE LOCALITY OF SPECIES. Turonian–Campanian of Austria (Gosau Group).

DISTRIBUTION. Turonian–Campanian of Austria (Gosau Group), Coniacian–Santonian of Spain, Senonian of Slovenia (resedimented), Upper Santonian of France (Corbières), ? Senonian of Hungary, Lower Campanian of Turkey, Upper Campanian of Bulgaria, ?Lower Maastrichtian of Spain, Thanetian of Madagascar.

Genus ***PSILOGYRA*** Felix, 1903*a*

TYPE SPECIES. *Psilogyra telleri* Felix, 1903*a*, Upper Santonian of Austria (Gosau Group).

DIAGNOSIS. Colony massive, meandroid. Individual corallites subdistinct to indistinct, forming long calicinal series separated by tectiform collines and ambulacrae. Septa thick, compact, non-confluent, finely granulated to strongly beaded laterally. Reduced costae irregularly present. Columella absent, but trabecular extensions of axial septal ends occasionally form a pseudo-columella. Wall septoparathecal. Endothecal and exothecal dissepiments vesicular.

Psilogyra felixi Oppenheim, 1930 (Pl. 18, fig. 2)

*1930 *Psilogyra felixi* n. sp.; Oppenheim: 446, pl. 37, fig. 2, pl. 38, fig. 7.
1982 *Psilogyra felixi* Oppenheim 1930; Beauvais: vol. 1, p. 244.
2000b *Psilogyra felixi*, Oppenheim 1930; Löser: 70.
2002 *Psilogyra felixi* Oppenheim, 1930; Baron-Szabo: 85.

DIMENSIONS. d (series) = 2.5–4 mm; d (ambulacrum) = 0.5–2 mm; s/mm = 14–16/5.

DESCRIPTION. Massive, meandroid colony; corallites arranged in sinuous series; columella irregularly trabecular to discontinuous lamellar; other skeletal elements developed as in the species described below.

TYPE LOCALITY OF SPECIES. Santonian of Austria (Gosau Group at Edelbachgraben).

DISTRIBUTION. Santonian of Austria (Gosau Group), Maastrichtian of Jamaica (this paper).

NEW MATERIAL. Maastrichtian of Jamaica, NMNH, Coates coll., sample nos.: 562h (=Coffee Ground-Bowen's coral bed); J-71-7b (=Glenbrook).

Psilogyra telleri Felix, 1903*a* (Pl. 17, fig. 4; Pl. 18, fig. 1)

v*1903*a* *Psilogyra telleri* n. sp.; Felix: 309, pl. 24, fig. 4.
1914 *Psilogyra telleri* Felix 1903; Felix: pars 7, p. 149.
1930 *Psilogyra telleri* Felix; Oppenheim: 444, pl. 36, fig. 1.
1943 *Dichocoenia (Psilogyra) telleri* (Felix); Vaughan & Wells: 189, pl. 37, fig. 6.
1956 *Dichocoenia (Psilogyra) telleri* (Felix); Wells: F415, fig. 316.
v1982 *Psilogyra telleri* Felix 1903; Beauvais: vol. 1, p. 242, pl. 20, fig. 10.
2000b *Psilogyra telleri*, Felix 1903; Löser: 70.
v2002 *Psilogyra telleri* Felix, 1903; Baron-Szabo: 85, pl. 61, fig. 4, pl. 62, fig. 2.

DIMENSIONS. d (series) = 3–6 mm; d (ambulacrum) = 1–3 mm; s/mm = 11/5.

DESCRIPTION. Colony massive, meandroid; gemmation intracalicinal; individual corallites subdistinct to indistinct, forming long calicinal series separated by tectiform collines and ambulacrae; septa thick, compact, non-confluent, finely granulated to strongly beaded laterally; reduced costae irregularly present; columella trabecular or absent; wall septoparathecal; endothecal and exothecal dissepiments vesicular.

TYPE LOCALITY OF SPECIES. Santonian of Austria (Gosau Group at Nefgraben).

DISTRIBUTION. Santonian of Austria (Gosau Group), Middle–Upper Maastrichtian of Jamaica.

Genus ***PHYTOGYRA*** d'Orbigny, 1849

TYPE SPECIES. *Phytogyra magnifica* d'Orbigny, 1849, Upper Jurassic of France.

DIAGNOSIS. Colonial, subdendroid–flabelliform. Branches low, horizontal, formed by laterally free uniserial calicinal rows. Gemmation intracalicinal with terminal forking. Costosepta compact, granulated laterally and marginally. Columella lamellar. Endothecal dissepiments vesicular.

***Phytogyra* sp.** (Pl. 18, figs 3a, b)

DIMENSIONS. d (series) = 10–12 mm; s/mm = 4–7/2.

DESCRIPTION. Colonial, dendro–flabelliform, forming low horizontal branches with terminal forking; costosepta compact, developed in three irregularly occurring orders; axial

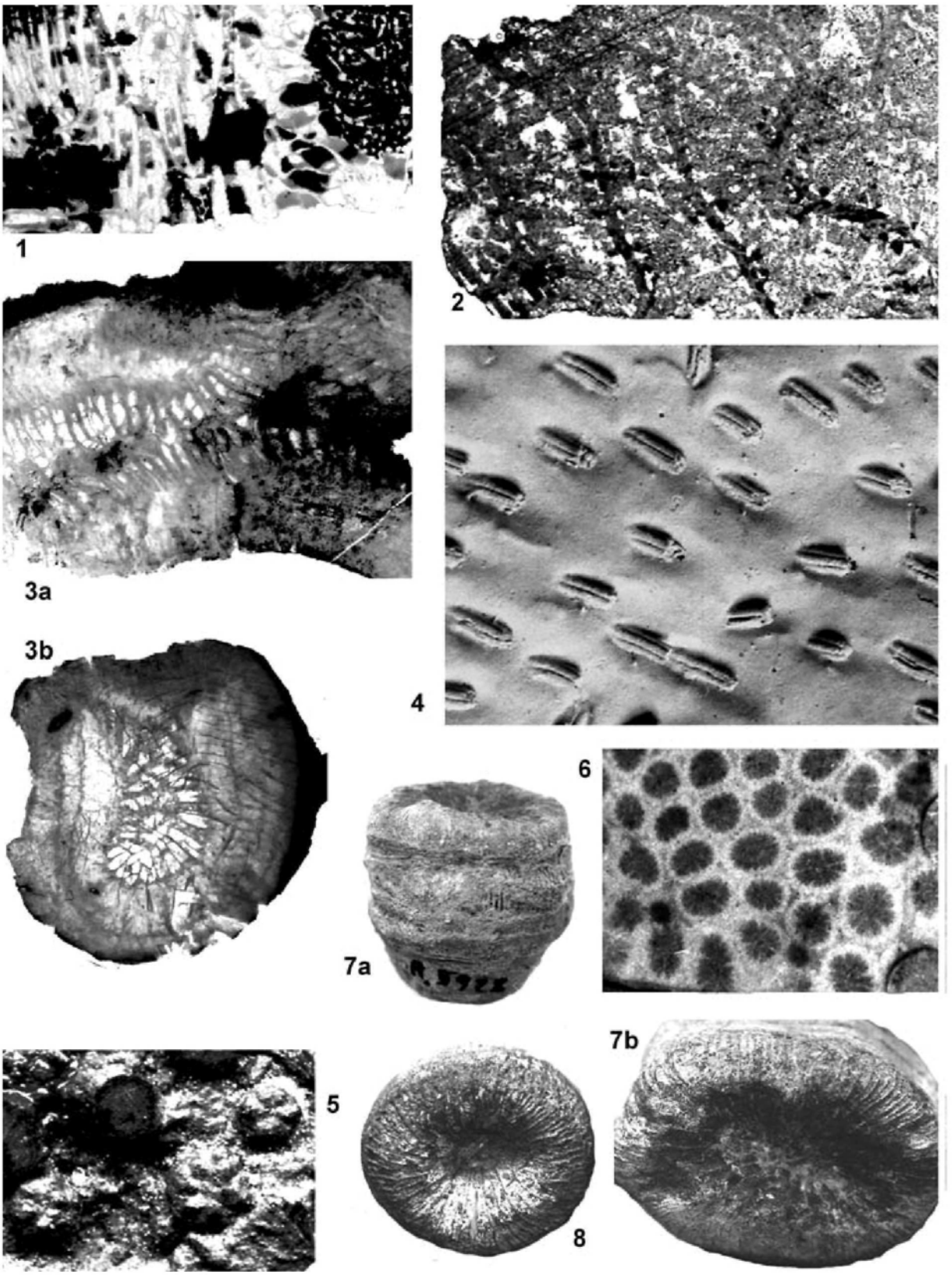


Plate 18 **Fig. 1** *Psilogyra telleri* Felix, 1903*a*, longitudinal thin section, Coates coll. NMNH, no. 393, Middle–Upper Maastrichtian of Jamaica, ×3.4 **Fig. 2** *Psilogyra felixi* Oppenheim, 1930, cross thin section, Coates coll. NMNH, no. J-71–7b, Middle–Upper Maastrichtian of Jamaica, ×7.5. **Fig. 3** *Phytogyra* sp, Coates coll. NMNH, no. 540g, Middle–Upper Maastrichtian of Jamaica. **3a**, cross thin section, ×6; **3b**, longitudinal cut through the calicinal series, ×6. **Fig. 4** *Heterocoenia bacellaris* (Goldfuss, 1826), holotype, cast, upper surface of colony, lateral view, oblique, IPB, Goldfuss coll., no. 73c, Upper Maastrichtian of the Netherlands, ×3. **Fig. 5** *Heterocoenia bacellaris* (Goldfuss, 1826), upper surface of colony, cross view, UANL-CE MAAS 210, Lower Maastrichtian of Mexico, ×6. **Fig. 6** *Reussicoenia edwardsi* (Reuss, 1854) (holotype of

ends usually claviform; septal flanks finely granulated; S1 and S2 reach the axial region, slightly alternating in length and thickness; columella sublamellar, discontinuous; wall septothecal, thick.

REMARKS. Because the specimens represent fragments, the total dimensions of the skeletal elements cannot be determined.

DISTRIBUTION. Upper Maastrichtian of Jamaica (this paper).

NEW MATERIAL. Upper Maastrichtian of Jamaica, NMNH, Coates coll. sample nos.: 540g; 540h (= Shaw Castle, Maldon Formation).

Suborder **AMPHIASTREINA** Alloiteau, 1952*a*

DIAGNOSIS. Solitary and colonial. Wall pachythecaliine (originally described as 'archaeothecal', see Remarks below). Septa arranged bilaterally, formed by simple, very small trabeculae aligned in a single row. Upper septal margins dentate, lateral surfaces granulate. Endothecal dissepiments tabulate (axially) and/or vesicular (peripherally). Gemmation extracalicinal and intracalicinal ('Taschenknospung').

REMARKS. The term 'archaeotheca' was created by Alloiteau (1952*a*) to describe the transversely folded septo-dissepimental wall of the amphiastreids and other groups. Because this coral group does not develop a septo-dissepimental wall and, moreover, because structurally different walls were later described using the term archaeotheca, Stolarski (1995), and Roniewicz & Stolarski (1999) proposed that this term be rejected as imprecisely established and confusing. They (Roniewicz & Stolarski 2001) later described for the amphiastreids a pachythecaliine wall (= thick wall built of radially oriented equal-sized fascicles of fibres.

Family **HETEROCOENIIDAE** Oppenheim, 1930 (= Baryheliidae M. Beauvais, 1977; = Pachycoeniidae M. Beauvais, 1977; = Paronastraeidae M. Beauvais, 1977)

DIAGNOSIS. Colonial. Gemmation generally extracalicinal, rarely intracalicinal, or due to 'Taschenknospung'. Septa formed by small trabeculae, dentate laterally, bilateral or radial. Lonsdaleoid septa present or absent. Columella absent. Endothecal dissepiments vesicular, developed in one or two zones. Exothecal dissepiments large, vesicular or tabulate, well-developed, generally dense.

Genus ***HETEROCOENIA*** Milne Edwards & Haime, 1848*d*

TYPE SPECIES. *Lithodendron exiguum* Michelin, 1847, Santonian of France (see Milne Edwards & Haime 1848*d*).

DIAGNOSIS. Colonial massive, foliaceous, or ramose, plocoid. Gemmation extracalicinal and marginal. Corallites circular to elongate, united by extensive vesicular to dense coenosteum. Septa compact, trimerally arranged. One main septum, with remaining septa sometimes reduced to rudimentary spines. Columella absent. Endothecal dissepiments thin, vesicular to subtabulate. Wall thick, septothecal-pachythecal.

Heterocoenia bacellaris (Goldfuss, 1826) (Pl. 18, figs 4, 5)

parsv*1826 *Gorgonia bacellaris*; Goldfuss: 19, pl. 7, figs 12–13, non figs 1–11, 14–16.
1847 *Lithodendron exiguum*; Michelin: 305, pl. 72, fig. 7.
1849*b* *Heterocoenia exiguis*; Milne Edwards & Haime: vol. 10, p. 308, pl. 9, figs 13–13a.
1854 *Heterocoenia provincialis* Milne Edwards & Haime; Reuss: 100, pl. 10, figs 3–4.
1857 *Heterocoenia exigua*; Milne Edwards: vol. 2, p. 283.
1857 *Heterocoenia Reussi*; Milne Edwards: vol. 2, p. 284.
1879 *Heterocoenia exigua* Milne-Edwards et Haime; de Fromentel: 500.
1879 *Heterocoenia reussi* Milne-Edwards et Haime; de Fromentel: 501.
1903*a* *Heterocoenia provincialis* M. Edwards et J. Haime (Michelin sp.); Felix: 234, pl. 19, fig. 11.
v1903*a* *Heterocoenia Reussi* M. Edwards; Felix: 235, pl. 17, fig. 12.
pars1914 *Heterocoenia provincialis* Michelin sp. 1841; Felix: pars 7, p. 153.
1914 *Heterocoenia Reussi* M. Edwards 1857; Felix: pars 7, p. 154.
1930 *Heterocoenia exigua* Michelin sp.; Oppenheim: 269–270.
1982 *Heterocoenia exigua* Michelin 1847; Beauvais: vol. 3 table 14.
(v)1982 *Heterocoenia reussi* H. Milne Edwards 1857; Beauvais: vol. 3, p. 13, pl. 50, fig. 3.
(v)1996 Hexakoralle, Morphotyp 10; Tragelehn: 198, pl. 61, fig. 6.
v1998 *Heterocoenia exigua* (Michelin 1846); Baron-Szabo: 132, pl. 2, fig. 3.
1999 *Heterocoenia bacellaris*; Leloux: 193, fig. 2.
2000b *Heterocoenia bacellaris* (Goldfuss 1826); Löser: 41.
2000b *Heterocoenia exigua* (Michelin 1847); Löser: 41.
2000b *Heterocoenia reussi*, Milne-Edwards 1857; Löser: 41.
2002 *Heterocoenia bacellaris* (Goldfuss 1826); Baron-Szabo: 198.

Columnastraea phillipsiae Gregory, 1900), Upper Paleocene of Somalia (lower part of Auradu Limestone), upper surface, BMNM, R.5039, ×3.5. **Fig. 7** *Rennensismilia inflexa* (Reuss, 1854) (= *Trochosmilia protectans* Nötling, 1897), Maastrichtian of Madagascar, Bührer coll. NMNH, R.5928 (larger one of the two specimens). **7a**, upper surface, longitudinal view, ×1.2; **7b**, upper surface, cross view, ×2.2. **Fig. 8** *Rennensismilia inflexa* (Reuss, 1854) (= *Trochosmilia protectans* Nötling, 1897), Maastrichtian of Madagascar,Bührer coll. NMNH, R.5928 (smaller one of the two specimens), surface, cross view, ×2.

2002 *Heterocoenia exigua* (Michelin, 1847); Baron-Szabo: 198.
2002 *Heterocoenia provincialis* (Michelin *sensu* Fromentel, 1879); Baron-Szabo: 198.
2002 *Heterocoenia reussi* Milne Edwards, 1857; Baron-Szabo: 198.

DIMENSIONS. d = 1.2–2.2 mm; c-c = 2.5–4.5 mm; s = 6–12.

DESCRIPTION. Plocoid, massive to subfasciculate colony; corallites circular or oval in outline; septa six in number with another set of six spine-like or reduced, arranged radially or bilaterally in irregular systems.

REMARKS. The specimen IPB 73c (corresponding to fig. 12 on pl. 7 in Goldfuss 1826) represents the type specimen of *Heterocoenia bacellaris*. According to the dimensions of skeletal elements (d = 1.2–2.2 mm; s = 6–12), the specimen IPB 73i (corresponding to fig. 13 on pl. 7 in Goldfuss 1826) belongs to the same species.

TYPE LOCATION OF SPECIES. Upper Maastrichtian of the Netherlands (St. Pietersberg).

DISTRIBUTION. Santonian of France (Martigues, Bouches-du-Rhone), Santonian–Campanian of Austria (Gosau Group), Campanian of northern Spain (Torallola), Lower Maastrichtian of Mexico (Cerralvo, this paper), Upper Maastrichtian of the Netherlands, Paleocene of Austria.

NEW MATERIAL. Lower Maastrichtian of Mexico, UANL-CE MAAS 210.

Heterocoenia dendroides Reuss, 1854
(Pl. 19, figs 1a, b)

parsv1826 *Gorgonia bacellaris*; Goldfuss: 19, pl. 7, fig. 9, non figs 1–8 and 10–16.
*1854 *Heterocoenia dendroides*; Reuss: 100, pl. 10, figs 5–6.
1857 *Heterocoenia dendroides*; Milne Edwards: vol. 2, p. 284.
non1858–61 *Heterocoenia dendroides*; de Fromentel: 182.
non1879 *Heterocoenia dendroides*; de Fromentel: 500, pl. 132, fig. 1.
v1903*a* *Heterocoenia dendroides* Reuss; Felix: 236.
1903*a* *Heterocoenia costata* nov. sp.; Felix: 237, pl. 19, figs 4–5, 8–9.
1914 *Heterocoenia costata* Felix 1903; Felix: pars 7, p. 152.
1914 *Heterocoenia dendroides* Reuss 1854; Felix: pars 7, p. 152.
1921 *Heterocoenia garumnica*, n. sp.; Vidal: 6, pl. 8, figs 6–7.
1930 *Heterocoenia dendroides* Reuss; Oppenheim: 270, pl. 31, figs 12–13.
1930 *Heterocoenia costata* Felix; Oppenheim: 275.
1937*a* *Heterocoenia costata* Felix 1903; Bataller: 98.
1937*a* *Heterocoenia dendroides* Reuss; Bataller: 98.
1982 *Heterocoenia dendroides* Reuss 1854; Beauvais: vol. 3, p. 15, pl. 51, figs 1–2.
1982 *Heterocoenia costata* Felix 1903; Beauvais: vol. 3, p. 17, pl. 51, fig. 5.
1994 *Heterocoenia subramosa* n. sp.; Reig Oriol: 11, pl. 1, 3, pl. 2, fig. 10.
v1998 *Heterocoenia dendroides* Reuss, 1854; Baron-Szabo: 134, pl. 3, figs 1–2, pl. 7, fig. 6.
1999 *Heterocoenia bacellaris*; Leloux: 193, fig. 2.
2000b *Heterocoenia costata*, Felix 1903; Löser: 41.
2000b *Heterocoenia dendroides*, Reuss 1854; Löser: 41.
2000b *Heterocoenia garumnica*, Vidal 1921; Löser: 41.
2000b *Heterocoenia subramosa*, Reig Oriol 1994; Löser: 41.
2002 *Heterocoenia costata* Felix, 1903; Baron-Szabo: 198.
v2002 *Heterocoenia dendroides* Reuss, 1854; Baron-Szabo: 198, figs 3–4, 6.
2002 *Heterocoenia garumnica* Vidal, 1921; Baron-Szabo: 198.
2002 *Heterocoenia subramosa* Reig Oriol, 1994; Baron-Szabo: 198.

DIMENSIONS. d = 2–3 mm; c-c = 2–4 mm; s = 6–12.

DESCRIPTION. Ramose, plocoid colony; corallites subcircular in outline, projecting; costosepta arranged in cycles of unclear systems, bilateral; oldest septa reach around one quarter of the size of corallite diameter; remaining ones are very short or reduced.

REMARKS. Because the holotype of *Heterocoenia dendroides* Reuss was lost, Beauvais (1982: vol. 3, p. 15) chose a neotype. Even though the dimensions of the skeletal elements of the neotype differ distinctly from the ones of the specimen originally described by Reuss (1854: 100), they have to be considered the specific characters of the species. In the original description, Reuss (1854: 100) gave a calicinal diameter of 1.5–2 mm and the number of septa as 6–12, whereas the corallites in the neotype are 1.8–3.2 mm in diameter and the number of septa is generally six.

According to the dimensions of skeletal elements (d = 1.6–2.8 mm, s = 6 + s) specimen IPB 73f, Goldfuss collection, part of the type series of *Heterocoenia bacellaris* (Goldfuss, 1826) is considered synonymous with *H. dendroides*.

TYPE LOCATION OF SPECIES. Upper Santonian of Austria (Gosau Group at Neue Welt).

DISTRIBUTION. Coniacian–Santonian of Austria (Gosau Group), Upper Santonian–Maastrichtian of northern Spain, Upper Maastrichtian of the Netherlands (St. Pietersberg).

Heterocoenia gracilis (Quenstedt, 1881)
(Pl. 19, figs 2a, b)

parsv1826 *Gorgonia bacellaris*; Goldfuss: 19, pl. 7, figs 3 and 11, non figs 1–2, 4–10, 12–16.
v*1881 *Bacillastraea gracilis*; Quenstedt: vol. 2, p. 851, pl. 176, figs 44, 44x.
1903*a* *Heterocoenia erecta* nov. sp.; Felix: 235, pl. 19, fig. 3.
1914 *Heterocoenia erecta* Felix 1903; Felix: pars 7, p. 152.
1972 *'Solitary coral'*; Samuel *et al.*: pl. 155, fig. 3.

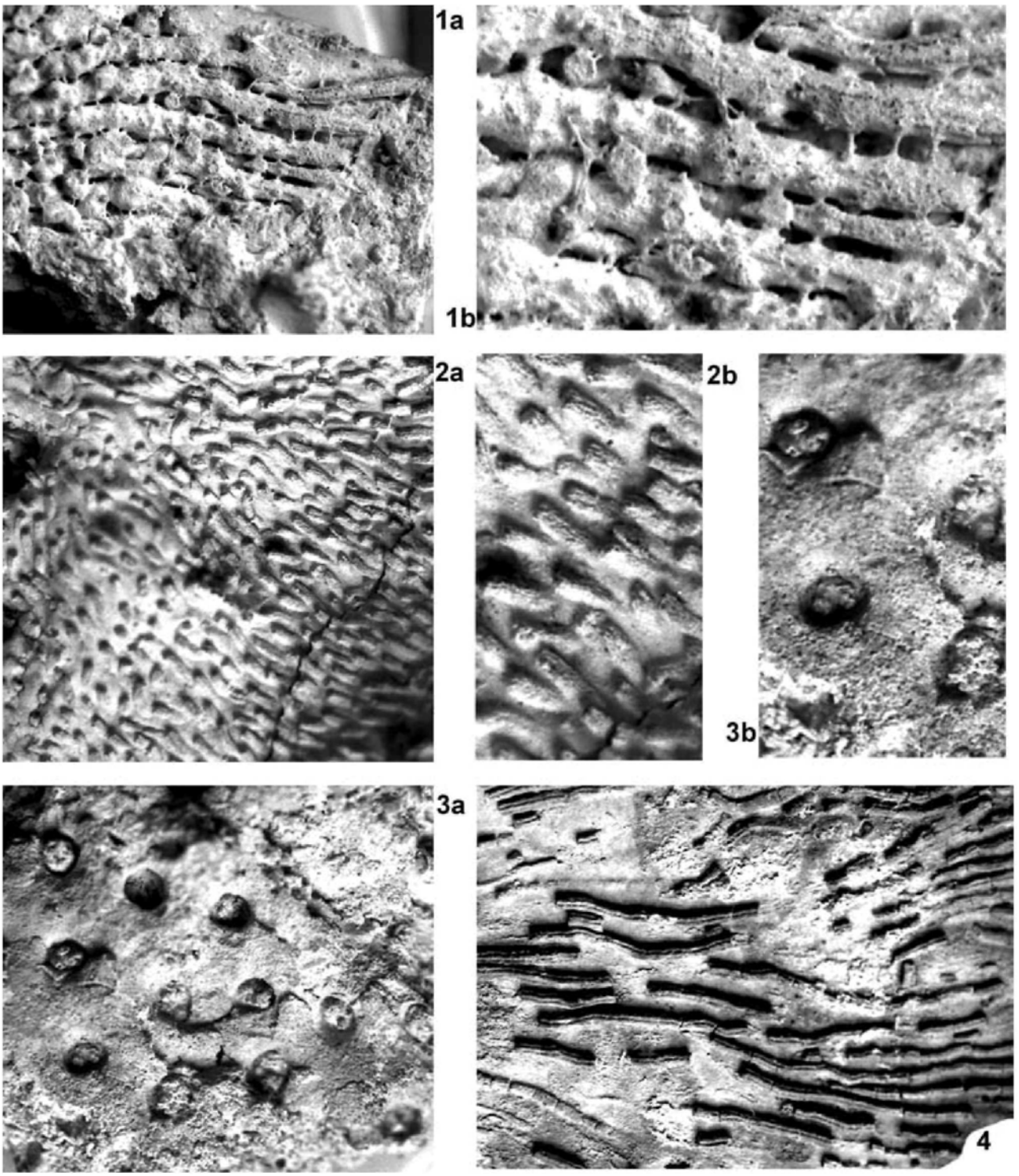


Plate 19 **Fig. 1** *Heterocoenia dendroides* Reuss, 1854, upper surface of colony, IPB Goldfuss coll. no. 73f, Upper Maastrichtian of the Netherlands. **1a**, lateral view, ×1.5; **1b**, ×4.5. **Fig. 2** *Heterocoenia gracilis* (Quenstedt, 1881), upper surface of colony, cast, oblique, IPB Goldfuss coll. no. 73h, Upper Maastrichtian of the Netherlands. **2a**, ×3; **2b**, ×6. **Fig. 3** *Heterocoenia grandis* Reuss, 1854, upper surface of colony, cross view, IPB Goldfuss coll. no. 73j, Upper Maastrichtian of the Netherlands. **3a**, ×1.5; **3b**, ×3. **Fig. 4** *Heterocoenia minima* d'Orbigny, 1850, upper surface of colony, cast, lateral view, IPB Goldfuss coll. no. 73d, Upper Maastrichtian of the Netherlands, ×2.

1982 *Heterocoenia erecta* Felix 1903; Beauvais: vol. 3, p. 14.
1999 *Heterocoenia bacellaris*; Leloux: 193, fig. 2.
2000b *Heterocoenia erecta*, Felix 1903; Löser: 41.
2002 *Heterocoenia erecta* Felix, 1903; Baron-Szabo: 198.
2002 *Heterocoenia minutisima* Reig, Oriol 1997; Baron-Szabo: 198.

DIMENSIONS. d = 0.5–1 mm; c-c = 0.5–1.5 mm; s = 6 + s.

DESCRIPTION. Plocoid, subfasciculate colony; corallites circular in outline; septa, generally six in number, arranged radially or bilaterally in irregular systems.

REMARKS. According to the dimensions of skeletal elements (d = 0.6–1 mm, s = 6 + s) the specimens IPB 73a and 73h, Goldfuss collection, part of the type series of *Heterocoenia bacellaris* (Goldfuss, 1826) belong to *H. gracilis* with specimen IPB 73h as the type of *H. gracilis* (see Quenstedt 1881: 851).

TYPE LOCATION OF SPECIES. Upper Maastrichtian of the Netherlands (St. Pietersberg).

DISTRIBUTION. Upper Santonian of Austria (Gosau Group), Upper Maastrichtian of the Netherlands, Montian–Thanetian of Slovakia (Western Carpathians).

Heterocoenia grandis Reuss, 1854
(Pl. 19, figs 3a, b)

parsv1826 *Gorgonia bacellaris*; Goldfuss: 19, pl. 7, figs 5 and 14, non figs 1–4, 6–13, 15–16.
v*1854 *Heterocoenia grandis*; Reuss: 100, pl. 10, figs 1–2.
pars1857 *Heterocoenia crassi-lamellata*; Milne Edwards: vol. 2, p. 283.
1858–61 *Heterocoenia crassi-lamellata*; de Fromentel: 181.
1879 *Heterocoenia excentrica*; de Fromentel: 499, pl. 124, figs 1–1b, pl. 125, fig. 2.
v1903*a* *Heterocoenia grandis* Reuss; Felix: 229, pl. 19, figs 1, 6, 7.
1914 *Heterocoenia excentrica* de Fromentel 1870; Felix: pars 7, p. 153.
1914 *Heterocoenia grandis* Reuss 1854; Felix: pars 7, p. 153.
1930 *Heterocoenia grandis* Reuss; Oppenheim: 262, pl. 38, figs 9–9a.
1937*a* *Heterocoenia excentrica* Fromentel 1870; Bataller: 99.
1937*a* *Heterocoenia grandis* Reuss 1854; Bataller: 100.
(v)1976 *Heterocoenia grandis* Reuss; Turnšek & Buser: 50, 76, pl. 5, figs 1–3.
v1982 *Heterocoenia grandis* Reuss 1854; Beauvais: vol. 3, p. 11, pl. 50, figs 2a–d.
1982 *Heterocoenia pachypleura* n. sp.; Beauvais: vol. 3, p. 11, table 14.
1987 *Heterocoenia exigua* (Michelin); Kuzmicheva: 80, pl. 1, fig. 1.
1999 *Heterocoenia bacellaris*; Leloux: 193, fig. 2.
2000b *Heterocoenia excentrica*, de Fromentel 1879; Löser: 41.
2000b *Heterocoenia, grandis* Reuss 1854; Löser: 41.
2000b *Heterocoenia, pachypleura*, Beauvais 1982; Löser: 41.
2002 *Heterocoenia excentrica* de Fromentel, 1879; Baron-Szabo: 198.
v2002 *Heterocoenia grandis* Reuss, 1854; Baron-Szabo: 198, pl. 139, fig. 1.
2002 *Heterocoenia pachypleura* Beauvais, 1982; Baron-Szabo: 198.
v2003 *Heterocoenia grandis* Reuss, 1854; Baron-Szabo: 132, pl. 9, fig. 2.

DIMENSIONS. d = 2.5–5.5 mm, juvenile around 2 mm; c-c = 9–12 mm; s = 6 + s.

DESCRIPTION. Massive to subramose, plocoid colony; corallites circular or elliptical in outline; septa arranged bilaterally in two to three cycles in three systems.

REMARKS. According to the dimensions of skeletal elements (d = 2.8–5 mm; s = 6 + s) specimens IPB 73e and 73j, Goldfuss collection, part of the type series of *Heterocoenia bacellaris* (Goldfuss, 1826) belong to *H. grandis*.

TYPE LOCATION OF SPECIES. Santonian of Austria (Gosau Group).

DISTRIBUTION. Upper Turonian of France (Uchaux), Santonian of Armenia, Upper Santonian of Austria (Gosau Group), Maastrichtian of northern Spain, resedimented in Senonian breccia of Slovenia, Upper Maastrichtian of the Netherlands (St. Pietersberg).

Heterocoenia minima d'Orbigny, 1850
(Pl. 19, fig. 4)

parsv1826 *Gorgonia bacellaris*; Goldfuss: 19, pl. 7, figs 4, 10, non figs 1–3, 5–9, 11–16.
*1850 *Heterocoenia minima*; d'Orbigny: vol. 2, p. 207.
1857 *Heterocoenia minima*; Milne Edwards: vol. 2, p. 285.
1879 *Heterocoenia dendroides*; de Fromentel: 500, pl. 132, fig. 1.
1914 *Heterocoenia minima* d'Orbigny 1850; Felix: pars 7, p. 153.
non1971 *Heterocoenia minima* n. sp.; Morycowa: 66, pl. 12, figs 1–2, text-fig. 19.
1982 *Heterocoenia minima* d'Orbigny 1850; Beauvais: vol. 3, table 14.
1997*a* *Heterocoenia minutisima* n. sp.; Reig Oriol: 12, pl. 1, fig. 12.
1999 *Heterocoenia bacellaris*; Leloux: 193, fig. 2.
2000b *Heterocoenia, minima* d'Orbigny 1850; Löser: 41.
2000b *Heterocoenia minutisima* Reig Oriol 1997; Löser: 41.
2002 *Heterocoenia minima* d'Orbigny, 1850; Baron-Szabo: 198.
2002 *Heterocoenia minutisima* Reig Oriol, 1997; Baron-Szabo: 198.

DIMENSIONS. d = 1–1.5 mm; c-c = 1.2–3.5 mm; s = 1–6.

DESCRIPTION. Plocoid colony; corallites circular in outline; septa generally six in number, arranged radially or bilaterally in irregular systems.

REMARKS. According to the dimensions of skeletal elements (d = 1.2–1.5 mm, rarely up to 2 mm in latest ontogenetical stages; s = max. 6), specimens IPB 73d and 73g, Goldfuss collection, part of the type series of *Heterocoenia bacellaris* (Goldfuss, 1826) belong to *H. minima*.

Reig Oriol (1997*a*) stated that his newly created species *Heterocoenia minutisima* was characterised by a calicinal diameter of 0.4–0.6 mm. However, the illustration of the

holotype (Reig Oriol: pl. 1, fig. 12) shows a calicinal diameter of 1–1.5 mm for this species, thus corresponding to *Heterocoenia minima*.

TYPE LOCATION OF SPECIES. Lower Santonian of France (Le Beausset).

DISTRIBUTION. Lower Santonian of France (Le Beausset and La Cardière, Var), Santonian of northern Spain, Upper Maastrichtian of the Netherlands.

ACKNOWLEDGEMENTS

My thanks and gratitude go to my husband Dennis, to colleagues and friends for their encouragement and support. I am very grateful to two unknown reviewers for providing very helpful comments. I thank Dragica Turnšek (Slovenska akademija znanosti in umetnosti, Ljubljana) for many discussions on coral taxonomy and for carefully reviewing an earlier version of the manuscript. For many discussions on coral taxonomy and/or stratigraphic questions of type localities of corals I wish to thank Jacob Leloux (Leiden, Netherlands), Steve Cairns (Smithsonian Institution, Washington, DC) and Wolfgang Kiessling (Humboldt University, Berlin). Type material and material from new localities were made accessible to me by Jill Darrell (The Natural History Museum, London, UK), Martin Sander (University of Bonn, Germany), Christine Perrin (Museum d'Histoire Naturelle de Paris, France), Franz Stojaspal and Harry Lobitzer (Geologische Bundesanstalt, Wien, Austria), Heinz Kollmann (Naturhistorisches Museum, Vienna, Austria), Miguel Tellez (Universidad Autónoma de Baja California, Mexico), Christina Ifrim and Wolfgang Stinnesbeck (both Geological Institute, University Karlsruhe, Germany), Riccardo Manni (University of Rome) and Chiara Sorbini and Giovanni Bianucci (both University of Pisa, Italy). As a Research Associate of the Smithsonian Institution the author would like to express her deep appreciation for the continuing support of the SI at Washington, DC. I am very indebted to the Deutsche Forschungsgemeinschaft (DFG) for providing support by funding the project Ba1830/3.

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APPENDIX 1: FORMS WRONGLY ASSIGNED TO THE MAASTRICHTIAN

Clausastrea arnaudi Alloiteau, 1960; France (Dordogne); Campanian.

Clausastrea bellomontensis Alloiteau, 1960; France (Dordogne); Campanian.

Clausastrea neuvicendesis Alloiteau, 1960; France (Dordogne); Campanian.

Phyllosmilia gracile (de Fromentel, 1862) France (Dordogne); Campanian.

APPENDIX 2: MAASTRICHTIAN/PALEOCENE TAXA LISTED WITHOUT DESCRIPTION OR WHOSE TAXONOMIC AND/OR STRATIGRAPHIC ASSIGNMENT IS UNCLEAR

Actinastrea sp. *in* Barthel & Herrmann-Degen (1981), Paleocene of Egypt, no description, no illustration.

Astrocoenia decaphylla Michelin sp. 1847, *in* Bataller (1937*b*: 309), Maastrichtian of northern Spain, no description, no illustration.

Astrocoenia gregoryi Latham, 1929, *in* Carbone *et al.* (1993), Upper Paleocene–Lower Eocene of Somalia, no description, no illustration.

Astrocoenia immersa Fritsch, 1878, *in* Carbone *et al.* (1993), Upper Paleocene–Lower Eocene of Somalia, no description, no illustration.

Caulastrea sp., *in* Barthel & Herrman-Degen (1981), Paleocene of Egypt, no description, no illustration.

Cereiphyllia tenuis (Reuss, 1868), *in* Carbone *et al.* (1993), Upper Paleocene–Lower Eocene of Somalia, no description, no illustration.

Cladocora rosicensis (Oppenheim, 1912) in Carbone *et al.* (1993), Upper Paleocene–Lower Eocene of Somalia, no description, no illustration.

Columactinastraea pachinensis (De Greg.) in Matteucci *et al.* (1982), Maastrichtian of Italy (Sicily), no description, no illustration.

Columastraea maxima Gregory, 1900, Paleocene of Somalia, taxonomic position unclear.

Diploctenium gracile de Fromentel, 1862, *in* Bataller (1937*b*: 309), Maastrichtian of northern Spain, no description, no illustration.

Favia sp. *in* Barthel & Herrmann-Degen (1981), Paleocene of Egypt, no description, no illustration.

Heliastraea francqana Milne Edwards, 1857, Maastrichtian of the Netherlands, taxonomic position unclear.

Heterocoenia provincialis Michelin sp. 1841 *in* Bataller (1937*b*: 301), Maastrichtian of northern Spain, no description, no illustration.

Hidnophoraraea multilamellosa (Reuss) *in* Matteucci *et al.* (1982), Maastrichtian of Italy (Sicily), no description, no illustration.

Hydnophyllia nov. sp *in* Ciry, 1939, Maastrichtian of northern Spain, no description, no illustration.

Isastrea sp. *in* Hanna (1995: 303, fig. 4 [4]), Maastrichtian of Iraq (Aqra Limestone Formation), taxonomic position unclear.

Montastraea sp. *in* Matteucci *et al.* (1982), Maastrichtian of Italy (Sicily), no description, no illustration.

Mesomorpha andrusovi: Kuzmicheva (1975), Upper Danian of Ukraine, most probably represents a chaetitid sponge.

?*Oculina osiris* Alloiteau, 1958, Upper Maastrichtian of Madagascar, taxonomic position unclear.

Oculina sp., *in* Nielsen (1922), Danian of Denmark, no description, no illustration.

Pachygyra daedalea Reuss, 1854 *in* Bataller (1937*b*: 301), Maastrichtian of northern Spain, no description, no illustration.

Phyllocoeniopsis pediculata (Desh.) *in* Matteucci *et al.* (1982), Santonian–Maastrichtian of Italy (Sicily), no description, no illustration.

Placocoenia gigantea Oppenheim, 1930, *in* Bataller (1945: 23), Santonian and Maastrichtian of northern Spain, no description, no illustration.

Placocyathus striatus Duncan (1880), Paleocene of Pakistan, taxonomic position unclear.

Platygyra sp. *in* Barthel & Herrmann-Degen (1981), Paleocene of Egypt, no description, no illustration.

Sclerhelia volgensis Kuzmicheva, 1975, Paleocene of Russia, taxonomic position unclear.

Stylophora sp. *in* Duncan (1880), Paleocene of Pakistan, taxonomic position unclear.

Trochosmilia triangulatus Kühn, 1929, age of type locality uncertain.

Turbinolia inauris Morton, 1834, Upper Maastrichtian of the USA (Alabama), taxonomic position unclear.

APPENDIX 3: LIST OF SYNONYMIES

Acropora esperanza: Vecsei & Moussavian (1997) see *Astreopora esperanzae* Frost & Langenheim, 1974.

Acropora tergestina: Carbone *et al.* (1993) see *Dendracis* sp.

Acrosmilia (Acrosmiliopsis) almerai n. sp.: Reig Oriol & Vilella (1995) see *Calamophylliopsis simonyi* (Reuss, 1854).

Acrosmilia (Acrosmiliopsis) marini: Reig Oriol & Vilella (1995), Löser (2000*b*) see *Calamophylliopsis marini* (Bataller, 1936).

Acrosmilia vidali: Baron-Szabo (2002) see *Calamophylliopsis marini* (Bataller, 1936).

Actinacis octophylla: Trauth (1911) see *Stylophora octophylla* (Felix, 1906).

Actinastraea decaphylla madagascariensis, Alloiteau 1958: Löser (2000*b*), Baron-Szabo (2002) see *Holocoenia madagascariensis* (Alloiteau, 1958).

Actinastraea hexacnema: (Quenstedt) 1881: Beauvais (1982) see *Actinastrea hexacnema* (Quenstedt, 1881).

Actinastrea bellomontensis: Alloiteau (1954) see *Actinastrea subdecaphylla* (Oppenheim, 1930).

Actinastrea bellomontensis petrocoriensis: Alloiteau (1954), Löser (2000*b*), Baron-Szabo (2002) see *Actinastrea geminata* (Goldfuss, 1826).

Actinastrea decaphylla: Meyer (1987) see *Actinastrea geminata* (Goldfuss, 1826).

Actinastrea faujasi: Löser (2000*b*), Baron-Szabo (2002) see *Actinastrea geminata* (Goldfuss, 1826).

Actinastrea goldfussi: d'Orbigny (1850), Leloux (1999), Löser (2000*b*), Baron-Szabo (2002) see *Actinastrea geminata* (Goldfuss, 1826).

Actinastrea hexaphylloides: Alloiteau & Tissier (1958), Löser (2000*b*), Baron-Szabo (2002) see *Actinastrea geminata* (Goldfuss, 1826).

Actinastrea ingens: Reig Oriol (1997), Löser (2000*b*) see *Actinastrea subdecaphylla* (Oppenheim, 1930).

Actinastrea menabensis: Alloiteau (1958) see *Actinastrea subdecaphylla* (Oppenheim, 1930).

Actinastrea octolamellosa: Beauvais (1982), Matteucci *et al.* (1982), Löser (2000*b*), Baron-Szabo (2002) see *Actinastrea ramosa* (Sowerby, 1832).

Actinastrea petrocoriensis: Alloiteau (1954), Löser (2000*b*), Baron-Szabo (2002) see *Actinastrea geminata* (Goldfuss, 1826).

Actinastrea pygmaea: Felix (1903*b*), Alloiteau (1954), Beauvais *et al.* (1975) see *Columactinastrea pygmaea* (Felix, 1903*b*).

Actinastrea sowerbyi Alloiteau 1954: Beauvais (1982), Löser (2000*b*) see *Actinastrea ramosa* (Sowerby, 1832).

Actinastrea sp. 1: Vidal (1980) see *Actinastrea ramosa* (Sowerby, 1832).

Actinastrea tuberculata: Alloiteau (1954), Löser (2000*b*), Baron-Szabo (2002) see *Actinastrea ramosa* (Sowerby, 1832).

Ahrdorffia Trauth, 1911 see *Mesomorpha* Pratz, 1882.

Ahrdorffia mammillata: Alloiteau (1957) see *Mesomorpha mammillata* (Reuss, 1854).

Ahrdorffia stellulata: Trauth (1911), Felix (1914) see *Mesomorpha mammillata* (Reuss, 1854).

Amfihelia Becki: Nielsen (1922) see *Oculina becki* (Nielsen, 1922).

Anisoria batalleri: Reig Oriol (1987), Löser (2000*b*) see *Dictuophyllia batalleri* (Reig Oriol, 1987).

Anthophyllum atlanticum: Morton (1829, 1830, 1834) see *Montlivaltia atlantica* (Morton, 1829).

Antillia Duncan, 1863, see *Trachyphyllia* Milne Edwards & Haime, 1848*d*.

Antillia sawkinsi: Vaughan, *in* Vaughan & Hoffmeister (1926), Wells (1956), Frost & Langenheim (1974) see *Trachyphyllia sawkinsi* (Vaughan, 1926).

Antillophyllia Vaughan, 1926, see *Trachyphyllia* Milne Edwards & Haime, 1848*d*.

Antillophyllia olssonni: Durham, *in* Clark & Durham (1946) see *Trachyphyllia sawkinsi* (Vaughan, 1926).

Aplophyllia barkai: Carbone *et al.* (1993) see *Cladocora barkii* (Duncan, 1880).

Areacis Auvertiaca: Milne Edwards & Haime (1850*b*), Reuss (1874), Quenstedt (1881), Felix (1925) see *Astreopora auvertiaca* (Michelin, 1844).

Astraea cribraria: Michelin (1840) see *Phyllocoenia cribraria* (Michelin, 1840).

Astraeopora hexaphylla: Felix (1906, 1914), see *Astreopora hexaphylla Felix*, 1906.

Astraeopora octophylla: Felix (1906, 1914) see *Stylophora octophylla* (Felix, 1906).

Astraeopora perexigua: Oppenheim (1914), Eliášová (1974) see *Astreopora hexaphylla* Felix, 1906.

Astraeopora pseudopanicea: Oppenheim (1930), Turnšek & Drobne (1998) see *Astreopora auvertiaca* (Michelin, 1844).

Astrea angulosa: Goldfuss (1826) see *Isastrea angulosa* (Goldfuss, 1826).

Astrea Auvertiaca: Michelin (1844) see *Astreopora auvertiaca* (Michelin, 1844).

Astrea cellulosa: Duncan (1863) see *Antiguastrea cellulosa* (Duncan, 1863).

Astrea cretacea Bölsche: Bölsche (1870) see *Astrangia cretacea* (Bölsche, 1870).

Astrea Faujasii: Quenstedt (1881) see *Actinastrea geminata* (Goldfuss, 1826).

Astrea geminata: Goldfuss (1826), Quenstedt (1881) see *Actinastrea geminata* (Goldfuss, 1826).

Astrea goldfussi: Quenstedt (1881) see *Actinastrea geminata* (Goldfuss, 1826).
Astrea hexacnema: Quenstedt (1881) see *Actinastrea hexacnema* (Quenstedt, 1881).
Astrea hexacnema nodulosa: Quenstedt (1881) see *Actinastrea hexacnema* (Quenstedt, 1881).
Astrea hexaphylla: Quenstedt (1881) see *Actinastrea hexaphylla* (Quenstedt, 1881).
Astrea lepida: Reuss (1854) see *Neocoenia lepida* (Reuss, 1854).
Astrea macrophthalma nobis: Goldfuss (1826) see *Placocoenia macrophthalma* (Goldfuss, 1826).
Astrea octolamellosa: Michelin (1847) see *Actinastrea ramosa* (Sowerby, 1832).
Astrea ramosa: Michelin (1847) see *Actinastrea ramosa* (Sowerby, 1832).
Astrea ramosa: Sowerby, *in* Sedgwick & Murchison (1832) see *Actinastrea ramosa* (Sowerby, 1832).
Astrea reticulata: Quenstedt (1881) see *Actinastrea ramosa* (Sowerby, 1832).
Astrea rotula: Milne Edwards & Haime (1851*b*) see *Paraplacocoenia rotula* (Goldfuss, 1826).
Astrea rotula: Goldfuss (1826), Quenstedt (1881) see *Paraplacocoenia rotula* (Goldfuss, 1826).
Astrea striata: Goldfuss (1826), Michelin (1847), Quenstedt (1881) see *Columastrea striata* (Goldfuss, 1826).
Astrea tuberculata: Quenstedt (1881) see *Actinastrea ramosa* (Sowerby, 1832).
Astrea variolaris: Michelin (1847) see *Columastrea striata* (Goldfuss, 1826).
Astreopora Auvertiana: d'Orbigny (1850), d'Achiardi (1875) see *Astreopora auvertiaca* (Michelin, 1844).
Astreopora octophylla: Felix (1906), Löser (2000*b*) see *Stylophora octophylla* (Felix, 1906).
Astreopora tecta: Pfister (1980) see *Astreopora auvertiaca* (Michelin, 1844).
Astrocoenia aff. *decaphylla*: Schuster (1996) see *Astrocoenia blanfordi* Duncan, 1880.
Astrocoenia aff. *hexaphylla*: Felix (1903*b*) see *Actinastrea geminata* (Goldfuss, 1826).
Astrocoenia bistellata: Turnšek & Drobne (1998) see *Actinastrea hexaphylla* (Quenstedt, 1881).
Astrocoenia cellulata: Duncan (1880) see *Stylocoenia maxima Duncan*, 1880.
Astrocoenia decaphylla: Stoliczka (1873) see *Actinastrea elongata Alloiteau*, 1954.
Astrocoenia decaphylla: Maccagno (1942) see *Actinastrea subdecaphylla* (Oppenheim, 1930).
Astrocoenia Faujasi: Umbgrove (1925) see *Actinastrea geminata* (Goldfuss, 1826).
Astrocoenia Goldfussi: Milne Edwards & Haime (1851*b*, 1857), Felix (1914), Umbgrove (1925) see *Actinastrea geminata* (Goldfuss, 1826).
Astrocoenia hexaphylla: Felix (1914) see *Actinastrea hexaphylla* (Quenstedt, 1881).
Astrocoenia hexaphylloides: Felix (1906, 1914), Trauth (1911) see *Actinastrea geminata* (Goldfuss, 1826).
Astrocoenia kurkurensis: Schuster (1996) see *Actinastrea elongata* Alloiteau, 1954.
Astrocoenia nana: Duncan (1880) see *Astrocoenia ramosa minor* Duncan, 1880.
Astrocoenia pumila: Stoliczka (1873), Alloiteau (1936) see *Actinastrea exigua* Alloiteau, 1954.
Astrocoenia pygmaea: Felix (1903*a*, 1914) see *Columactinastrea pygmaea* (Felix, 1903*a,b*).
Astrocoenia ramosa: Milne Edwards & Haime (1849*b*, 1857), de Fromentel (1861), Reuss (1854), Felix (1898, 1903*a*, 1914), Oppenheim (1930), Hackemesser (1936), Bataller (1937*b*), Bendukidze (1956) see *Actinastrea ramosa* (Sowerby, 1832).
Astrocoenia reticulata: Milne Edwards (1857), Reuss (1854) see *Actinastrea ramosa* (Sowerby, 1832).
Astrocoenia subdecaphylla: Oppenheim (1930) see *Actinastrea subdecaphylla* (Oppenheim, 1930).
Astrocoenia tuberculata: Reuss (1854) see *Actinastrea ramosa* (Sowerby, 1832).
Astroite: Faujas-Saint-Fond (1799) see *Isastrea angulosa* (Goldfuss, 1826).
Aulosmilia compressa: Metwally (1996) see *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848*c*).
Aulosmilia cristata: Beauvais (1982) see *Aulosmilia aspera* (Sowerby, 1832).
Aulosmilia protectans: Metwally (1996) see *Placosmilia sinuosa* (Reuss, 1854) or *Rennensismilia inflexa* (Reuss, 1854).
Aulosmilia protectans: Löser (2000*b*) see *Rennensismilia inflexa* (Reuss, 1854).
Aulosmilia: Hassan & Salama (1970) see *Aulosmilia aspera* (Sowerby, 1832).
Bacillastraea gracilis: Quenstedt (1881) see *Heterocoenia gracilis* (Quenstedt, 1881).
Barbardiastrea Wells, 1945, see *Favia*.
Brachiatusmilia fuxumensis: Alloiteau & Tissier (1958) see *Liptodendron nefiana* (Oppenheim, 1930).
Brachyseris supracretacea: Meyer (1987) see *Isastrea angulosa* (Goldfuss, 1826).
Calamophyllia gracilis: d'Orbigny (1850) see *Cladocora gracilis* (d'Orbigny, 1850).
Calamophyllia Marini: Bataller (1936) see *Calamophylliopsis marini* (Bataller, 1936).
Calamophyllia quaylei: Mitchell (2002) see *Liptodendron nefiana* (Oppenheim, 1930).
Calamophyllia Vidali: Mallada (1892), Bataller (1937*a*, 1947, 1956, 1959), Löser (2000*b*) see *Calamophylliopsis vidali* (Bataller, 1956).
Calamophylliopsis sp. (*C. crassicalami* n. sp.): Meyer (1987) see *Calamophylliopsis simonyi* (Reuss, 1854).
Cereiphyllia Barta-Calmus, 1973, see *Cladocora* Ehrenberg, 1834.
Cladocora antarctica: Filkorn (1994) see *Cladocora jamaicaensis* Vaughan, 1899.
Cladocora cf. *prolifera*: Schuster (1996) see *Cladocora jamaicaensis* Vaughan, 1899.
Cladocora cf. *tenuis*: Schuster (1996) see *Cladocora gracilis* (d'Orbigny, 1850).

Cladocora simonyi: Reuss (1854), Milne-Edwards (1857), de Fromentel (1861), Felix (1903*a*, 1914), Oppenheim (1930) see *Calamophylliopsis simonyi* (Reuss, 1854).

Cladocora sp.: Vecsei & Moussavian (1997) see *Cladocora jamaicaensis* Vaughan, 1899.

Cladocora tenuis: Reuss (1854), Milne Edwards (1857), de Fromentel (1858–61), Felix (1903*b*, 1914), Oppenheim (1930), Bataller (1937*a*, 1945) see *Cladocora gracilis* (d'Orbigny, 1850).

Coelosmilia Atlantica: (Morton 1829, 1830, 1834), d'Orbigny (1850), Milne Edwards & Haime (1851*a*, 1857), Bölsche (1870), Felix (1914), Löser (2000*b*) see *Montlivaltia atlantica* (Morton, 1829).

Coelosmilia niobe: Kolosváry (1954) see *Rennensismilia inflexa* (Reuss, 1854).

Columactinastrea guadelupae: Baron-Szabo (1998, 2000) see *Columactinastrea torallolensis* (Reig Oriol, 1989).

Columactinastrea ingens: Reig Oriol (1997*a*), Leloux (2003) see *Actinastrea subdecaphylla* (Oppenheim, 1930).

Columactinastraea parvistella: Reig Oriol (1992), Leloux (2003) see *Actinastrea exigua* Alloiteau, 1954.

Columastraea fallax: Umbgrove (1925), Leloux (1999, 2002, 2003), Löser (2000*b*), Baron-Szabo (2002) see *Columactinastraea fallax* (Umbgrove, 1925).

Columastrea dubia: Alloiteau (1958), Baron-Szabo (2000, 2002), Löser (2000*b*) see *Columastraea dubia* Alloiteau, 1958.

Columastrea Leymeriei: Bataller (1937*a*) see *Columastrea striata* (Goldfuss, 1826).

Columnastraea bicoronata: see *Stephanaxophyllia bicoronata* (Gregory, 1900).

Columnastraea Leymeriei : Vidal (1874), Mallada (1892) see *Columastrea striata* (Goldfuss, 1826).

Columnastraea Phillipsiae: Gregory (1900) and Löser (2000*b*) see *Reussicoenia edwardsi* (Reuss, 1854).

Columnastrea striata: Pratz (1910), Felix (1914) see *Columastrea striata* (Goldfuss, 1826).

Coscinaraea mammillata: Milne Edwards (1860) see *Mesomorpha mammillata* (Reuss, 1854).

Cryptocoenia rotula: d'Orbigny (1850) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Cyathoceras ellipticus: Wu (1975), Liao & Xia (1994), Löser (2000*b*), Löser & Liao (2001), Baron-Szabo (2002) see *Trochosmilia faujasi* Milne Edwards & Haime, 1848*d*.

Cyathoseris multistellata: Reis (1889), Felix (1925) see *Mycetophyllia multistellata* Reuss, 1864.

Cyphastraea orbignyana: Milne Edwards (1857) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Dendrogyra salisburgensis: de Fromentel (1877), Felix (1903*a*, 1914), Kolosváry (1954) see *Orbignygyra tenella* (Goldfuss, 1826).

Dichocoenia (Psilogyra) telleri: Vaughan & Wells (1943), Wells (1956) see *Psilogyra telleri* Felix, 1903.

Dichocoenia trechmanni: Wells (1934*a*), Löser (2000*b*) see *Barysmilia trechmanni* (Wells, 1934*a*).

Dichocoeniopsis proletaria: Alloiteau (1957) see *Barysmilia irregularis* (Reuss, 1854).

Dictuophyllia basseae: Baron-Szabo (2002) see *Orbignygyra tenella* (Goldfuss, 1826).

Dictyophyllia reticulata: Blainville (1830, 1834), Milne Edwards & Haime (1851*b*, 1857), Milne Edwards (1860), Felix (1914) see *Dictuophyllia reticulata* (Goldfuss, 1826).

Diplocoenia cf. *parvistella* Alloiteau, 1958: Baron-Szabo (2000) see *Goniastrea tenera* Traub, 1938.

Diploctenium angusterimatum: Oppenheim (1930) see *Diploctenium lunatum* (Bruguière, 1792).

Diploctenium conjungens: Metwally (1996) see *Diploctenium cordatum* Goldfuss, 1827.

Diploctenium golfussianum: d'Orbigny (1850), Baron-Szabo (2002) see *Diploctenium lunatum* (Bruguière, 1792).

Diploctenium lunatum: Quenstedt (1881, 1885) see *Diploctenium ferrumequinum* Reuss, 1854.

Diploctenium Pachecoi: Bataller (1954, 1959) see *Diploctenium lunatum* (Bruguière, 1792).

Diploctenium pavoninum: Reuss (1854), Milne Edwards (1857), de Fromentel (1858–61), Felix (1903*a*) Beauvais (1982), Löser (2000*b*), Baron-Szabo (2002) see *Diploctenium ferrumequinum* Reuss, 1854.

Diploctenium reussi: Beauvais (1982) see *Diploctenium ferrumequinum* Reuss, 1854.

Diploctenium Zuffardii: Maccagno (1942) see *Rennensismilia inflexa* (Reuss, 1854).

Diploria conferticostata: Vaughan (1899) see *Dictuophyllia conferticostata* (Vaughan, 1899).

Diploria crasso-lamellosa: Milne Edwards & Haime (1849*b*), Reuss (1854), Milne Edwards (1857), Felix (1903*a*) see *Orbignygyra tenella* (Goldfuss, 1826).

Diploria crassolamellosa: Duncan, *in* Duncan & Wall (1865), Duncan (1868) see *Dictuophyllia conferticostata* (Vaughan, 1899).

Diploria flexuosissima: Duncan (1880) see *Pachygyra princeps* Reuss, 1854.

Diploria latisinuata: Felix (1903*a*, 1914), Bataller (1937*a*) see *Orbignygyra latisinuata* (Felix, 1903*a*).

Diploria Meridionalis: Vidal (1921), Bataller (1937*a*), de la Revilla & Quintero (1966), Löser (2000*b*) see *Orbignygyra tenella* (Goldfuss, 1826).

Diploria reticulata: Umbgrove (1925) see *Dictuophyllia reticulata* (Goldfuss, 1826)

Diplothecophyllia Alloiteau, 1952*a*, see *Orbignygyra* Alloiteau, 1952*a*.

Diplothecophyllia basseae: Alloiteau (1952*a*, 1957), Löser (2000*b*) see *Orbignygyra tenella* (Goldfuss, 1826).

Dordonophyllia Alloiteau, 1957, see *Elasmophyllia* d'Achiardi, 1875.

Dordonophyllia arnaudi: Alloiteau (1957), Baron-Szabo (2002), Löser (2002) see *Elasmophyllia gigantea* d'Achiardi, 1875.

Edwardsosmilia faujasi: Alloiteau (1952*a*), Leloux (1999) see *Trochosmilia faujasi* Milne Edwards & Haime, 1848*d*.

Ellipsosmilia Faujasii: d'Orbigny (1850) see *Trochosmilia faujasi* Milne Edwards & Haime, 1848*d*.

Ellipsosmilia inflexa: Löser (2000*b*) see *Rennensismilia inflexa* (Reuss, 1854).

Enallastrea ramosa: d'Orbigny (1850), de Fromentel (1887) see *Actinastrea ramosa* (Sowerby, 1832).

Euphyllia sinuosa: Reuss (1854) see *Placosmilia sinuosa* (Reuss, 1854).

Favia ammergensis: Söhle (1899) see *Barysmilia irregularis* (Reuss, 1854).

Favia irregularis: Milne Edwards (1857), de Fromentel (1861) see *Barysmilia irregularis* (Reuss, 1854).

Favia planissima: Umbgrove (1925), Löser (2000*b*), Leloux (2002) see *Dictuophyllia reticulata* (Goldfuss, 1826).

Favioseris anomalos: Wells (1934*a*) see *Dichocoenia anomalos* (Wells, 1934*a*).

Feddenia cristata: Duncan (1880), Felix (1925) see *Trochosmilia cristata* (Duncan, 1880).

Feddenia elongata: Duncan (1880), Felix (1925) see *Trochosmilia cristata* (Duncan, 1880).

Feddenia typica: Duncan (1880) see *Trochosmilia faujasi* Milne Edwards & Haime, 1848*d*.

Feddenia typica Variety 1: Duncan (1880) see *Trochosmilia faujasi* Milne Edwards & Haime, 1848*d*.

Feddenia typica Variety 2: Duncan (1880) see *Trochosmilia cristata* (Duncan, 1880).

Flabellosmilia santasusanai: Bataller (1936), Baron-Szabo (2002) see *Flabellosmilia vaughani* (Stephenson, 1916).

Flabellosmilia subcarinatum: Oppenheim (1930), Vaughan & Wells (1943), Wells (1956), Löser (2002), Baron-Szabo (2002) see *Flabellosmilia* cf. *bisinuatum* (Reuss, 1854).

Flabellum bisinuatum: Reuss (1854), Felix (1903*a*, 1914) see *Flabellosmilia* cf. *bisinuatum* (Reuss, 1854).

Flabellum pugaensis: Pal *et al.* (1984) see *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848*c*).

Flabellum santasusanai: Bataller (1936), Löser (2000*b*) see *Flabellosmilia vaughani* (Stephenson, 1916).

Flabellum subcarinatum: Reuss (1854), Felix (1903*a*, 1914) see *Flabellosmilia* cf. *bisinuatum* (Reuss, 1854).

Goniocora tenuis: Alloiteau (1957) see *Cladocora gracilis* (d'Orbigny, 1850).

Goniopora goldfussi: Baron-Szabo (2002) see *Mesomorpha mammillata* (Reuss, 1854).

Gorgonia bacellaris: Goldfuss (1826) see *Heterocoenia bacellaris* (Goldfuss, 1826), or *Heterocoenia dendroides* Reuss, 1854, or *Heterocoenia gracilis* (Quenstedt, 1881), or *Heterocoenia grandis* Reuss, 1854.

Gyrosmilia edwardsi: Reuss (1854) see *Astrogyra edwardsi* (Reuss, 1854).

Haimesastrea peruviana: Frost & Langenheim (1974) see *Haimesastrea conferta* Vaughan, 1900.

Haimesastrea distans: Vaughan (1922), Felix (1925), Wells (1941), Budd *et al.* (1992) see *Haimesastrea conferta* Vaughan, 1900.

Haimesastrea humilis: Vaughan (1922), Felix (1925), Budd *et al.* (1992) see *Haimesastrea conferta* Vaughan, 1900.

Haimesastrea peruviana: Vaughan (1922), Drobne *et al.* (1988), Turnšek & Drobne (1998) see *Haimesastrea conferta* Vaughan, 1900.

Haplaraea diversicostata: Oppenheim (1930) see *Peplosmilia latona* (Felix, 1903*a*).

Heliastaea corollaris (Reuss): Oppenheim (1930) see *Placocoenia major* Felix, 1903*a*.

Heliastaea Edwardsi: Milne Edwards (1857), de Fromentel (1858–61, 1867) see *Reussicoenia edwardsi* (Reuss, 1854).

Heliastraea cribaria: Milne Edwards (1857), Bataller (1937*b*, 1945), Alloiteau (1941), de la Revilla & Quintero (1966) see *Phyllocoenia cribraria* (Michelin, 1840).

Heterocoenia bacellaris: Leloux (1999) see *Heterocoenia bacellaris* (Goldfuss, 1826), or *Heterocoenia dendroides* Reuss, 1854, or *Heterocoenia gracilis* (Quenstedt, 1881), or *Heterocoenia grandis* Reuss, 1854.

Heterocoenia costata: Felix (1903*a*, 1914), Oppenheim (1930), Bataller (1937*a*), Beauvais (1982), Löser (2000*b*), Baron-Szabo (2002) see *Heterocoenia dendroides* Reuss, 1854.

Heterocoenia crassi-lamellata: Milne Edwards (1857), de Fromentel (1858–61) see *Heterocoenia grandis* Reuss, 1854.

Heterocoenia dendroides: de Fromentel (1879) see *Heterocoenia minima* d'Orbigny (1850).

Heterocoenia erecta: Felix (1903*a*, 1914), Beauvais (1982), Löser (2000*b*), Baron-Szabo (2002) see *Heterocoenia gracilis* (Quenstedt, 1881).

Heterocoenia excentrica: de Fromentel (1879), Felix (1914), Bataller (1937*a*), Löser (2000*b*), Baron-Szabo (2002) see *Heterocoenia grandis* Reuss, 1854.

Heterocoenia exigua: Michelin (1847), Milne Edwards (1857), Oppenheim (1930), Beauvais (1982), Baron-Szabo (1998, 2002), Löser (2000*b*) see *Heterocoenia bacellaris* (Goldfuss, 1826).

Heterocoenia exigua: Milne Edwards & Haime (1849*b*), de Fromentel (1879) see *Heterocoenia bacellaris* (Goldfuss, 1826).

Heterocoenia garumnica: Vidal (1921), Löser (2000*b*), Baron-Szabo (2002) see *Heterocoenia dendroides* Reuss, 1854.

Heterocoenia minutisima: Reig Oriol (1997*a*), Löser (2000*b*), Baron-Szabo (2002) see *Heterocoenia minima* d'Orbigny (1850).

Heterocoenia pachypleura: Beauvais (1982), Löser (2000*b*), Baron-Szabo (2002) see *Heterocoenia grandis* Reuss, 1854.

Heterocoenia provincialis: Reuss (1854), Felix (1903*a*, 1914), Leloux (1999), Baron-Szabo (2002) see *Heterocoenia bacellaris* (Goldfuss, 1826).

Heterocoenia Reussi: Milne Edwards (1857), de Fromentel (1879), Felix (1903*a*, 1914), Beauvais (1982), Löser (2000*b*), Baron-Szabo (2002) see *Heterocoenia bacellaris* (Goldfuss, 1826).

Heterocoenia subramosa: Reig Oriol (1994), Löser (2000*b*), Baron-Szabo (2002) see *Heterocoenia dendroides* Reuss, 1854.

Hexakoralle, Morphotyp 3: Tragelehn (1996) see *Oculina becki* (Nielsen, 1922).

Hexakoralle, Morphotyp 5: Tragelehn (1996) see *Calamophylliopsis simonyi* (Reuss, 1854).

Hexakoralle, Morphotyp 6: Tragelehn (1996) see *Acropora* sp.

Hexakoralle, Morphotyp 8: Tragelehn (1996) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Hexakoralle, Morphotyp 9: Tragelehn (1996) see *Astreopora auvertiaca* (Michelin, 1844).

Hexakoralle, Morphotyp 10: Tragelehn (1996) see *Astreopora hexaphylla* Felix, 1906.

Hexakoralle, Morphotyp 10: Tragelehn (1996) see *Heterocoenia bacellaris* (Goldfuss, 1826).

Hexakoralle, Morphotyp 13: Tragelehn (1996) see *Stylocoenia montium* (Oppenheim, 1912).

Hexakoralle, Morphotyp 15: Tragelehn (1996) see *Astreopora hexaphylla* Felix, 1906.

Hexakoralle, Morphotyp 18: Tragelehn (1996) see *Haimesastrea conferta* Vaughan, 1900.

Hydnophora blancoensis: Wells (1932) see *Hydnophora styriaca* (Michelin, 1847).

Hydnophora elongata: Bosellini (1999) see *Monticulastraea insignis* Duncan, 1880.

Hydnophora inaequalis: Bosellini (1999) see *Monticulastraea insignis* Duncan, 1880.

Hydnophora insignis: Bosellini (1999) see *Monticulastraea insignis* Duncan, 1880.

Hydnophororaraea aconus: Oppenheim (1930) see *Hydnophora styriaca* (Michelin, 1847).

Hydnophororaraea cfr. *styriaca*: Matteucci *et al.* (1982) see *Hydnophora styriaca* (Michelin, 1847).

Hydnophororaraea rapulum: Oppenheim (1930) see *Hydnophora styriaca* (Michelin, 1847).

Hydnophororaraea styriaca: Michelin (1847), Reuss (1854), de Fromentel (1858–61, 1877), Milne Edwards (1857), Pictet (1857), Felix (1903*a*, 1914), Oppenheim (1930), Kolosváry (1954), de la Revilla & Quintero (1966), Turnšek & Buser (1976), Scholz (1979), Beauvais (1982), Moussavian (1992), Baron-Szabo & Steuber (1996), Baron-Szabo, (1997, 1998, 2002, 2003), Turnšek (1997) see *Hydnophora styriaca* (Michelin, 1847).

Hydnophoropsis thecalis: Söhle (1899) see *Columastrea striata* (Goldfuss, 1826).

Hydnophyllia zuberi: Felix (1906, 1914), Löser, (2000*b*) see *Taxogyra zuberi* (Felix, 1906).

Isastraea angulosa: Milne Edwards (1857), Felix (1914), Umbgrove (1925) Leloux (1999, 2003), Löser (2000*b*), Baron-Szabo (2002) see *Isastrea angulosa* (Goldfuss, 1826).

Lasmogyra irregularis: Felix (1900), Löser (2000*b*) see *Placosmilia sinuosa* (Reuss, 1854).

Leptophyllia Astrei: Bataller (1936) see *Calamophylliopsis marini* (Bataller, 1936).

Leptophyllia vidali: Bataller (1937*b*) see *Calamophylliopsis marini* (Bataller, 1936).

Leptoria cf. *pauca*: Schuster (1996) see *Manicina hydnophoroidea* (Duncan, 1880).

Leptoria conferticostata: Vaughan (1899, 1919), Felix (1925) see *Dictuophyllia conferticostata* (Vaughan, 1899).

Leptoria hydnophoroidea: Duncan (1880), Felix (1925) see *Manicina hydnophoroidea* (Duncan, 1880).

Leptoria koninckí: Felix (1903*a*) see *Orbignygyra tenella* (Goldfuss, 1826).

Leptoria laxa: Schuster (1996) see *Manicina hydnophoroidea* (Duncan, 1880).

Leptoria sp.: Myers (1968) see *Colpophyllia reagani* Durham, 1942.

Litharaea Goldfussi: Milne Edwards (1860), Löser (2000*b*) see *Mesomorpha mammillata* (Reuss, 1854).

Lithodendron exiguum: Michelin (1847) see *Heterocoenia bacellaris* (Goldfuss, 1826).

Lithostrotionoides Alloiteau, 1952*b*, see *Glenarea* Počta, 1887.

Lithostrotionoides tissieri: Alloiteau (1952*b*) see *Glenarea cretacea* Počta, 1887.

Madracis densa: Budd *et al.* (1992), Schuster (1996) see *Madracis vaughani* Wells, 1941.

Madracis rotiformis: Wu (1975), Liao & Xia (1994), Löser (2000*b*), Löser & Liao (2001) see *Madracis johnwellsi* Frost & Langenheim, 1974.

Madracis sp.: Baron-Szabo (2002) see *Madracis johnwellsi* Frost & Langenheim, 1974.

Madrepora lunata: Bruguière (1792) see *Diploctenium lunatum* (Bruguière, 1792).

Meandrastraea calzadai: Reig Oriol (1992), Löser (2000*b*) see *Meandrastraea antiqua* (Reuss, 1854).

Meandrina reticulata: Goldfuss (1826) see *Dictuophyllia reticulata* (Goldfuss, 1826).

Meandrina salisburgensis: Milne Edwards (1857) see *Orbignygyra tenella* (Goldfuss, 1826).

Meandrina saltzburgiana: Milne Edwards & Haime (1849*b*, 1851*b*), Reuss (1854) see *Orbignygyra tenella* (Goldfuss, 1826).

Meandrina tenella: de Fromentel (1858–61) see *Orbignygyra tenella* (Goldfuss, 1826).

Meandrina tenella: Michelin (1845) see *Orbignygyra latisinuata* (Felix, 1903*a*).

Meandrina tenella: Goldfuss (1826), Michelin (1845) see *Orbignygyra tenella* (Goldfuss, 1826).

Méandrite: Faujas-Saint-Fond (1799) see *Dictuophyllia reticulata* (Goldfuss, 1826).

Meandroria koninckí: Turnšek & Buser (1976), Vidal (1980), Turnšek (1997) see *Orbignygyra tenella* (Goldfuss, 1826).

Meandroria patellaris: Liao & Xia (1994), Löser & Liao (2001) see *Dictuophyllia conferticostata* (Vaughan, 1899).

Meandroria tenella: Beauvais (1982), Tchéchmédjiéva (1985, 1986), Höfling (1989), Löser (1998, 2000*b*) see *Orbignygyra tenella* (Goldfuss, 1826).

Mesomorpha stellulata: Beauvais (1982) see *Mesomorpha mammillata* (Reuss, 1854).

Montastraea rotula: Leloux (1999), Löser (2000*b*) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Montastrea parinasensis: Wells (1941) see *Haimesastrea conferta* Vaughan, 1900.

Montastrea sp.: Schuster (1996) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Monticularia styriana: Michelin (1847) see *Hydnophora styriaca* (Michelin, 1847).

Monticulastraea elongata: Duncan (1880), Baron-Szabo (2002) see *Monticulastraea insignis* Duncan, 1880.

Montlivaltia Granti: d'Archiac & Haime (1853), Milne Edwards (1857), de Fromentel (1861), Duncan (1880), Felix (1925) see *Trachyphyllia granti* (d'Archiac & Haime, 1853).

Montlivaltia latona: Felix (1903*a*, 1914) see *Peplosmilia latona* (Felix, 1903*a*).

Montlivaltia Lynyani: Duncan (1880), Felix (1925) see *Trachyphyllia granti* (d'Archiac & Haime, 1853).

Montlivaltia Ranikoti: Duncan (1880), Felix (1925) see *Montlivaltia atlantica* (Morton, 1829).

Montlivaltia sp.: Baron-Szabo (2000) see *Montlivaltia angusticostata* Umbgrove, 1925.

Montlivaultia rudis: Milne Edwards (1857) see *Aulosmilia aspera* (Sowerby, 1832).

Mycetophyllia antiqua: Reuss (1854), Milne Edwards (1857), de Fromentel (1858–61), Felix (1903*a*, 1914), Bendukidze (1956) see *Meandrastraea antiqua* (Reuss, 1854).

Mycetophyllopsis antiqua: Oppenheim (1930), Bataller (1937*b*), Vaughan & Wells (1943), Wells (1956), Turnšek & Polšak (1978), Reig Oriol (1997*b*) see *Meandrastraea antiqua* (Reuss, 1854).

Neocoenia lepida (Reuss 1854): Götz (2003) see *Columastraea dubia* Alloiteau, 1958.

Neocaeniopsis lepida (Reuss): Beauvais (1982), Matteucci *et al.* (1982) see *Neocoenia lepida* (Reuss, 1854).

Oculina new sp.: Stemann *in* Bryan *et al.* (1997) see *Oculina conferta* Milne Edwards & Haime 1850*a*.

Orbicella cribraria: Felix (1914) see *Phyllocoenia cribraria* (Michelin, 1840).

Orbicella Edwardsi: Felix (1914) see *Reussicoenia edwardsi* (Reuss, 1854).

Orbicella moravica: Trauth (1911) see *Provinciastrea moravica var. mazaugui* Chevalier, 1954.

Orbicella rotula: Felix (1914) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Orbignygyra crassolamellosa: Beauvais (1982), Löser (2000*b*), Baron-Szabo (2002) see *Orbignygyra tenella* (Goldfuss, 1826).

Orbignygyra salisburgensis: Beauvais (1982) see *Orbignygyra tenella* (Goldfuss, 1826).

Orbignygyra sp.: Turnšek & Drobne (1998) see *Pachygyra princeps* Reuss, 1854.

Ovalastrea anomalos: Löser (2000*b*), Mitchell (2002) see *Dichocoenia anomalos* (Wells, 1934*a*).

Ovalastrea trechmanni: Mitchell (2002) see *Barysmilia trechmanni* (Wells, 1934*a*).

Pachygyra arbuscola: d'Achiardi (1866) see *Pachygyra savii* d'Achiardi, 1866.

Pachygyra pusulifera: Oppenheim (1930), Beauvais (1982), Löser (2000*b*), Baron-Szabo (2002) see *Pachygyra princeps* Reuss, 1854.

Pachygyra Vallcebri: Vidal (1921) see *Dictuophyllia reticulata* (Goldfuss, 1826).

Paraplacocoenia orbignyana: Beauvais (1982), Baron-Szabo (1999, 2000, 2002), Löser (2000*b*) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Paraplacocoenia sp. (*P. vignyensis* n. sp.): Meyer (1987) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Peruviastraea peruviana: Vaughan (1922), Felix (1925), Wells (1941), Budd *et al.* (1992) see *Haimesastrea conferta* Vaughan, 1900.

Phragmosmilia inconstans: Beauvais (1982), Tchéchmédjiéva (1986), Baron-Szabo (1998, 2000, 2002), Löser (2000*b*) see *Phragmosmilia lineata* (Goldfuss, 1826).

Phragmosmilia psecadiophora: Turnšek (1992), Baron-Szabo (2002) see *Placosmilia sinuosa* (Reuss, 1854).

Phyllocoenia corbarica: d'Orbigny (1850) see *Columastrea striata* (Goldfuss, 1826).

Phyllocoenia excelsa: Söhle (1899) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Phyllocoenia lepida: Felix (1903*a*), Hackemesser (1936) see *Neocoenia lepida* (Reuss, 1854).

Phyllocoenia marticensis: d'Orbigny (1850), Tchéchmédjiéva (1986) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Phyllocoenia variolaris: d'Orbigny (1850) see *Columastrea striata* (Goldfuss, 1826).

Phyllocoeniopsis cribraria: Chevalier (1954), Löser (2000*b*) see *Phyllocoenia cribraria* (Michelin, 1840).

Phyllosmilia catalaunica: Bataller (1936, 1937*a*, 1945), Vidal (1980) see *Phyllosmilia* cf. *didymophila* (Felix, 1903*a*).

Phyllosmilia complanata: Beauvais & Beauvais (1974) see *Rennensismilia complanata* (Goldfuss, 1826).

Placocaeniopsis arnaudi: Löser (2002) see *Columnocoenia arnaudi* (Alloiteau, 1957).

Placocoenia dumortieri: de Fromentel (1879), Felix (1903*a*, 1914), Oppenheim (1930), Bataller (1937*b*), Beauvais (1982), Tchéchmédjiéva (1986), Turnšek (1992), Löser (2000*b*), Baron-Szabo (2002) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Placocoenia irregularis: Reuss (1854), Söhle (1899), Felix (1903*a*, 1914), Oppenheim (1930), Bataller (1945) see *Barysmilia irregularis* (Reuss, 1854).

Placocoenia Orbignyana: Reuss (1854), Felix (1903*a*, 1914), Bataller (1937*a*) see *Paraplacocoenia rotula* (Goldfuss, 1826).

Placocoeniopsis arnaudi: Alloiteau (1952*a*, 1957), Kuzmicheva (1975, 1987), Tchechmedjieva (1986), see *Columnocoenia arnaudi* (Alloiteau, 1957).

Placocoeniopsis katzi: Kuzmicheva (1975, 1987), Vecsei & Moussavian (1997) see *Columnocoenia katzi* (Kuzmicheva, 1975).

Placocolumastraea torallolensis: Reig Oriol (1989), Löser (2000*b*) see *Columactinastrea torallolensis* (Reig Oriol, 1989).

Placocyathus Nysti: Milne Edwards & Haime (1848*c*) see *Aulosmilia aspera* (Sowerby, 1832).

Placosmilia arcuata: de Fromentel (1863) see *Aulosmilia aspera* (Sowerby, 1832).

Placosmilia cuneiformis: Milne Edwards & Haime (1848*c*), Duncan (1870), Felix (1903*a*, 1914), Alloiteau (1957) see *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848*c*).

Placosmilia decora: Oppenheim (1930) see *Aulosmilia aspera* (Sowerby, 1832).

Placosmilia irregularis: Baron-Szabo (2002) see *Placosmilia sinuosa* (Reuss, 1854).

Placosmilia Nysti: Milne Edwards & Haime (1851*b*), Milne Edwards (1857), Felix (1914), Baron-Szabo (2002) see *Aulosmilia aspera* (Sowerby, 1832).

Placosmilia psecadiophora: Löser (2000*b*) see *Placosmilia sinuosa* (Reuss, 1854).

Placosmilia robusta: Umbgrove (1925), Leloux (1999, 2002, 2004), Löser (2000*b*), Baron-Szabo (2002) see *Peplosmilia latona* (Felix, 1903*a*).

Platytrochus vaughani: Wells (1933) see *Flabellosmilia vaughani* (Stephenson, 1916).

Plesiophyllia latona: Oppenheim (1930), Löser (2000*b*) see *Peplosmilia latona* (Felix, 1903*a*).

Polypier en forme de feuille: Faujas-Saint-Fond (1799) see *Diploctenium plumum* Goldfuss, 1827.

Porites mammillata: Reuss (1854) see *Mesomorpha mammillata* (Reuss, 1854).

Porites stellulata: Reuss (1854), Milne Edwards (1860) see *Mesomorpha mammillata* (Reuss, 1854).

Prionastraea Milne Edwards & Haime, 1848*b*, see *Astrangia* Milne Edwards & Haime, 1848*b*.

Prionastraea insignis: Duncan (1880), Felix (1925) see *Goniastrea insignis* (Duncan, 1880).

Procladocora jamaicaensis: Löser (2000*a*) see *Cladocora jamaicaensis* Vaughan, 1899.

Procladocora simonyi: Turnšek & Buser (1976), Turnšek & Polšak (1978), Löser (2000*b*) see *Calamophylliopsis simonyi* (Reuss, 1854).

Procladocora tenuis (Reuss): Beauvais & Beauvais (1974), Turnšek & Polšak (1978), Beauvais (1982), Matteucci *et al.* (1982), Höfling (1985), Turnšek (1994, 1997), Löser (2000*b*) see *Cladocora gracilis* (d'Orbigny, 1850).

Prodiploastraea schindewolfi: Wells (1934*a*), Löser (2000*b*) see *Haldonia schindewolfi* (Wells, 1934*a*).

Rennensismilia chondrophora: Turnšek (1978, 1992), Baron-Szabo (1998, 2002), Löser (2000*b*) see *Rennensismilia inflexa* (Reuss, 1854).

Rennensismilia corbariensis: Beauvais (1982) see *Rennensismilia complanata* (Goldfuss, 1826).

Rennensismilia didyma: Alloiteau (1952*a*, 1957), Tchéchmédjiéva (1986), Turnšek (1992), Löser (2000*b*), Baron-Szabo (2002) see *Rennensismilia complanata* (Goldfuss, 1826).

Rennensismilia dumortieri: Beauvais (1982) see *Rennensismilia complanata* (Goldfuss, 1826).

Rhabdophyllia Barkii: Duncan (1880) see *Cladocora barkii* (Duncan, 1880).

Rhabdophyllia gracilis: Milne Edwards (1857), de Fromentel (1864), Felix (1914) see *Cladocora gracilis* (d'Orbigny, 1850).

Rhabdophyllia quaylei: Wells (1934*a*), Löser (2000*b*) see *Liptodendron nefiana* (Oppenheim, 1930).

Rhabdophylliopsis alloiteaui: Vecsei & Moussavian (1997) see *Cladocora jamaicaensis* Vaughan, 1899.

Rhizangia sp.: Vecsei & Moussavian (1997) see *Rhizangia padricensis* Turnšek, 1998.

Siderastrea cretacea: Wells (1933) see *Astrangia cretacea* (Bölsche, 1870).

Smilotrochus Blanfordi: Duncan (1880) see *Rennensismilia complanata* (Goldfuss, 1826).

Solitary coral: Samuel *et al.* (1972) see *Heterocoenia gracilis* (Quenstedt, 1881).

Stenosmilia proletaria: Oppenheim (1930) see *Barysmilia irregularis* (Reuss, 1854).

Stephanastraea dumortieri: de Fromentel (1884) see *Columastrea striata* (Goldfuss, 1826).

Stephanastraea mirabilis: de Fromentel (1886) see *Columastrea striata* (Goldfuss, 1826).

Stephanaxophyllia casterasi: Alloiteau (1957), Tchéchmédjiéva (1986), Baron-Szabo (2000, 2002), Löser (2000*b*) see *Stephanaxophyllia bicoronata* (Gregory, 1900).

Stephanaxophyllia hofergrabenensis: Beauvais (1982), Löser (2000*b*) see *Stephanaxophyllia bicoronata* (Gregory, 1900).

Stephanaxophyllia reussi: Reig Oriol (1992) see *Columastrea striata* (Goldfuss, 1826).

Stephanaxophyllia villaltai: Reig Oriol (1992) see *Columastrea striata* (Goldfuss, 1826).

Stephanocoenia angulosa: d'Orbigny (1850) see *Isastrea angulosa* (Goldfuss, 1826).

Stephanocoenia formosissima: Oppenheim (1930) see *Columastrea striata* (Goldfuss, 1826).

Stratogyra savii: Carbone *et al.* (1993) see *Pachygyra savii* d'Achiardi, 1866.

Strotogyra meandra: Reig Oriol (1997*a*) see *Pachygyra krameri* Oppenheim, 1930.

Stylina faujasi: Milne Edwards (1857) see *Actinastrea geminata* (Goldfuss, 1826).

Stylina parvula: Stoliczka (1873), Felix (1914), Löser (2000*b*), Baron-Szabo (2002) see *Holocoenia parvula* (Stoliczka, 1873).

Stylocoenia epithecata: Oppenheim (1908), Schuster (1996) see *Stylocoenia ranikoti* Duncan, 1880.

Stylophora montium: Oppenheim (1912), Felix (1925) see *Stylocoenia montium* (Oppenheim, 1912).

Stylophora ponderosa: Bryan (1991) see *Stylophora garumnica* Vidal, 1921.

Thecosmilia edwardsi: Milne Edwards (1857) see *Astrogyra edwardsi* (Reuss, 1854).

Thecosmilia nefiana: Oppenheim (1930), Löser (2000*b*) see *Liptodendron nefiana* (Oppenheim, 1930).

Thecosmilia sinuosa: Milne Edwards (1857) see *Placosmilia sinuosa* (Reuss, 1854).

Trochocyathus Besairiei: Alloiteau (1936) see *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848*c*).

Trochocyathus lineatus: Milne Edwards & Haime (1851*b*) see *Phragmosmilia lineata* (Goldfuss, 1826).

Trochocyathus vaughani: Stephenson (1916), Löser (2000*b*) see *Flabellosmilia vaughani* (Stephenson, 1916).

Trochosmilia Archiaci: de Fromentel (1867), Felix (1914) see *Aulosmilia aspera* (Sowerby, 1832).

Trochosmilia Boissyana: Reuss (1854) see *Placosmilia sinuosa* (Reuss, 1854).

Trochosmilia boissyana: Oppenheim (1930) see *Rennensismilia complanata* (Goldfuss, 1826).

Trochosmilia chondrophora: Felix (1903*a*, 1914), Kolosváry (1954), Suraru (1961) see *Rennensismilia inflexa* (Reuss, 1854).

Trochosmilia complanata: Milne Edwards & Haime (1849*b*), Reuss (1854), Felix (1903*a*) see *Rennensismilia complanata* (Goldfuss, 1826).

Trochosmilia didyma: de Fromentel (1863), Felix (1903*a*, 1914) see *Rennensismilia complanata* (Goldfuss, 1826).

Trochosmilia didymophila: Felix (1903*a*, 1914) see *Phyllosmilia cf. didymophila* (Felix, 1903*a*).

Trochosmilia dumortieri: Haime (1854), Milne Edwards (1857), de Fromentel (1858–61), Felix (1914) see *Rennensismilia complanata* (Goldfuss, 1826).

Trochosmilia guerini: Bataller (1936) see *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848*c*).

Trochosmilia inconstans: de Fromentel (1862) see *Phragmosmilia lineata* (Goldfuss, 1826).

Trochosmilia inflexa: Reuss (1854), de Fromentel (1864), Stoliczka (1873), Felix (1903*a*, 1914), Pal. *et al.* (1984) see *Rennensismilia inflexa* (Reuss, 1854).

Trochosmilia manduleyi: Bataller (1936) see *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848*c*).

Trochosmilia marini: Bataller (1936) see *Aulosmilia cuneiformis* (Milne Edwards & Haime, 1848*c*).

Trochosmilia Medlicotti: Duncan (1880), Felix (1925) see *Rennensismilia complanata* (Goldfuss, 1826).

Trochosmilia protectans: Nötling (1897), Felix (1914), Abed & El Asa'ad (1981) see *Rennensismilia inflexa* (Reuss, 1854).

Trochosmilia psecadiophora: Felix (1903*a*) see *Placosmilia sinuosa* (Reuss, 1854).

Trochosmilia raymondi: Wells (1934*b*) see *Rennensismilia complanata* (Goldfuss, 1826).

Tropidocyathus minimus: Filkorn (1994), Cairns (1997), Löser (2000*b*) see *Flabellosmilia vaughani* (Stephenson, 1916).

Tropidocyathus seymouriensis: Filkorn (1994), Cairns (1997), Löser (2000*b*) see *Flabellosmilia vaughani* (Stephenson, 1916).

Turbinolia aspera: Sowerby (1832) see *Aulosmilia aspera* (Sowerby, 1832).

Turbinolia complanata: Goldfuss (1826) see *Rennensismilia complanata* (Goldfuss, 1826).

Turbinolia lineata: Goldfuss (1826), Milne Edwards & Haime (1848*c*) see *Phragmosmilia lineata* (Goldfuss, 1826).

Ulastraea Edwardsi: Reuss (1854), Bataller (1937*b*, 1945) see *Reussicoenia edwardsi* (Reuss, 1854).