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Distribution and palaeoecology of scleractinian corals during the Maastrichtian (Late Cretaceous)

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Original Article

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Abstract

Maastrichtian scleractinian corals from 94 localities in 26 Maastrichtian regions world-wide with strata of that age are taxonomically and palaeobiogeographically evaluated. A total of 205 taxa, belonging to 116 genera and 37 families, are included in the present study. Most coral taxa have been recorded from non-reefal environments. A significant majority of these taxa (genera = 70.7%; species = 75.6%) appear to have been endemic during the Maastrichtian. The Maastrichtian coral fauna is dominated by solitary and cerioid-plocoid forms (both accounting for 41 genera = 70%), having mainly medium- and large-sized corallites. The most diverse coral assemblages are those that have been recorded from arid (Jamaica: 63 species, Mexico: 29 species), warm-temperate (the Netherlands-Belgium: 32 species) and tropical regions (Iran: 27 species). The occurrence of *Cunnolites polymorphus* (Goldfuss) is newly recorded for the Netherlands (southern Limburg). Compared to the microstructural composition of the coral fauna of the lowermost Cretaceous (Berriasian; 91% of the species and 83% of the genera belonged to previously established microstructural groups), in the Maastrichtian, corals belonging to previously established microstructural groups were of minor importance (genera = 26%; species = 29.3%). The majority of Maastrichtian scleractinian taxa (both solitary and colonial) from the type area of the Maastrichtian Stage in the southeast Netherlands and northeast Belgium are illustrated.

Introduction

Scleractinian corals of Maastrichtian age have been the focus of various studies since the late 18th century, including works on their taxonomy (e.g. Faujas-Saint-Fond, 1798–1803; Goldfuss, 1826–1844; Milne Edwards & Haime, 1857; Nötling, 1897; Trauth, 1911; Dietrich, 1917; Umbgrove, 1925; Wells, 1933, 1934; Alloiteau, 1936, 1952b, 1958; Kuzmicheva, 1985, 1987; Tchéchmédjiéva, 1986, 1995; Filkorn, 1994; Leloux, 1999, 2004; Baron-Szabo, 2000, 2002, 2006, 2008; Filkorn et al., 2005; Jell et al., 2011; Löser, 2012; Baron-Szabo et al., 2023) as well as in analyses primarily dealing with Maastrichtian stratigraphy and sedimentology (e.g. Gill et al., 1966; Sohl & Koch, 1984; Görmüş et al., 2019; Afghah, 2022). Frequently, corals have been documented from rudist-dominated limestones (e.g. Kühn, 1933; Özer, 1992; Pons et al., 1994; Mitchell, 2002; Schafhauser et al., 2003; Mitchell et al., 2004; Khazaei et al., 2009). In more recent decades, an increasing number of works have been aimed at assessments of extinction patterns amongst corals across the Cretaceous/Paleogene (K/Pg) boundary (Rosen & Turnšek, 1989; Kiessling & Baron-Szabo, 2004; Baron-Szabo, 2006, 2008).

The purpose of the present paper is to provide a comprehensive overview of Maastrichtian occurrences of scleractinian corals and evaluate their taxonomic assignment, palaeoecological occurrences and palaeogeographical distribution (Tables 1–5).

Material and methods

Material included in the present study originates from beds having stratigraphical ranges clearly defined as Maastrichtian, only including works in which descriptions or illustrations of the coral material were provided. Works in which the stratigraphical ranges of the coral-bearing strata are not distinctly defined but given as, for example, Campanian–Maastrichtian (e.g. Felix, 1906; Baron-Szabo, 2000; Gameil, 2005), or in which material was either only listed or insufficiently described (e.g. Böhm. 1891; Rengarten, 1959) and identifications have not been confirmed in subsequent works, are excluded from the present study. Over 2,000 records, including around 500 nominal taxa, have been evaluated (Kiessling & Baron-Szabo, 2004; Leloux, 2004; Filkorn et al., 2005; Baron-Szabo, 2006, 2008; Khazaei et al., 2009; Jell et al., 2011; Löser, 2012; Görmüş et al., 2019; Baron-Szabo et al., 2023), inclusive of new information provided by Paleobiology

Table 1. List of Maastrichtian scleractinian coral genera and their family assignments; *previously (**potentially previously) established microstructural group

Family	Genus	Family	Genus
Acroporidae	*Acropora*	*Haplaraeidae	*Astraraea*
			Loboseris
			Meandrophyllia
	Astreopora		*Pleurocora*
*Acrosmiliidae	*Acrosmilia*		*Stiboriopsis*
	Brachyphyllia	Heterocoeniidae	*Baryhelia*
	Dermosmiliopsis		*Heterocoenia*
Actinacididae	*Actinacis*	*Latomeandridae	*Baryphyllia*
	Actinhelia		*Dimorphastrea*
	Bosnopsammia		*Ellipsocoenia*
*Actinastreidae	*Actinastrea*		*Fungiastraea*
	Columactinastraea		*Latomeandra*
Agariciidae	*Cyathoseris*		*Ovalastrea*
	Morphastrea	Madreporidae	*Madrepora*
	Ogilviastraea	Meandrinidae	*Aulosmilia*
	Trochoseris		*Dichocoenia*
	Vaughanoseris		*Dictuophyllia*
Agatheliidae	*Agathelia*		*Diploctenium*
	Reussicoenia		*Flabellosmilia*
Agathiphylliidae	*Pattalophyllia*		*Lithostrotionoides*
Aplosmiliidae	*Barysmilia*		*Pachygyra*
	Phytogyra		*Phragmosmilia*
	Psilogyra		*Strotogyra*
Astrocoeniidae	*Stylocoenia*		*Tortoflabellum*
Caryophylliidae	*Bathycyathus*	Merulinidae	*Cladocora*
	Caryophyllia		*Hydnophora*
	Ceratotrochus		*Monticulastraea*
	Conotrochus		*Neocoenia*
	Cyathoceras	Micrabaciidae	*Micrabacia*
	Dasmosmilia		*Stephanophyllia*
	Deltocyathus	Montastraeidae	*Astrogyra*
	Desmophyllum		Montastraeinae indet.
	Leptocyathus		*Placocoenia*
	Parasmilia	Mussidae	*Colpophyllia*
	Stephanocyathus		*Cycloria*
	Stephanosmilia		*Liptodendron*
	Stylocyathus		*Mycetophyllia*
	Trochocyathus	Placosmiliidae	*Peplosmilia*
*Cladophylliidae	*Cladophyllia*		*Placosmilia*
*Columastreidae	*Columastrea*		*Rennensismilia*
	Haimesiastraea	Pocilloporidae	*Madracis*
	Haldonia		*Multicolumnastraea*
	Stephanaxophyllia		*Stylocoeniella*

(*Continued*)

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Table 1. (*Continued*)

Family	Genus	Family	Genus
*Comoseriidae	*Microsolena*		*Stylophora*
	Polyphylloseris	Poritidae	*Goniopora*
**Cunnolitidae	*Aspidastraea*	Rhizangiidae	*Astrangia*
	Cunnolites		*Rhizangia*
	Paracycloseris	Siderastreidae	*Hindeastraea*
Dendrophylliidae	*Areopsammia*		*Siderastrea*
	Balanophyllia		*Siderofungia*
	Dendrophyllia	Smilotrochidae	*Smilotrochus*
	Palaeopsammia	*Synastreidae	*Synastrea*
	Wadeopsammia	*Thecosmiliidae	*Isastrea*
Faviidae	*Antiguastrea*		*Montlivaltia*
	Favia		*Trochosmilia*
	Goniastrea	Turbinoliidae	*Alveolocyathus*
Flabellidae	*Flabellum*		*Bothrophoria*
Fungiacyathidae	*Fungiacyathus*		*Palocyathus*
Guyniidae	*Onchotrochus*		*Wellsotrochus*

Table 2. Corallite size and types of corallite integration of the Maastrichtian scleractinian coral species; 186 taxa have been included in our evaluation (19 species were omitted due to a lack of sufficient data). Corallite sizes: small (s) = up to 2.5 mm; medium (m) = >2.5–9 mm; large (l) = >9 mm. For information on individual species, reference is made to Table 4

Types of corallite integration	Number of species in each corallite size group		
	Large (71 species)	Medium (80 species)	Small (35 species)
Solitary	55	17	3
Branching	4	9	1
Cerioid-plocoid	3	31	26
(hydno) thamnasterioid-meandroid	9	23	5

Database (paleobiodb.org). Affinities of coral assemblages have been calculated using the Jaccard Index.

Abbreviations used in Table 4 are as follows: d = corallite diameter; d (series) = width of corallite series; cc = distance between corallite centres; h = height of corallum; s = number of septa; s/mm = septal density.

Material illustrated (Figs. 2–9) in the present paper includes specimens from the following institutions:

MB, Museum für Naturkunde der Humboldt Universität, Berlin, Germany;

MNHN, Muséum National d'Histoire Naturelle, Paris, France;

NHMM, Natuurhistorisch Museum Maastricht, the Netherlands;

RGM, Naturalis Biodiversity Center, Leiden, the Netherlands;

USNM, United States National Museum of Natural History, Smithsonian Institution, Washington DC, USA (now NMNH).

The taxonomic framework used here follows a synthesis of the modern studies (for a discussion, see Baron-Szabo, 2021b) with the classic works by Milne Edwards & Haime (1857), de Fromentel (1861, 1877), Duncan (1884), Koby (1887), Ogilvie (1897), Oppenheim (1930), Vaughan & Wells (1943), Alloiteau (1952a, 1958) and Wells (1956) and recent updates (Baron-Szabo, 2021a, b and present study). For information on excluded taxonomic models, reference is made to Baron-Szabo (2021a, pp. 29, 30, 166; 2021b, pp. 391, 392).

Analyses and results

Overview of localities with coral-bearing Maastrichtian strata

Africa: Libya, Madagascar, Senegal

Maastrichtian coral faunas from Africa are rather rare and distinctly dominated by solitary forms (80.7%) (see Table 5), as recorded in older studies carried out on corals from Libya by Rossi Ronchetti (1955), and coral assemblages found in West African and sub-Saharan areas by Alloiteau (1952b [Senegal]; 1936, 1951, 1958 [Madagascar]) (Table 4). Unfortunately, little information on the lithology of the coral-bearing rocks was provided in these works, and no bioconstructions formed by the corals were reported. In recent papers, coral faunas have been re-evaluated and thoroughly revised (Kiessling & Baron-Szabo, 2004; Baron-Szabo, 2006, 2008; and present study).

Americas: Greenland, Jamaica, Mexico, Peru, USA

Studies on the K/Pg sections in the Nûgssuaq area of Greenland are few (Floris, 1972). As far as Maastrichtian coral occurrences are concerned, only two solitary taxa from coastal environments have previously been recorded.

The rich coral fauna of Jamaica, occurring mainly in coral-rudist associations, has long attracted the attention of palaeontologists who focused on Late Cretaceous and K/Pg boundary assemblages. Collecting efforts by Coates, Kauffman and Jackson between 1966 and 1972 (collections of the Smithsonian Institution, Washington, DC) have provided insights into the most extensive

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Table 3. List of localities with Maastrichtian strata from which the coral material has been collected. Co-ordinates and palaeo co-ordinates representative of distributional patterns are from Paleobiology Database (see paleobiodb.org, for more details on individual sites); palaeoclimate zones estimated based on paleomaps by Tennant et al. (2017) and the Paleomap project at www.scotese.com: (ar) = arid; (ct) = cool temperate; (pt) = para- to subtropical; (tr) = tropical; (wt) = warm temperate

Localities with Maastrichtian strata	Corresponding number in Fig. 1 herein	Present-day co-ordinates	Palaeo co-ordinates	Palaeoclimatic zones
Antarctica	1	64° S, 57° W	62° S, 67° W	ct
Australia	2	23° S, 114° 6’ E	50° S, 100° 24’ E	wt
Bulgaria	15	42° 48’ N, 22° 48’ E	29° 42’N, 20° 36’E	pt
		42° 42’ N, 22° 48’E	29° 36’N, 20° 36’E	pt
Denmark	21	55° 18’ N, 12° 30’ E	47° 42’ N, 10° 30’ E	wt
Germany	23	47° 48’ N, 12° 42’ E	36° 12’ N, 13° 12’ E	wt
Greenland	27	70° 30’ N, 53° 6’ W	61° 48’ N, 17° 48’ W	ct
India	5	12° N, 79° 48’ E	33° 30’ S, 58° 12’ E	ar
Iran	8	29° 12’ N, 54° 18’ E	10° 42’ N, 45° 18’ E	tr
Jamaica	37	18° 6’ N, 77° 24’ W	18° 24’ N, 72° 6’ W	ar
		18° 6’ N, 76° 24’ W	18° 24’ N, 71° 6’ W	ar
		18° 6’ N, 76° 18’ W	18° 18’ N, 70° 48’ W	ar
		18° 6’ N, 77° 48’ W	18° 36’ N, 72° 18’ W	ar
		18° 12’ N, 77° 24’ W	18° 36’ N, 71° 54’ W	ar
		18° 18’ N, 77° 54’ W	18° 42’ N, 72° 24’ W	ar
		18° 18’ N, 78° 12’ W	18° 54’ N, 72° 42’ W	ar
		18° 24’ N, 78° 18’ W	18° 54’ N, 72° 48’ W	ar
Kazakhstan	12	44° N, 53° 12’ E	37° 36’ N, 46° 48’ E	?pt
		44° N, 52° E	37° 18’ N, 45° 48’ E	?pt
	13	47° 30’ N, 54° 18’ E	41° 12’ N, 47° 24’ E	wt
		50° N, 64° E	44° 30’ N, 55° 36’ E	wt
Libya	25	31° 54’ N, 15° 6’ E	19° 54’ N, 12° 12’ E	tr
Madagascar	3	13° 48’ S, 48° E	37° 54’ S, 39° 54’ E	wt
		23° 48’ S, 44° 24’ E	38° S, 35° 54’ E	wt
	4	15° 30’ S, 46° 54’ E	29° 36’ S, 38° 42’ E	ar
		15° 6’ S, 47° 24’ E	29° 18’ S, 39° 12’ E	ar
Mexico	35	22° 6’ N, 101° W	28° 36’ N, 81° 36’ W	ar
		25° 48’ N, 101° 18’ W	32° 12’ N, 81° 6’ W	ar
	36	16° 48’ N, 93° 24’ W	21° 54’ N, 75° 6’ W	ar
Netherlands-Belgium	22	50° 54’ N, 5° 42’ E	43° 24’ N, 4° 30’ E	wt
Oman	6	24° 18’ N, 55° 54’ E	6° N, 46° 6’ E	tr
		24° 54’ N, 56° E	6° 18’ N, 46° 18’ E	tr
Peru	38	5° 18’ S, 79° 54’ W	6° 48’ S, 64° 54’ W	ar
Poland	20	50° 36’ N, 23° 6’ E	43° N, 19° 42’ E	wt
		51° 18’ N, 22° E	43° 48’ N, 18° 42’ E	wt
Russia	14	44° 18’ N, 40° 54’ E	36° 54’ N, 35° 48’ E	wt
		45° 12’ N, 39° 54’ E	37° 48’ N, 34° 48’ E	wt
Senegal	26	14° 36’ N, 17° 6’ W	9° 12’ N, 21° 18’ W	tr
Eastern Serbia	17	45° 12’ N, 19° 42’ E	32° 24’ N, 18° 30’ E	pt

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Table 3. (*Continued*)

Localities with Maastrichtian strata		Corresponding number in Fig. 1 herein	Present-day co-ordinates	Palaeo co-ordinates	Palaeoclimatic zones
Spain		24	38° 48’ N, 0° 30’ W	30° 54’ N, 1° 6’ W	pt
			42° 6’ N, 1° 6’ E	42° 6’ N, 1° 6’ E	pt
Turkey		10	38° 18’ N, 43° E	21° 12’ N, 37° 6’ E	pt
		16	40° 12’ N, 31° 18’ E	32° 48’ N, 27° 18’ E	pt
Turkmenistan		11	38° 42’ N, 56° 36’ E	32° 30’ N, 50° 30’ E	pt
United Arab Emirates		7	25° N, 55° 48’ E	6° 48’ N, 46° 12’ E	tr
Ukraine		9	44° 30’ N, 33° 30’ E	16° 6’ N, 45° 36’ E	tr
			44° 36’ N, 34° 6’ E	14° 42’N, 45° 42’ E	tr
		18	49° 48’ N, 24° E	36° 30’ N, 22° 54’ E	pt
		19	51° N, 35° 6’ E	43° 24’ N, 30 ° 6’ E	pt
USA	Alabama	29	31° 42’ N, 85° 6’ W	34° 36’ N, 63° 18’ W	ar
			31° 48’ N, 85° 6’ W	34° 36’ N, 63° 18’ W	ar
			32° 6’ N, 86° 48’ W	35° 18’ N, 64° 54’	wt
			32° 6’ N, 87° 24’ W	35° 30’ N, 65° 30’ W	wt
			32° 18’ N, 87° 48’ W	35° 42’ N, 65° 48’ W	wt
			32° 42’ N, 88° 18’ W	36° 12’ N, 66° 12’ W	wt
	California	34	32° 42’ N, 117° 12’ W	38° 12’ N, 93° 30’ W	wt
	Colorado	33	40° 18’ N, 107° W	47° 30’ N, 82° 42’ W	wt
	Georgia	29	31° 42’ N, 85° 6’ W	34° 36’ N, 63° 18’ W	ar
			31° 42’ N, 85° 6’ W	34° 36’ N, 63° 18’ W	ar
			31° 48’ N, 85° W	34° 36’ N, 63° 6’ W	ar
			32° 12’ N, 84° 54’ W	35° 6’ N, 62° 30’ W	wt
	Maryland	28	38° 48’ N, 77° W	39° 42’ N, 52° 54’ W	wt
			38° 54’ N, 76° 54’ W	39° 48’ N, 52° 12’ W	wt
			39° N, 76° 36’ W	39° 48’ N, 52° 24’ W	wt
	Mississippi	30	33° 6’ N, 88° 42’ W	36° 42’ N, 66° 24’ W	wt
			33° 30’ N, 88° 48’ W	37° N, 66° 24’ W	wt
			33° 48’ N, 89° W	37° 24’ N, 66° 30’ W	wt
			34° 30’ N, 88° 54’ W	38° 12’ N, 66° 12’ W	wt
			34° 54’ N, 88° 54’ W	38° 30’ N, 66°	wt
	Missouri	30	37° N, 89° 54’ W	40° 42’ N, 66° 24’ W	wt
	North Carolina	28	35° 48’ N, 78° 36’ W	37° 6’ N, 55° 30’ W	wt
	North Dakota	32	46° 18’ N, 101.7° W	52° N, 75° W	wt
	South Carolina	28	33° 48’ N, 79° 18’ W	35° 24’ N, 56° 48’ W	wt
			33° 54’ N, 79° 24’ W	35° 30’ N, 57° W	wt
			34° N, 79° 30’ W	35° 36’ N, 57° W	wt
			38° 48’ N, 77° W	39° 42’ N, 52° 54’ W	wt
	Tennessee	29	34° 12’ N, 88° 54’ W	37° 48’ N, 66° 18’ W	wt
			35° 18’ N, 88° 24’ W	38° 54’ N, 65° W	wt
	Texas	31	29° 30’ N, 98° W	35° 18’ N, 76° 36’ W	wt
			29° 42’ N, 97° 54’ W	35° 18’ N, 76° 54’ W	wt
			29° 48’ N, 97° 48’ W	35° 18’ N, 76° 48’	wt
			30° N, 97° 42’ W	35° 30’ N, 76° 36’ W	wt
			30° 12’ N, 97° 36’ W	35° 48’ N, 76° W	wt

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Table 3. (*Continued*)

Localities with Maastrichtian strata		Corresponding number in Fig. 1 herein	Present-day co-ordinates	Palaeo co-ordinates	Palaeoclimatic zones
			30° 12’ N, 97° 36’ W	35° 42’ N, 76° 30’ W	wt
			30° 18’ N, 97° 36’ W	36° N, 75° 54’ W	wt
			30° 24’ N, 97° 24’ W	35° 48’ N, 76° 12’ W	wt
			30° 30’ N, 97° 18’ W	36° 6’ N, 75° 30’ W	wt
			30° 54’ N, 97° W	36° 18’ N, 75° 12’ W	wt
			31° 42’ N, 96° 36’ W	37° N, 75° W	wt
			31° 48’ N, 96° 30’ W	37° N, 74° 54’ W	wt
			32° 6’ N, 96° 30’ W	37° 24’ N, 74° 12’ W	wt
			32° 30’ N, 96° 18’ W	37° 42’ N, 74° 24’ W	wt
			32° 42’ N, 96° 18’ W	38° N, 73° 48’ W	wt
	Wyoming	32	43° 18’ N, 104° 18’ W	49° 48’ N, 78° 30’ W	wt

Table 4. Alphabetical list of Maastrichtian scleractinian coral species, localities from which they were collected and remarks on their taxonomic position. Age of strata at collecting site: (*) = Maastrichtian (unspecified); (1) = lower Maastrichtian; (2) = mid-Maastrichtian; (3) = upper Maastrichtian (for more details on locations and recent taxonomic updates, see Paleobiology Database [paleobiodb.org]). For further information on localities, see also Table 3, and for excluded taxa herein, reference is made to Baron-Szabo (2006, 2008) and updates herein. Types of corallite integration are as follows: cp = cerioid-plocoid; s = solitary (no integration); htm = hydnophoro-thamnasterioid-meandroid; b = branching. Corallite sizes: small (s) = up to 2.5 mm; medium (m) = >2.5–9 mm; large (l) = >9 mm. * = might occur in more than one type of corallite integration or overlapping types of integration

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
cp–s	*Acropora bancellsae* (Álvarez-Pérez, 1997)	d (branch): 1.4–3 mm; d (axial corallite): 0.7–1.2 mm; d (secondary corallite): 0.3–0.6 mm; s (axial corallite): 12 (+s); s (secondary corallite): 6 (+s)	Iran (3)		Baron-Szabo et al. (2023)
s–l	*Acrosmilia conica* (Koby, 1886)	d (min): 22–30 mm; d (max): 25–33 mm; d (min)/d (max): 0.85–0.96; s: 96–192, s/mm: 9–11/ 5	Jamaica (3)		Baron-Szabo (2008)
cp–s	*Actinacis barretti* (Wells, 1934)	d: 0.8–1.3 mm; c–c: 1.5–2.5 mm; s: 16–22, in juvenile corallites, the number may be 12; in oldest corallites, the number may reach 24	Iran (3)		Baron-Szabo et al. (2023)
cp–m	*Actinacis elegans* (Reuss, 1854)	d: 2–4 mm, in areas of intense budding around 1.5 mm; c–c: 2.5 to around 4 mm; s: 24+s, in corallites in areas of intense budding around 12	Mexico (*)	Referring to material described by Löser (2012) described as *Actinacis magna* (Alloiteau), but as shown in Löser (2012, figs. 5D, E) having corallite dimensions more closely corresponding to *A. elegans*	Löser (2012); updated herein
cp–s	*Actinacis martiniana* (d’Orbigny, 1850)	d: 0.5–1 mm; c–c: 1.5–3 mm s: 22–24, in corallites in areas of intense budding around 18	Mexico (*)	Referring to material described as *Actinacis haueri* (Reuss)	Baron-Szabo et al. (2006); Baron-Szabo (2008); updated herein
cp–s	*Actinacis reussi* (Oppenheim, 1930)	d: 1–1.5 mm, in areas of intense budding around 0.8 mm, up to 2 mm in some parts of the colony; c–c: 1.5–3 mm; s: up to 24	Mexico (*)	Referring to material described as *Actinacis parvistella*	Baron-Szabo et al. (2006); Baron-Szabo (2008)
			Jamaica (*, 2–3)	Also refers to material described as *Actinacis martiniana* and *A. multipartita* (Oppenheim); see Fig. 2M herein	Baron-Szabo (2008); updated herein
cp	*Actinacis* sp. 1	–	Oman (*)	No information provided	Smith et al. (1995)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
cp	*Actinacis* sp. 2	–	Spain (3)	No information provided	Pons et al. (1994)
cp	*Actinacis* sp. 3	–	Jamaica (*)	No information provided	Mitchell (2002)
cp–s	*Actinastrea exigua* (Alloiteau, 1954)	d (monocentric): 0.6–1 mm; c–c: 0.8–1 mm, up to 1.2 mm in some areas; s: 12 (6s1 + 6s2)	Jamaica (2–3)		Baron-Szabo (2006)
			Mexico (*)	Referring to material described as *Actinastrea* sp., having dimensions of skeletal elements closely corresponding to those of *A. exigua*	Filkorn et al.(2005); updated herein
cp–s	*Actinastrea goldfussi* (d'Orbigny, 1850)	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)	Netherlands-Belgium (3)	See Figs. 2A, 5A–C herein. The main form with predominantly 6s1 + 6s2, while forma *faujasi* has predominantly 8s1 + 8s2. Forma *faujasi* occurring in middle Meerssen Member, *A. goldfussi* is known to straddle K/Pg boundary having been recorded from middle to top of Meerssen Member. Name *Actinastrea geminata* or *Aplosastrea geminata* is herein restricted to the lectotype and has more irregularly shaped and sized corallites and more diverse septal formulae. See Fig. 5D herein.	Leloux (1999); Baron-Szabo (2006); Löser (2011)
cp–s	*Actinastrea hexaphylla* (Quenstedt, 1881)	d: 1–1.5 mm, juvenile 0.8 mm; c–c: 1.2–1.8, rarely up to 2 mm; s: 12 (6s1 + 6s2)	Jamaica (*, 2–3)		Baron-Szabo (2006)
cp	*Actinastrea* sp.	–	Jamaica (*)	No information provided	Mitchell (2002)
cp–s	*Actinhelia elegans* (Goldfuss, 1826)	d: 1.5–2 mm; d (juvenile); around 1 mm; c–c: 1.8–2.2 mm, up to around 2.8 mm in some places; s: 16 + s (8s1 + 8s2+s)	Netherlands-Belgium(3)		Leloux (1999)
			Mexico (*)	Including material of Löser (2012) described as *Actinastrea reticulata* (Goldfuss); see Fig. 2D herein.	Filkorn et al.(2005): Baron-Szabo et al. (2006); Löser (2012); updated herein
			Jamaica (*, 2–3)		Baron-Szabo (2008)
cp–m	*Agathelia asperella* (Reuss, 1854)	d (max): 4.5–8 mm, in areas of intense budding generally ranging between 2–3.5 mm ; c–c: 5–7 mm, in areas of intense budding around 2.5 mm; s: 26–48, in corallites in areas of intense budding around 20	Iran (3)	Referring to material described as 'Faviidae'	Khazaei et al. (2009); updated herein
s–m	*Alveolocyathus felixi* (Filkorn, 1994)	d: 7.5–8.3 mm; s: 48; h: 7.5 mm	Antarctica (*)	Including *Conocyathus felixi*, *Laminocyathus wellsi* and *Alveolocyathus nordenskjoeldi*	Filkorn (1994)
cp–m	*Antiguastrea cellulosa* (Duncan, 1863)	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 ranging between 14 and 18	Mexico (*)		Baron-Szabo et al. (2006)
			Jamaica (*, 2–3)		Baron-Szabo (2006)
s–l	*Areopsammia alacca* (Morren, 1828)	d: 18 × 22 mm; s: 96	Netherlands-Belgium (3)	See discussion in Baron-Szabo (2014); see Fig. 3F, G herein	Leloux (1999); Baron-Szabo (2008)
htm–l	*Aspidastraea clathrata* (Goldfuss, 1826)	c–c: 6–30 mm; s (secondary corallites): around 12; s (main corallite): around 60; s/mm: 18–20/10	Netherlands-Belgium (3)	See Fig. 8A herein	Leloux (1999); Baron-Szabo (2008)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
htm–m	*Aspidastraea orientalis* (Kühn, 1933)	c–c (adjacent series): 3–5.5 mm, up to 7 mm in peripheral areas; c–c (same series): 2.5–5 mm, around 1.5 mm in areas of intense budding; 16–28, main corallite: up to 60 in main corallite; s/mm: 16–20/ 5; h: 5–25 mm; colony: 18–53 mm in diameter	Iran (3)		Kühn (1933); Baron-Szabo (2000, 2008)
			Türkiye (*)	Referring to material figured as *Cyclolites* sp., seemingly showing resemblance to the colonial *Aspidastraea*; material provisionally grouped with *Aspidastraea* herein	Özer (1992); updated herein
htm	*Aspidastraea* sp.	–	Oman (*)	No information provided	Smith et al. (1995)
cp–m	*Astrangia*? *cretacea* (Bölsche, 1870)	d: 3–4 mm; s: 24	USA (*)		Wells (1933); Stephenson (1941); Baron-Szabo (2006)
cp–m	*Astrangia* sp.	d: 2–4 mm; c–c: up to around 10 mm; s: around 32	Australia (3)		Jell et al. (2011)
htm–m	*Astraraea media* (Sowerby, 1832)	d: 4–8 mm, in areas of intense budding around 3 mm; c–c: 4–8 mm; s: 24–48; s/mm: 7–8/2	Jamaica (*)		Baron-Szabo (2008); updated herein
htm–m	*Astraraea rosi* (Reig Oriol, 1992)	d: 5–10 mm, up to around 12 mm in some places, in areas of intense budding around 4 mm; c–c: up to around 14; s (monocentric): 40 to around 60	Iran (3)	Referring to material described as *Microsolena* sp. and *Pseudofavia grandiflora* (Reuss)	Khazaei et al. (2009); updated herein
cp–s	*Astreopora hexaphylla* (Felix, 1906)	d (lumen): 0.4–0.8 mm; d: 0.6–1.2; c–c: 0.7–2.2 mm; s: 6–12	Jamaica (3)	Including *Astreopora perexigua* (Oppenheim)	Baron-Szabo (2006)
htm–l	*Astrogyra edwardsi* (Reuss, 1854)	d (series including wall): (12) 18–25 (30) mm; d (ambulacrum): 1–5 mm; s/ mm: 10–18/ 10	Oman (*)		Baron-Szabo (2000, 2006)
s–l	*Aulosmilia aspera* (Sowerby, 1832)	d (min, d): 8–22 mm; d (max, D): 13–55 mm; d/D: 0.44–0.78; s: up to around 200 in 2–3 size orders; h: 8–50 mm	Jamaica (2–3)		Baron-Szabo (2006)
s–l	*Balanophyllia acostae* (Jell et al., 2011)	d: 12 mm; s: 48; h: 30 mm	Australia (3)		Jell et al. (2011)
s–l	*Balanophyllia caulifera* (Conrad, 1848)	d (min): 5.3–24 mm; d (max): 7.5–34 mm; d (min)/d (max): 0.63–0.9; s: 48–96; h: 8.5–50 mm	Madagascar (*)	Including *Eupsammia collignoni* (Alloiteau, 1951), *E. narindensis* (Alloiteau, 1936) and *Palaeopsammia mitsinjoensis* (Alloiteau, 1958) (see Fig. 2I herein)	Alloiteau (1958); Baron-Szabo (2008)
*cp–s	*Baryhelia dendroides* (Reuss, 1854)	d: 1.8–3.2 mm, in areas of intense budding as small as 0.8 mm; c–c: 1.5–3 mm; s: 6 (+s)	Spain (*)	Originally described as belonging to *Heterocoenia*; based on the presence of both multi-layered corallite wall and apophysal septal extensions; species *dendroides* transferred to *Baryhelia* herein, including *Heterocoenia garumnica*	Vidal (1921); Baron-Szabo (2006): updated herein
cp–l	*Baryphyllia maxima* (Umbgrove, 1925)	d (min): up to 14 mm; d (max): up to 18 mm; s: 96	Netherlands-Belgium (3)	Referring to material previously assigned to *Montastraea maxima* (see Fig. 6H herein)	Leloux (1999, 2004); Baron-Szabo (2008)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
cp–m	*Barysmilia trechmanni* (Wells, 1934)	Maximum diameter of the calice: 3.5–7 mm, in late budding stages reaching about 10 mm; minimum diameter of the calice: 2.5–5 mm, up 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 may be down to 16	Mexico (*)		Filkorn et al. (2005)
			Jamaica (*, 2–3)		Mitchell (2002); Baron-Szabo (2006)
*s–m	*Bathycyathus corneti* (Alloiteau & Tissier, 1958)	d (max., adult): 6.7 mm; d (min., adult): 3.8 mm; s (adult): 48 + s4 (12s1 + 12s2 + 24s3+s4); h: up to about 45 mm	Iran (3)		Baron-Szabo et al. (2023)
*s–l	*Bathycyathus lloydi* (Vaughan, 1920)	d (adult): 8 × 14.5 mm, (juvenile): 4.5 mm; s (adult): 64, s (juvenile): 36; costae (adult): 64, (juvenile): around 30; h: 13.5–18 mm	Iran (3)		Baron-Szabo et al. (2023)
			USA (3)	Originally described as *Paracyathus lloydi*; also including are *Paracyathus thomi*, *Paracyathus kayserensis*, and *Steriphonotrochus manorensis*	Vaughan (1920); Wells (1933); Baron-Szabo (2008)
cp–m	*Bosnopsammia lindstroemi* (Oppenheim, 1930)	c–c: 3–8 mm, up to 10 mm in peripheral areas of colony; s: 9–20, in largest corallites 24 septa possible; size of colony: 3–10 cm in length, about 2–6 cm in width	Jamaica (*, 2–3)		Baron-Szabo (2008, 2014)
s–m	*Bothrophoria ornata* (Felix, 1909)	d (min): 4.6–8 mm; d (max): 6–11 mm; d (min)/d (max): 0.67–0.89; s: 48–62; h: 5.5–10.5 mm	Antarctica (*)		Filkorn (1994); Baron-Szabo (2008)
s–s	*Bothrophoria* sp.	d: 1.3–1.5 mm; s: 24; h: 1.7–2 mm.	Australia (3)		Jell et al. (2011)
cp–m	*Brachyphyllia felixi* (Baron-Szabo, 2000)	d: 4–8 mm, in late adult stages up to 10 mm; s: 60, up to about 100; material: colony (holotype) up to 3 cm in diameter and juvenile, single polyps in early settling stages	Jamaica (3)		Baron-Szabo (2008)
s–l	*Caryophyllia arcotensis* (Forbes, 1846)	d (min): 16.5–24 mm; d (max): 17–25 mm; d (min)/d (max): 0.8–1; s: 40–48+s5; h: up to 35 mm	India (3)	Referring to material described as *Turbinolia arcotensis*	Forbes (1846); Baron-Szabo (2008)
s–l	*Caryophyllia konincki* (Milne Edwards & Haime, 1848a)	d (min): 1.5–16 mm; d (max): 2–18 mm; d (min)/d (max): 0.81–0.96; s (adult): 48+s5; h: up to 45 mm	USA (*, 3)	Including *Caryophyllia stephensoni*	Wells (1933); Sohl & Koch (1984); Baron-Szabo (2008)
			Madagascar (*)	Referring to material of Alloiteau (1951) described as ?*Caryophyllia antonibensis* (Alloiteau)	Alloiteau (1951, 1958): Baron-Szabo (2008)
			Australia (3)	Referring to material described as *Caryophyllia arcotensis*	Jell et al. (2011)
			Senegal (*)	Including *Cylindrocyathus popenguinensis*	Alloiteau (1952b); Baron-Szabo (2008)
			Libya (*)	Including material described as *Caryophyllia arcotensis* (Forbes), *C. cupuliformis* (Alloiteau) and *C. antonibensis* (Alloiteau)	Rossi Ronchetti (1955); Baron-Szabo (2008)
			Netherlands-Belgium (3)	Including material described as *Caryophyllia bredai* and *C. cylindrica* (see Fig. 3A, B herein)	Leloux (1999); Baron-Szabo (2008)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
s–l	*Caryophyllia mediavia* (Vaughan & Popenoe, 1935)	d (max): 9–12 mm; d (min): 8.3–10 mm; s: 40–48 (+?s5); h: up to up to 16.5 mm	Greenland (*)	Including material described as ? *Caryophyllia agatdalensis*	Floris (1972): Baron-Szabo (2008)
s–l	?*Caryophyllia* sp. 1	d: 15 mm; s: 48; h: 6 mm	Senegal (*)		Alloiteau (1952b); updated herein
s	*Caryophyllia* sp.	–	Denmark (3)	No information about measurements provided	Floris (1979); Bernecker & Weidlich (2005)
s–m	?*Caryophyllia* sp. 3	d: 5 mm; s: around 48; h: 5 mm	Australia (3)		Jell et al. (2011)
s–l	*Ceratotrochus supracretacea* (Hennig, 1899)	d: 9–25 mm; s: 36–96; h: up to 28 mm	Ukraine (*)	Referring to material of Siemiradzki (1927) described as *Ceratotrochus polonicus*	Siemiradzki (1927); Baron-Szabo (2008)
			Libya (*)	Referring to material of Rossi Ronchetti (1955) described as *Axocyathus punctatus*	Rossi Ronchetti (1955); Baron-Szabo (2008)
b–m	*Cladocora gracilis* (d'Orbigny, 1850)	d: 2.8–4.5 mm, reaching 5 mm in latest ontogenetic stages; s: 16–38	Mexico (*)		Baron-Szabo et al. (2006)
			Jamaica (*, 3)		Baron-Szabo (2006)
b–m	*Cladocora jamaicaensis* (Vaughan, 1899)	d (max): 3.5–7 mm, up to 10 mm in late budding stages; d (min): 3–5 mm; s: 30–50	Mexico (*)		Filkorn et al. (2005); Baron-Szabo et al. (2006)
			Jamaica (*, 3)		Baron-Szabo (2006)
b–l	*Cladocora* sp.	d: 16.5 mm; s: 24	Spain (3)	Referring to fragmentary material in Pons et al., (1994, pl. 2, Fig. 1) described as *Procladocora* sp.	Pons et al. (1994); updated herein
b–m	*Cladophyllia* cf. *furcifera* (Roemer, 1888)	d: 4–7 mm, juvenile around 2.5 mm; s: 32–48 (+s), juvenile 24	Jamaica (*, 3)		Baron-Szabo (2008)
htm–l	*Colpophyllia reagani* (Durham, 1942)	d (series): 6–14 mm; c–c: 4–15 mm; s/mm: 13–18/5	Jamaica (*, 3)	Referring to material of Myers (1968) described as *Leptoria* sp.	Myers (1968); Baron-Szabo (2006)
cp–m	*Columactinastraea anthonii* (Leloux, 2003)	d: 4–5.3 mm; c–c: 1–1.8 mm; s: 24	Netherlands-Belgium (3)	See Fig. 5F, G herein	Leloux (2003)
cp–s	*Columactinastraea fallax* (Umbgrove, 1925)	d (max): 1.2–1.7 mm, in areas of intense budding around 0.7 mm; c–c: 1–1.8 mm; s: 12	Netherlands-Belgium (3)	Referring to material described as *Columnastraea fallax* (see Fig. 5E herein)	Leloux (1999, 2004)
			Mexico (*)	Referring to material of Löser (2012) assigned to *Columactinastraea hilli* (Wells), but as shown in Löser (2012, Fig. 2D, E), with corallite diameters more closely corresponding to those of *C. fallax*	Löser (2012); updated herein
cp–s	*Columastrea dubia* (Alloiteau, 1958)	d: 1.2–2.2 mm; dl: 1–1.6 mm, in areas of intense budding around 0.7 mm; c–c: 1.5–2.2 mm, in areas of intense budding around 1 mm; s: 24, in areas of intense budding around 18	Oman (1)		Baron-Szabo (2006)
s–m	*Conotrochus giraliensis* (Jell et al., 2011)	d: 4 mm; s: 32; h: 8 mm	Australia (3)		Jell et al. (2011)
s–l	*Cunnolites angiostoma* (Kühn, 1933)	d (min)/d (max): 0.85–0.89; d (min): 25–28 mm; d (max): 28–33 mm; s/mm: 20–25/5 in peripheral areas, 25/5 around calicinal pit	Iran (3)		Kühn (1933); updated herein

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
s–l	*Cunnolites barrerei* (Alloiteau, 1952a, 1952b)	d (min): 31–41 mm; d (max): 35–51 mm; d (min)/ d (max): 0.80–0.89; s/mm: 17–22/5 (peripheral area), 14–16/5 around calicinal pit; h: up to 22 mm	Bulgaria (*)		Tchéchmédjiéva (1970)
s–l	*Cunnolites cancellata* (Goldfuss, 1826)	d (min)/d (max): 0.9–1; s/mm: 17–25/5 in peripheral areas, 22–25/5 around calicinal pit	India (3)	Referring to material of Forbes (1846) described as *Fungia filamentosa*	Forbes (1846); Baron-Szabo (2006)
			Netherlands-Belgium (3)	Possibly overlapping with *Cunnolites polymorphus* and in need of further studies (see Fig. 4F, G)	Leloux (1999)
			Iran (3)	Referring to material of Kühn (1933) described as *Cyclolites medlicotti* (Noetling)	Kühn (1933); Baron-Szabo (2008)
			Eastern Serbia (*)		Turnšek (1992)
s–l	*Cunnolites giganteus* (d'Orbigny, 1850)	d (min)/d (max): 0.73–0.97; s/mm: 8–15/5 in peripheral areas, 8–15/5 around calicinal pit	Iran (3)	Referring to material of Kühn (1933) described as *Cyclolites robustus* (Quenstedt)	Kühn (1933); Baron-Szabo (2008
			Jamaica (*)	Including some material originally described as *Cyclolites jamaicaensis*	Wells (1934); updated herein
			Bulgaria (*)	Referring to material of Tchéchmédjiéva (1995) described as *Cunnolites beaussetensis* and *C. mitissimus,* but images show that specimens have a significantly smaller number of septa, closely corresponding to *C. giganteus;* also included here is species *C. undulatiformis* of Tchéchmédjiéva (1970)	Tchéchmédjiéva (1970, 1986, 1995); updated herein
			Eastern Serbia (*)		Turnšek (1992);
s–l	*Cunnolites numismalis* (Lamarck, 1816)	d (min, d): often up to 25 mm; d (max, D): often about to 30 mm; d/D: 0.85–1; h: often up to around 7 mm; s: 192 septa in corallum of 25 × 28 mm in diameter; s/mm: 9/5 in peripheral areas, 5/2 around calicular pit	Iran (3)		Kühn (1933); updated herein
			Eastern Serbia (*)		Turnšek (1992)
s–l	*Cunnolites polymorphus* (Goldfuss, 1826)	d (min)/d (max): 0.7–0.98; s/mm: 17–20/5 in peripheral areas, up to 25/5 in peripheral areas in growing stage, 17–20/5 around calicinal pit	Libya (*)	Referring to material described as *Cyclolites krumbecki* (de Stefani), and var. *orfellensis*	Marini (1942); Baron-Szabo (2008)
			Netherlands-Belgium (3)	See Fig. 2E, F herein	new record; updated herein
			Bulgaria (*)	Including *Cunnolites reussi* and *C. sororius*	Tchéchmédjiéva (1986)
			eastern Serbia (*)	Referring to material of Turnšek (1992) described as *Cunnolites ellipticus*	Turnšek (1992); Baron-Szabo (2008)
s–l	*Cunnolites rugosus* (Michelin, 1846)	d (min): up to around 90 mm; d (max): up to around 100 mm; d (min)/ d (max): 0.82–0.94; s/mm: 13–17/5 (peripheral area), 13–15/5 around calicinal pit; h: up to around 40 mm	Bulgaria (*)	Including *Cunnolites subcircularis* (Oppenheim)	Tchéchmédjiéva (1970); updated herein

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
s–l	*Cunnolites scutellum* (Reuss, 1854)	d (min)/d (max): 0.8–1; s/mm: 14–20/5 in peripheral areas, 15–22/5 around calicinal pit	Iran (3)		Kühn (1933); Baron-Szabo (2008)
			India (3)	Referring to material of Stoliczka (1873) described as *C. conoidea*	Stoliczka (1873); Baron-Szabo (2008)
s	*Cunnolites* sp. 1	–	Türkiye (3)	No information provided	Görmüş et al. (2019)
s	*Cunnolites* sp. 2	–	Oman (*)	No information provided	Smith et al. (1995)
s–l	*Cyathoceras embaensis* (Kuzmicheva, 1987)	d (min): 24–28 mm; d (max): 28–32 mm; d (min)/d (max): 0.86–0.88; s: 70–72	Kazakhstan (*, 1)		Kuzmicheva (1987); Baron-Szabo (2008)
s–l	*Cyathoceras mangyschlakensis* (Kuzmicheva, 1987)	d (min): 22–23 mm; d (max): 25–27 mm; d (min)/d (max): 0.85–0.88; s: 90–96.	Ukraine (*)		Kuzmicheva (1987)
			Kazakhstan (*)		Kuzmicheva (1987); Baron-Szabo (2008)
htm–m	*Cyathoseris catadupensis* (Vaughan, 1899)	c–c (series): 3–5 mm; c–c (between series): 3–6 mm; s/mm: 5–7/2	Mexico (*)	Referring to material described as *Mesomorpha catadupensis* (Vaughan)	Filkorn et al. (2005)
			Jamaica (2–3)	Including *Cyathoseris senessei* (Alloiteau)	Baron-Szabo (2002, 2008)
htm–l	*Cyathoseris formosa* (d'Achiardi, 1875)	d (primary corallite): 20–30 mm; d (secondary ones): 3–9 mm; c–c (series): 5–13 mm; c–c (between series): 5–24 mm; s/mm: 4–7/2; s (secondary corallites): up to 36	Mexico (*)		Baron-Szabo et al. (2006)
htm–s	*Cycloria vidali* (Vidal, 1917)	d (series, wall to wall): 2–2.5 mm; s/mm: 14–16/5; ambulacra: up to 3 mm	Spain (*)	Referring to material described as species of *Anisoria*; genus *Anisoria* considered to be a junior synonym of *Cycloria* Reuss (see Baron-Szabo (2014)	Vidal (1917); Reig Oriol (1987)
htm–s	*Cycloria tenella* (Goldfuss, 1826)	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	Bulgaria (*)	*Meandroria tenella* (Goldfuss)	Tchéchmédjiéva (1986); Baron-Szabo (2014)
s–l	*Dasmosmilia kochii* (Pratz, 1910)	d (min): 5–20 mm; d (max): 5–21 mm; d (min)/d (max): 0.83–1; s: up to 100; h: up to 23 mm	USA (*, 3)	Including *Dasmosmilia reesidei*	Gabb (1860); Wells (1933): Bryan & Jones (1989); Baron-Szabo (2008); updated herein
s–l	*Deltocyathus cupuliformis* (Alloiteau, 1951)	d: up to 35 mm; s: 48 + s5; h: up to 20 mm	Madagascar (*)		Alloiteau (1951); Baron-Szabo (2008)
			Russia (*)	Referring to material of Kuzmicheva (1987) described as *Deltocyathus* (*Levipalifer*) *arctous* (Kuzmicheva)	Kuzmicheva (1987); Baron-Szabo (2008)
*b–m	*Dendrophyllia candelabrum* (Hennig, 1899)	d: 3.5–5 mm, juvenile around 2 mm, up to 12 mm in latest adult stages; s: 24–60, latest adult stages up to 96	Netherlands-Belgium (3)		Leloux (1999); Baron-Szabo (2008)
*b–m	*Dendrophyllia dendrophylloides* (Milne Edwards & Haime, 1848b)	d (lumen, max.): 3–5.5 mm, juvenile around 2 mm, late adult stages 8.5 mm; d (lumen, min.): 2.5–5 mm; s: 40–48+s5, in latest adult stages up to around 60, in juveniles up to 24	Jamaica (*, 3)		Baron-Szabo (2008)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
*b–s	*Dendrophyllia* sp.	d (lumen, max): 1.2–1.8 mm; d (max): 2–3.5 mm, in areas of intense budding around 1 mm; s: 24+, in corallites in areas of intense budding around 12	Senegal (*)	Referring to material described as *Stylophora* sp. but seemingly septa arranged in Pourtalès plan (see Fig. 2B, C herein)	Alloiteau (1952b): updated herein
b–l	*Dermosmiliopsis orbignyi* (Alloiteau, 1952)	d: 10–17 mm, juvenile corallites: 6.5–9 mm; s: 96, up to around 130, in juvenile corallites s: 48–70	Mexico (*)		Baron-Szabo et al. (2006); Baron-Szabo (2008)
b–m	*Dermosmiliopsis tenuicosta* (Reuss, 1854)	d: 4–8 mm; s: 60–100	Jamaica (*, 3)		Baron-Szabo (2008)
s–l	*Desmophyllum excavatum* (von Hagenow, 1839)	d (min): 9–34 mm; d (max): 10–38 mm; d (min)/d (max): 0.80–1; s: 24–96+s; h: 13–100 mm	Denmark (3)		Brünnich Nielsen (1922); Baron-Szabo (2008); Hansen & Surlyk (2014)
			Germany (1)		Von Hagenow (1839); Baron-Szabo (2008)
			Ukraine (*)	Including *Coelosmilia sacheri* (Reuss) and *C. cupuliformis* (Reuss)	Kuzmicheva (1987)
			Kazakhstan (1)	Referring to *Desmophyllum laxum* of Kuzmicheva (1987)	Kuzmicheva (1987); Baron-Szabo (2008)
			Russia (*)		Kuzmicheva (1987); Baron-Szabo (2008)
			Turkmenistan (3)		Kuzmicheva (1987); Baron-Szabo (2008)
			Libya (*)	Referring to *Coelosmilia laxa* of Rossi Ronchetti (1955)	Rossi Ronchetti (1955); Baron-Szabo (2008)
cp–m	*Dichocoenia anomalos* (Wells, 1934)	d (max): 3.5–7 mm, in late budding stages, it may 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, and in juvenile corallite, the number of septa is around 16	Mexico (*)	Referring to material of Löser (2012) described as *Favioseris anomalos* (Wells_ and *Favioseris* sp.	Löser (2012); updated herein
			Jamaica (3)		Baron-Szabo (2006)
htm–s	*Dictuophyllia conferticostata* (Vaughan, 1899)	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 reaching 16 in 2 mm; ambulacra: 0–2 mm	Jamaica (*, 2–3)	Referring to *Leptoria* (*Dictuophyllia*) *conferticostata* (Vaughan) of Mitchell	Mitchell (2002); Baron-Szabo (2006)
			Mexico (*)	Including material of Löser (2012) described as *Pachygyra* cf. *ilerdensis* but actually identical to *D. conferticostata*	Filkorn et al. (2005); Baron-Szabo et al. (2006); Löser (2012); updated herein
cp–s	*Dictuophyllia reticulata* (Goldfuss,1826)	d (series, wall to wall): 0.7–1.2 mm; c–c (series): 1.5–4 mm; s/mm: 14/2; ambulacra: 1–3.5 mm	Netherlands-Belgium (3)	Including species *Favia planissima* (see Fig. 7D, E herein).	Leloux (1999, 2004); Baron-Szabo (2006)
htm–m	*Dimorphastrea solida* (Umbgrove, 1925)	c–c (same series): 6–10 mm; c–c (adjacent series): 10–13 mm; s/mm: 8–10/10	Netherlands-Belgium (3)	See Fig. 8B herein	Leloux (1999); Baron-Szabo (2008)
htm–m	*Diploctenium cordatum* (Goldfuss, 1826)	Height of corallum from stem to upper surface: 22 mm; d (min): 8 mm; d (max): 31 mm; s/ mm: 15–16/5	Netherlands-Belgium (3)	See Fig. 4D herein	Leloux (1999); Baron-Szabo (2006)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
htm–m	*Diploctenium pluma* (Goldfuss, 1826)	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	Netherlands-Belgium (3)	See Fig. 4E herein	Leloux (1999); Baron-Szabo (2006)
htm	*Diploctenium* sp.	–	Oman (*)	No information provided	Smith et al. (1995)
*cp–m	*Ellipsocoenia conferta* (Umbgrove, 1925)	d (max, lumen): 3.5–8 mm; d (min, lumen): 3–6 mm; c–c: 6–10 mm; s: 60, up to around 80	Netherlands-Belgium (3)	Referring to material assigned to *Montastraea conferta* as well as to *Favia maastrichtensis* (see Fig. 7B, C herein)	Leloux (2004); Baron-Szabo (2008)
cp–m	*Favia gregoryi* (Wells, 1935)	d (max, monocentric): 6–9 (11 in latest stages) mm; d (min, monocentric): 4.5–7 mm; s (monocentric calice): 26–36	Jamaica (*, 2–3)		Baron-Szabo (2006)
			Mexico (*)	Referring to material provisionally grouped with *Favia gregoryi* (Wells)	Filkorn et al. (2005)
s–l	?*Flabellosmilia vaughani* (Stephenson, 1916)	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 ontogenetic stages; h: 4.5–9 mm	Antarctica (*)	Including *Tropidocyathus minimus* and *T. seymourensis*	Filkorn (1994)
			USA (*)	Including *Platytrochus vaughani*	Stephenson (1916); Baron-Szabo (2006)
s–l	?*Flabellum anderssoni* (Felix, 1909)	d (min): 1.5–15 mm; d (max): 6–21 mm; d (min)/d (max): 0.71–0.82, often ranging from 0.6 to 0.7 in juvenile stages; s: 24–48; h: up to 23 mm	Antarctica (*)		Filkorn (1994); Baron-Szabo (2008)
s–l	*Flabellum miriaensis* (Jell et al., 2011)	d (min): 9–14 mm; d (max): 12–17 mm; d (min)/d (max): 0.78–0.8, often ranging from 0.65 to 0.7 in juvenile stages; s: 48; h: 11–21 mm	Australia (3)		Jell et al. (2011); updated herein
s–m	*Fungiacyathus* (*Bathyactis*) sp.	d: 4 mm; s: 48; h: 1 m	Australia (3)		Jell et al. (2011)
s–l	*Fungiacyathus deltoidophorus* (Felix, 1909)	d: 4–26 mm; s: 48–96	Antarctica (*, 3)	Including *Fungiacyathus larseni* and *F. antarcticus*	Filkorn (1994); Baron-Szabo (2008); Videira-Santos et al. (2022)
htm–m	*Fungiastraea flexuosa* (Goldfuss, 1826)	c–c: 3–5 mm, in peripheral areas of colony up to 6 mm; juvenile corallites around 2.5 mm; s: 24–36, in corallite in budding stage, the number of septa may be larger; s/mm: 15–20/5	Netherlands-Belgium (3)	See Fig. 8G, H herein	Leloux (1999); Baron-Szabo (2008)
			Jamaica (2–3)	Including material described as *Fungiastraea igua*	Baron-Szabo (2008): updated herein
			Mexico (*)	Referring to material described as *Astraeofungia felixi* (Reyeros Navarro)	Löser (2012); updated herein
cp–m	*Goniastrea insignis* (Duncan, 1880)	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/	Jamaica (*)		Baron-Szabo (2006)
cp–m	*Goniopora elegans* (Leymerie, 1846)	d: 2.5–4 mm; c–c: around 3.5 mm; s: 20 to around 30	Iran (3)		Khazaei et al. (2009)
cp–s	*Goniopora imperatoris* (Vaughan, 1919)	d: 1.8–2.8 mm, juveniles are as small as 1.4 mm; c–c: 1.8–4 mm; s: 20–29	Jamaica (*, 2–3)		Baron-Szabo (2008)
			Iran (3)		Khazaei et al. (2009)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
cp–s	*Goniopora* cf. *microscopica* (Duncan, 1863)	d: 1.2–1.6 mm; c–c: ca. 1.4 mm; s: 24	Iran (3)		Baron-Szabo et al. (2023)
cp–s	*Goniopora microscopica* (Duncan, 1863)	d: 1.2–1.7 mm, juvenile around 0.9 mm; c–c: 2.2–3.2 mm; s: 24–2	Jamaica (*, 3)		Baron-Szabo (2008)
cp–s	*Goniopora reussiana* (Duncan *in* Duncan & Wall, 1865)	d: 2–3 mm, juvenile as small as 1.8 mm; c–c: 2.5–4 mm; s: 18–24, in juvenile corallite 12	Jamaica (*)	Including *Goniopora trechmanni* (Wells)	Duncan & Wall (1865); Wells (1934); Baron-Szabo (2008)
cp–s	*Goniopora* sp.	d: 1.2–2.5 mm; c–c: 2–3.8 mm; s: 12–16	Mexico (*)		Baron-Szabo et al. (2006)
cp–s	*Haimesiastraea conferta* (Vaughan, 1900b)	d: 1.3–2.6 mm; d (lumen): 1–1.3 mm; c–c: 2–4.5 mm; s: 16–24	Peru (*)	Including *Montastraea parinasensis* (Wells)	Wells (1941); Baron-Szabo (2006)
cp–m	*Haldonia schindewolfi* (Wells, 1934)	d (lumen): 2.5–4 mm, juvenile 1.5–2 mm; c–c: 3.5–8 mm; s: 24–32, juvenile around 20	Jamaica (3)	Originally described as *Prodiploastraea schindewolfi*	Baron-Szabo (2006)
*cp–s	*Heterocoenia gracilis* (Quenstedt, 1881)	d: 0.5–1 mm; c–c: 0.5–1.5 mm; s: 6+s	Netherlands-Belgium (3)	Partly included *Heterocoenia bacillaris* in Leloux (1999) (see Fig. 9B, E herein)	Leloux (1999); Baron-Szabo (2006)
*cp–m	*Heterocoenia grandis* (Reuss, 1854)	d: 2.5–5.5 mm, juvenile around 2 mm; c-c: 9–12 mm; s: 6 (3-3)	Netherlands-Belgium	Partly included in *Heterocoenia bacillaris* in Leloux (1999) (see Fig. 9A, C, D, F herein)	Baron-Szabo (2006)
s-l	*Heterocoenia*? sp.	d: 15–25 mm		Partly included in *Heterocoenia bacillaris* in Leloux (1999) (see Fig. 9G herein)	Umbgrove (1925), updated herein
cp–m	*Hindeastraea discoidea* (White, 1888)	d (max): 5–8.5 mm, juvenile corallites are around 4 mm, corallites in late adult stages are around 10 mm; s: 24–30	USA (*)		Wells (1933): Baron-Szabo (2008)
htm	*Hydnophora* sp.	–	Oman (*)	Referring to material mentioned as *Hydnophororaraea* sp.; genus *Hydnophororaraea* is considered to be a junior synonym of *Hydnophora*; no information provided with regard to dimensions of skeletal elements	Smith et al. (1995)
cp–m	?*Isastrea angulosa* (Goldfuss, 1826)	d (max): 5–7 mm; d (min): 2.5–5 mm; c–c: 4.5–7 mm; s: 32–44	Netherlands-Belgium (3)	See Fig. 5H herein	Leloux (1999)
*b–l	*Latomeandra boltonae* (Wells, 1934)	d (series): 4–21 mm; length of series: 17–35 mm; c–c (in series): 5–14 mm; s: 48, up to around 200 in latest adult stages; s/mm: 6–10	Jamaica (2–3)	Originally described as belonging to *Diplaraea*, later transferred to the *Gyrodendron* (Baron-Szabo, 2002) but latter now considered to be a junior synonym of *Latomeandra* (see Fig. 2G, H herein)	Baron-Szabo (2008); updated herein
*b	*Latomeandra* sp.	–	Jamaica (*)	Referring to material assigned to *Gyrodendron,* but genus now considered to be a junior synonym of *Latomeandra*; no information on dimensions of material provided	Mitchell (2002); updated herein
s–l	*Leptocyathus hexacristatus* (Alloiteau, 1936)	d: 14–18 mm; s: 96; h: up to around 10 mm	Madagascar (*)	Referring to material of Alloiteau (1958, pl. 6, Figs. 13–14, 17–19)	Alloiteau (1936); updated herein

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
b–m	*Liptodendron nefiana* (Oppenheim, 1930)	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	Jamaica (*, 2–3)		Mitchell (2002); Baron-Szabo (2006)
cp–m	*Lithostrotionoides tissieri* (Alloiteau, 1952)	d (max., monocentric): 2.5–5 mm, up to around 7 mm when in submeandroid series; s (monocentric): 12–22; d (min., monocentric): 1.5–3.5 mm, up to around 4.5 mm in a few places; s/mm: 3–4/2	Oman (*)	Referring to material described as *Glenarea cretacea* Počta	Baron-Szabo (2000)
			Libya (*)	Referring to material described as *Astrocoenia konincki* but with intracalicular budding, corallites in submeandroid series, a lamellar columella and a paraseptothecal wall, thus closely corresponding to *Lithostrotionoides*	Marini (1942): updated herein
htm–l	*Loboseris abbreviata* (Reuss, 1854)	d (max): 18–25 mm; d (min): 15–17 mm; s/mm: 19–25/10	Jamaica (*)		Baron-Szabo (2008)
htm–l	?*Loboseris parasolitaria* (Löser, 2012)	d (max): 27–40 mm; d (min): 22–30 mm; s/mm: 12–17/5	Mexico (*)	Referring to material originally described as *Filkornia parasolitaria* Löser, 2012; provisionally grouped with *Loboseris* by Baron-Szabo (2014)	Löser (2012); Baron-Szabo (2014)
htm–m	*Loboseris* sp.	d: 7–10 mm; s/mm: 19–25/10	Jamaica (*)		Baron-Szabo (2008)
cp–s	*Madracis johnwellsi* (Frost & Langenheim, 1974)	d (lumen): 1–1.5 mm; c–c: 1–3.5 mm; s: 8–16 (8s1 + 8s2)	Jamaica (*)		Baron-Szabo (2006)
b–m	*Madrepora* sp.	d (branch): 3–5 mm; d: 2.8–4 mm; s: 12–24; branching angle: ca. 50°–70°	Poland (1)		Stolarski & Vertino (2007)
htm–m	*Meandrophyllia oceani* (de Fromentel, 1877)	d (max): 3–4 mm; c–c (same series): 2.5–5.5 mm; s/mm: 7–9/2	Mexico (*)		Baron-Szabo et al. (2006)
			Jamaica (*)		Baron-Szabo (2008)
htm–s	*Meandrophyllia textilis* (Goldfuss, 1826)	d (max): 1.8–2 mm; c–c (same and adjacent series): 2–3.5 mm; s/mm: 8–10/2	Netherlands-Belgium (3)	Material questionably grouped with *Fungiastraea* by Leloux (1999)	Leloux (1999); Baron-Szabo (2008)
htm–s	*Meandrophyllia velamentosa* (Goldfuss, 1826)	d (max): 1.5 mm; d (min): 0.8–1.2 mm; c–c (same and adjacent series): 1.2–2.4 mm; s/mm: 10–14/2	Netherlands-Belgium (3)	Material questionably grouped with *Fungiastraea* by Leloux (1999), also containing *Meandrophyllia gyrosa* (Goldfuss) (see Figs. 7F, G, 8I, J herein)	Leloux (1999); Baron-Szabo (2008)
s–m	*Micrabacia marylandica* (Stephenson, 1916)	d: 2–7 mm; s: up to 96; h: up to 3 mm	USA (*)	Including *Micrabacia hilgardi*	Stephenson (1916); Wade (1926); Baron-Szabo (2008)
s–m	*Micrabacia radiata* (Goldfuss, 1826)	d (adult): 6–9 mm; s (adult): 96; h: up to 4 mm	USA (*, 3)	Including *Micrabacia navarroensis, M. americana, M. rotatilis* and *M. mineolensis*	Stephenson (1916); Wells (1933); Gill et al. (1966); Sohl & Koch (1984); Baron-Szabo (2008)
			Germany (1)	Referring to material described as *Cyclabacia* aff. *clathrata*	Böhm (1891); updated herein
s	*Micrabacia* sp. 1	–	USA (1, 3)	No information provided	Sohl & Koch (1984); Bryan & Jones (1989)
s	*Micrabacia* sp. 2	–	Netherlands-Belgium (3)	No information provided	Leloux (1999); Jagt (2000)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
htm	*Microsolena* sp.	–	Jamaica (*)	No information provided	Mitchell (2002)
cp–l	Montastraeinae indet.	d: 7–15 mm; s: up to around 60 in largest corallites	Netherlands-Belgium (3)		Leloux (2004)
	Montipora cretacea (Umbgrove, 1925)	d: 0.9–1.0; s: 12–16; c-c: 0.5–1.1	Netherlands-Belgium	See Fig. 6A herein	Umbgrove (1925); updated herein
htm–m	*Monticulastraea insignis* (Duncan, 1880)	d (series, wall to wall): 1.5–5 mm; maximum length of corallites: 2–9 mm; minimum length of corallites: 0.5–3 mm; s/ mm: 35–44/10	Iran (3)	Referring to material described as *Hydnophora styriaca* (Michelin)	Khazaei et al. (2009); updated herein
s–l	*Montlivaltia angusticostata* (Umbgrove, 1925)	d: 32 × 40 mm; d (min)/d (max): 0.8; s: around 180	Netherlands-Belgium (3)	See Fig. 3H, I herein	Leloux (1999); Baron-Szabo (2006)
htm–m	*Morphastrea escharoides* (Goldfuss, 1826)	c–c: 4–8 mm; s/mm: 15–20/5	Netherlands-Belgium (3)	Referring to material described as *Synastrea escharoides* in Leloux (1999) (see Fig. 8E, F herein)	Leloux (1999)
cp–s	*Multicolumnastraea cyathiformis* (Duncan, *in* Duncan & Wall, 1865)	dl (adult): 1.5–2 mm; d (adult): 1.8–2.5 (3) mm; d (juvenile): up to about 1 mm; c–c: 2–3.5 mm, in regions of intensive budding, the corallite distance may be smaller; s: 24	Jamaica (*, 2–3)		Mitchell (2002); Baron-Szabo (2008)
			Mexico (*)	Including material of Löser (2012) described as *Multicolumnastraea* sp. but corresponding well to colony areas of *M. cyathiformis* that are characterised by intense budding	Filkorn et al. (2005); Baron-Szabo et al. (2006); Löser (2012); updated herein
htm–m	*Mycetophyllia multistellata* (Reuss, 1864)	c–c: 3.5–8 mm; s/mm (on ridge): 11–15/5	Jamaica (*, 3)		Baron-Szabo (2006)
cp–m	*Neocoenia lepida* (Reuss, 1854)	d (lumen): 2.5–4 mm, late adult stage: 4.5 mm, 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	Iran (3)	Referring to material described as *Phyllocoenia* sp.	Khazaei et al. (2009); updated herein
			Eastern Serbia (*)		Turnšek (1992)
cp–m	*Neocoenia* (*Placocaeniopsis*) *rotula* (Goldfuss, 1826)	d: 3.5–5 mm, juvenile 3 mm; d (lumen): 1.8–3 mm; c–c: 3–6 mm; s: 24, juvenile 22	Netherlands-Belgium (3)	See Fig. 6B herein	Leloux (1999)
			Jamaica (*)	Referring to material grouped with *Paraplacocoenia;* recently considered to be a junior synonym of *Placocaeniopsis* (Baron-Szabo, 2014)	Baron-Szabo (2006); updated herein
			Eastern Serbia (*)	Including *Placocoenia dumortieri* de Fromentel, 1879	Turnšek (1992); Baron-Szabo (2006)
b–l	*Ogilviastraea bigemmis* (Felix, 1903)	d (max): up to 15 mm; d (min): up to 9 mm; s: 5–7/2	Kazakhstan (1)	Referring to *Euphyllia turgainensis* of Kuzmicheva (1987)	Kuzmicheva (1987); Baron-Szabo (2008)
			Senegal (*)	Referring to *Diblasus* sp. of Alloiteau (1952b)	Alloiteau (1952b); Baron-Szabo (2008)
			Jamaica (*, 3)		Baron-Szabo (2008)
cp	*Ovalastrea* sp.	–	Jamaica (*)	No information provided	Mitchell (2002)
htm–m	*Pachygyra princeps* (Reuss, 1854)	d (series): 1.5–5 mm, generally around 3.5–5 mm; d (ambulacrae): up to 2 mm (in material of Maastrichtian age), up to 15 mm in the holotype of the species; s/mm: 24–35/10	Jamaica (3)		Baron-Szabo (2006)
htm	?*Pachygyra* sp.	–	Jamaica (*)	No information provided	Mitchell (2002)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
s–m	*Palaeopsammia cardabiaensis* (Jell et al, 2011)	d: 4.5–7 mm; s: 36; h: up to 25 mm	Australia (3)		Jell et al. (2011)
s–m	*Palaeopsammia collignoni* (Alloiteau, 1958)	d: 2.5–4 mm; s: 32–42; h: up to 10 mm	Madagascar (*)	Originally described as belonging to *Sakalavicyathus* (Alloiteau)	Alloiteau (1958); Baron-Szabo (2008)
s–?l	*Palaeopsammia* sp.	d: >8 mm; s: 36; h: > 25 mm	Australia (3)		Jell et al. (2011)
s–l	*Palaeopsammia zitteli* (Vaughan, 1900b)	d (min): 5–23 mm; d (max): 6–30 mm; d (min)/d (max): 0.68–1; s: 48–96; h: up to 58 mm (broken piece)	USA (3)	Referring to material of Vaughan (1920) described as *Steriphonotrochus leithensis*	Vaughan (1920); Baron-Szabo (2008)
			Madagascar (*)	Including *Palaeopsammia multiformis* (Wanner); *Paratrochocyathus jasmundi* (Wanner) and *Kumbiopsammia besairiei* (Alloiteau)	Alloiteau (1958); Baron-Szabo (2008)
			Iran (3)	Including *Palaeopsammia fastigiata* (Kühn)	Kühn (1933); Baron-Szabo (2008)
			Libya (*)	Referring to material of Rossi Ronchetti (1955) described as *Trochocyathus* cf. *epicharis* (Wanner)	Rossi Ronchetti (1955); Baron-Szabo (2008)
			Turkmenistan (*)	Referring to material of Kuzmicheva (1987) assigned to *Palaeopsammia multiformis* (Wanner)	Kuzmicheva (1987); Baron-Szabo (2008)
s–m	*Palocyathus seymourensis* (Filkorn, 1994)	d (min): 4.4–8.2 mm; d (max): 4.4–9.1 mm; d (min)/d (max): 0.85–1; s: 48; h: 3.2–8.5 mm	Antarctica (*)		Filkorn (1994); Baron-Szabo (2008)
s–l	*Paracycloseris nariensis* (Duncan, 1880)	d (min): 9–31 mm; d (max): 10.5–35 mm; s: up to 200; d (min)/d (max): 0.85–1	Jamaica (*, 2–3)	Referring to material listed as *Paracycloseris elizabethae* (see also Fig. 2N herein)	Mitchell et al. (2004); Baron-Szabo (2008)
			Mexico (*)	Referring to material described as *Paracycloseris elizabethae* (Wells)	Filkorn et al. (2005)
			Iran (3)	Referring to material described as *Cycloseris lamellata* (Kühn)	Kühn (1933); updated herein
s	*Paracycloseris* sp.	–	Jamaica (3)	No information provided	Mitchell et al. (2004)
s–l	*Parasmilia elongata* (Milne Edwards & Haime, 1848a)	d: 16–18 mm; s: 48; h: up to 70 mm	Russia (*)		Kuzmicheva (1987)
			Ukraine (3)		Kuzmicheva (1987)
			Kazakhstan (*)		Kuzmicheva (1987)
s–l	*Parasmilia centralis* (Mantell, 1822)	d (adult): 10–13 mm; s (adult): 48; h: up to 60 mm	Libya (*)	Referring to material described as *Parasmilia granulata* Duncan, *Caryosmilia granosa*, *Parasmilia* cf. *cylindracea* de Fromentel	Rossi Ronchetti (1955); Baron-Szabo (2008)
			Denmark (3)	Referring to material described as *Parasmilia cylindrica*	Brünnich Nielsen (1922)
			Netherlands-Belgium (3)	Included in '*Parasmiliid/Smilotrochiid* sp.' in Leloux (1999) (see Fig. 4A–C herein)	Leloux (1999), updated herein
			Russia (*)		Kuzmicheva (1987); Baron-Szabo (2008)
s–l	*Parasmilia cyensis* (Jell et al., 2011)	d (max): 16–27 mm; d (min): 13–23 mm; d (min)/d (max): 0.81–0.85; s: up to 90; h: 16–30 mm	Australia (3)	Possibly a more adult stage of *P. elongata*	Jell et al. (2011); updated herein

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
s–m	*Parasmilia bullardi* (Wells, 1932)	d: 5.5 mm; s: 48 septa; h: 16 mm	Senegal (*)	Referring to material described as *Parasmilia* sp. which corresponds well to the juvenile stage of *P. bullardi* (characterized by 48 septa in a corallite of 5 mm)	Alloiteau (1952b); updated herein
s–l	*Pattalophyllia grumi* (Catullo, 1852)	d (min): 9–21 mm; d (max): 11.6–45 mm; s: up to 192+s7; s/mm: 5–7/2.; in a corallite of around 10 mm in diameter, around 80 septa occur; there are about 120 septa in a corallite of around 20 mm	Jamaica (*, 2–3)		Baron-Szabo (2008)
s–l	*Peplosmilia latona* (Felix, 1903)	d: 21 × 23 mm; s: around 80	Netherlands-Belgium (3)	Referring to material originally described as *Placosmilia robusta* Umbgrove, merged with *P. latona* based on ontogenetic studies (Baron-Szabo, 2003, p. 124–125, pl. 4, Figs. 1, 3–6) (see Fig. 3D, E herein)	Leloux (1999, 2004); Baron-Szabo (2006)
s–l	*Phragmosmilia lineata* (Goldfuss, 1826)	d: 12 × 17.5 mm; s: 96; s/mm: 7–8/5; h: 16 mm	Bulgaria (*)	Including *Phragmosmilia inconstans* (de Fromentel)	Tchéchmédjiéva (1986)
htm–l	*Phytogyra* sp.	d (series): 10–12 mm; s/mm: 4–7/2	Jamaica (*)		Baron-Szabo (2006)
cp–l	*Placocoenia macrophthalma* (Goldfuss, 1826)	d (lumen): 7–8 mm; d: usually around 10 mm; c–c: 10–12 mm; s: 40–48	Netherlands-Belgium (3)	Based on closely corresponding features found in the type material (as described by Milne Edwards & Haime, 1857, p. 463), the species *Heliastraea francqana* (belonging to *Montastraea* according to some authors) is herein provisionally grouped with *P. macrophthalma* (see Figs. 6F, G, 7A herein)	Actinacis
cp–m	*Placocoenia major* (Felix, 1903)	d: 3.5–6 mm; d (lumen): 1.8–3 mm; c–c: 4–7.5 mm; s: 20–34	Mexico (*)		Baron-Szabo et al. (2006)
htm–m	*Placosmilia* cf. *fenestrata* (Felix, 1903)	d (min): 3–6 mm; d (max): up to around 12 mm (incomplete specimens); s/mm: 7–10/2	Iran (3)		Baron-Szabo et al. (2023)
htm–l	*Placosmilia sinuosa* (Reuss, 1854)	d (max): 80–125 mm; d (min): 20–40 mm; s/ mm: 15–19/ 10; h: 40–90 mm	eastern Serbia (*)	Including *Phragmosmilia psecadiophora* (Felix)	Turnšek (1992); Baron-Szabo (2006)
			Bulgaria (*)	Referring to material described as *Aulosmilia archiaci*	Tchéchmédjiéva (1986); updated herei
*cp–m	*Pleurocora arachnoides* (Walch, 1775)	d (lumen): 1.5–3 mm; d: 3–4.5 mm; c–c: 4–5 mm; s: 40–48, in corallites in areas of intense budding around 24	Netherlands-Belgium (3	Grouped with *Montastraea* in Leloux (1999) (see Fig. 6C–E herein).	Leloux (1999); Baron-Szabo (2008); updated herein
*cp–m	*Pleurocora haueri* (Milne Edwards & Haime, 1849)	d: 5–7 mm, in areas of intense budding around 3.5 mm; s: 32–48, in corallites in areas of intense budding around 24	Antarctica (*)	Referring to ?*Oculina nordenskjoeldi* of Filkorn (1994)	Filkorn (1994); Baron-Szabo (2008); updated herein
cp–m	*Polyphylloseris microkothos* (Baron-Szabo, 2008)	d: 2–4 mm; c–c: 4–8.5 mm; s: 16–30+s	Jamaica (*, 3)		Baron-Szabo (2008)
			Mexico (*)	Referring to material described as ?*Microsolena* sp.	Löser (2012); updated herein
htm–m	*Psilogyra telleri* (Felix, 1903)	d (series): 3–6 mm; d (ambulacrum): 1–3 mm; s/mm: 11/5	Jamaica (*, 3)		Baron-Szabo (2006)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
s–l	*Rennensismilia complanata* (Goldfuss, 1826)	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	Eastern Serbia (*)	Including *Rennensismilia didyma* (de Fromentel)	Turnšek (1992); Baron-Szabo (2006)
			Bulgaria (*)	Including *Rennensismilia didyma* (de Fromentel)	Tchéchmédjiéva (1986)
s–l	*Rennensismilia inflexa* (Reuss, 1854)	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	Eastern Serbia (*)	Including *Rennensismilia chondrophora* (Felix)	Turnšek (1992); Baron-Szabo (2006)
			Iran (3)	Referring to material described as *Placosmilia rudis* (Sowerby)	Kühn (1933); Kiessling & Baron-Szabo (2004)
cp–m	*Reussicoenia edwardsi* (Reuss, 1854)	d: 3–6 mm; d (lumen): 1.5–4.5 mm; c–c: 2.5–5 mm; s: 26–40	Jamaica (2–3)		Baron-Szabo (2006)
*b–m	*Rhizangia sedgwicki* (Reuss, 1854)	d: 9 mm; s: around 100 (6s1 + 6s2 + 12s3 + 24s4 + 48s5 + s6)	Jamaica (*, 3)		Baron-Szabo (2006)
cp–m	*Siderastrea adkinsi* (Wells, 1934)	d: 4.5–6.5 (8) mm; juvenile corallites may be smaller (2–3.5 mm); c–c: 5–10 mm, in areas of intense budding distance is around 3.5 mm; s: 48, up to about 70; in juvenile corallites, the number of septa may be 20–30; s/mm: 7–10/2	Jamaica (*, 2–3)		Mitchell (2002); Baron-Szabo (2008
			Mexico (*)		Baron-Szabo et al. (2006)
cp–m	*Siderastrea vancouverensis* (Vaughan, 1923)	d (max): 7–11 mm, juvenile corallites may be 3–5.5 mm; d (min): 6–8 mm; c–c: 4–10 mm; s: 48– up to around 70	Mexico (*)		Baron-Szabo et al. (2006)
cp–m	*Siderofungia morloti* (Reuss, 1864)	d (adult): 2.8–5 mm; d (juvenile): 2–2.5 mm; s (adult): 20–36; s (juvenile): 12–18; c–c: 2.2–6 mm	Jamaica (2–3)	Including *Siderofungia bella* (Reuss)	Baron-Szabo (2008)
s–l	*Smilotrochus carnarvonensis* (Jell et al., 2011)	d (max): 11–17 mm; d (min): 8.5–13.5 mm; d (min)/d (max): 0.71–0.85; s: 72	Australia (3)		Jell et al. (2011); updated herein
s–l	*Smilotrochus cornucopiae* (Duncan, 1869)	d (min): 8–21 mm; d (max): 8–25 mm; d (min)/d (max): 0.8–0.92; s: 30–48; h: 20–70 mm.	Ukraine (*)	Referring to material of Kuzmicheva (1985, 1987) described as *Smilotrochus ponderosus*	Kuzmicheva (1985, 1987); Baron-Szabo (2008)
s–l	*Smilotrochus ponderosus* (Brünnich Nielsen, 1922)	d (min): 35–40 mm; d (max): 38–45 mm; d (min)/d (max): 0.88–0.92; s: 56– ca. 70; h: 46–100 mm	Kazakhstan (*)	Referring to *Smilotrochus excavatus* of Kuzmicheva (1985, 1987), revised in Baron-Szabo (2008)	Kuzmicheva (1985, 1987); Baron-Szabo (2008)
			Russia (*)		
			Ukraine (*)		
s–l	*Smilotrochus galeriformis* (Kner, 1848)	d (min): 7.5–38 mm; d (max): 10–50 mm; d (min)/d (max): 0.71–0.96; s: 96+s6; h: up to 80 mm	Netherlands-Belgium (3)	Including *Smilotrochus hagenowi* Milne Edwards & Haime	Umbgrove (1925); Leloux (1999)
			Ukraine (*)	Including *Coelosmilia galeriformis* of Reuss and *Smilotrochus nagorzanensis* Siemiradzki	Reuss (1852); Siemiradzki (1927); Kuzmicheva (1985, 1987); Baron-Szabo (2008)
s–l	*Smilotrochus milneri* (Gregory, 1898)	d (min): 9–15 mm; d (max): 26–30 mm; d (min)/d (max): 0.35–0.73; s: 40–96; h: up to 35 mm	Libya (*)	Referring to material described as *Dungulia milneri* (Gregory)	Rossi Ronchetti (1955); Baron-Szabo (2008)
			Madagascar (*)	Including ?*Dungulia milneri* (Gregory) and *Smilotrochus jacobi* (Alloiteau, 1936)	Alloiteau (1958); Baron-Szabo (2008)

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
s–s	*Onchotrochus minimus* (Bölsche, 1866)	d: 2 mm; s: 12–24; h: 15 mm	USA (3)	Originally described as *Stenocyathus alabamiensis* but with very thick septa, guyniid wall and forming scolecoid corallum, thus closely corresponding to *Onchotrochus*	Wells (1947); updated herein
cp–m	*Stephanaxophyllia bicoronata* (Gregory, 1900)	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	Iran (3)	Referring to material of Khazaei et al. (2009) assigned to both *Placocoenia major* Felix (in the caption of their plate 4, Fig. 7, the material is referred to as *Placocoenia* cf. *major* Felix) and *Columnocoenia arnaudi* (Alloiteau)	Khazaei et al. (2009); updated herein
s–l	*Stephanocyathus* sp.	d: 6–12 mm; s: 24–64	Greenland (*)		Floris (1972): Baron-Szabo (2008)
s–m	*Stephanophyllia cribraria* (Stephenson, 1916)	d: 5.5 mm; s: 96	USA (*, 3)	Referring to material originally described as *Micrabacia cribaria*; that species is considered to belong to genus *Stephanophyllia* (see Baron-Szabo, 2008)	Wade (1926); Bryan & Jones (1989); Baron-Szabo (2008)
s–s	*Stephanosmilia madagascariensis* (Alloiteau, 1958)	d: 2–3 mm; s: 24–48; h: 5 mm	Senegal (*)	Referring to material described as ?*Stylocyathus* sp. (see Fig. 2J, K herein)	Alloiteau (1952b); Baron-Szabo (2008)
htm–m	*Stiboriopsis jamaicaensis* (Vaughan, 1899)	d (max., isolated corallites): 7–9 mm; d (series, wall–wall): 3.5–7 mm; s (isolated corallites): 24+s4; s/mm: 20/10	Madagascar (*)	Including *Andemantastraea ambatryensis* (Alloiteau)	Alloiteau (1958); Baron-Szabo (2008)
htm–m	*Strotogyra copoyensis* (Frost & Langenheim, 1974)	d (series, wall–wall): 2.5–5 mm, up to 9 mm in areas of bifurcation; s (monocentric): up to around 40; s/mm: 6–8/2	Iran (3)		Baron-Szabo et al., 2023
cp–m	*Stylocoenia maxima* (Duncan, 1880)	d: 2.4–4.5 mm, in areas of intense budding less than 2 mm; c–c: 2.5–5 mm; s: 10+s	Iran (3)	Referring to material described as *Astrocoenia rariseptata* (Kühn)	Kühn (1933); updated herein
cp–s	*Stylocoeniella expansa* (d'Achiardi, 1875)	d: generally between 0.5 and 0.7 mm, up to around 1 mm in late budding stage, around 0.4 mm in early budding stage; s: 12+s	Madagascar (*)	Referring to material described as *Astrocoenia pumila* of Alloiteau (1936)	Alloiteau (1936); updated herein
cp–s	*Stylocoeniella hoernesi* (Oppenheim, 1901)	d: 1–1.8 mm, up to 2 mm in some places, in areas of intense budding often 0.5–0.7 mm; c–c: 1–2 mm; s: 12–24, often 16–20	Iran (3)	Referring to material assigned to *Actinastrea ramosa* (Sowerby) and *Actinacis parvistella* (Oppenheim)	Khazaei et al. (2009); updated herein (see text)
s–m	*Stylocyathus besairiei* (Alloiteau, 1958)	d: 4.5 × 5.5 mm; s: 28 (7s1 + 7s2 + 14s3); h: 6 mm	Madagascar (*)		Alloiteau (1958); Baron-Szabo (2008)
cp–s	*Stylophora garumnica* (Vidal, 1921)	d: 0.5–1 mm; c–c: 1–2.5 mm; s: 6+s	Spain (*)		Vidal (1921)
cp–s	*Stylophora octophylla* (Felix, 1906)	d: 0.6–1.1 mm; c–c: 1–2.5 mm; s: 8 (+s2)	United Arab Emirates (1)		Baron-Szabo (2000, 2006)
			Jamaica (*, 3)		Baron-Szabo (2002, 2006)
htm–m	*Synastrea agaricites* (Goldfuss, 1826)	c–c: 4–8.5 (10) mm; s: 24–34; s/mm: 5–6/2	Jamaica (*, 3)		Baron-Szabo (2008)
htm–m	*Synastrea parallela* (Reuss, 1846)	d: 3–8 mm; s: 50–60; s/mm: 5–7/2	Mexico (*)	Referring to material described as *Synastrea* cf. *agaricites* (Goldfuss)	Filkorn et al. (2005); updated herein

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
htm–m	*Synastrea garumnica* (Vidal, 1921)	c–c: 3–6 mm, in early budding stages the calicinal distance is around 2 mm; s: 20–36; s/mm: 6–9/2	Spain (*)	Referring to material of Vidal (1921) described as *Thamnastraea garumnica*	Vidal (1921); Baron-Szabo (2008)
			Jamaica (*)		Baron-Szabo (2008)
htm–l	*Synastrea geometrica* (Goldfuss, 1826)	d: 6–12 mm, in late budding stage up to 14 mm; c–c: 7–14 mm; s: 32–48; s/mm: 4–6/2	Madagascar (*)	Including species *Synastrea subflabellata*	Alloiteau (1958): Baron-Szabo (2008)
			Netherlands-Belgium (3)	See Fig. 8C, D herein	Leloux (1999); Baron-Szabo (2008); updated herein
htm–m	*Synastrea* sp.	c–c: 2–4 mm; s/mm: 8–10	Iran (3)		Baron-Szabo et al. (2023)
htm–m	*Tortoflabellum* cf. *marwicki* (Squires, 1962)	d: 3–9 mm, generally 5–9 mm; s/mm: 7–10/ 2	Jamaica (*, 3)		Baron-Szabo (2006)
s–m	*Trochocyathus antsiranensis* (Collignon, 1931)	d: 8–10 mm; s: 48	Madagascar (*)	Referring to material of Alloiteau (1958) described as *Protrochocyathus arcotensis* var. *regularis* (see discussion in Baron-Szabo, 2008)	Alloiteau (1958); Baron-Szabo (2008)
s–l	*Trochocyathus lakii* (Duncan, 1880)	d (min): 6–13.5 mm; d (max): 7–21 mm; d (min)/d (max): 0.59–0.96; s: 30–48+s5; h: 8–23 mm	Madagascar (*)	Including the species *Cyrtocyathus collignoni* (Alloiteau)	Alloiteau (1958); Baron-Szabo (2008)
			Libya (*)	Including the species *Trochocyathus desioi* Rossi Ronchetti and *T. libycus* (Rossi Ronchett)	Rossi Ronchetti (1955); Baron-Szabo (2008)
s–l	*Trochocyathus mitratus* (Goldfuss, 1826)	d (max): 9–41 mm; d (min): 8–30 mm; s: 50 up to around 200 (12s1 + 12s2 + 24s3 + 48s4 + 96s5+ s6, in adult stages); h: 25–65 mm; d (min)/d (max): 0.5–0.9; juvenile stage: d: 3.5–8 mm; s (juvenile stages): up to 48 (6s1 + 6s2 + 12s3 + 24s4)	Madagascar (*)	Including the species *Asterosmilia sakalavensis* (Alloiteau) *and Protrochocyathus septempartitus* (Alloiteau) and some of the material described as *Trochocyathus besairiei* (Alloiteau)	Alloiteau (1958); Baron-Szabo (2008): updated herein
			Libya (*)	Referring to material described as *Trochocyathus* aff. *harveyanus*	Rossi Ronchetti (1955); updated herein
			USA (*, 3)	Including *T. dakotaensis and T. neumani* and some of the material described as *T. gardnerae* (Wells) (see Baron-Szabo (2008) for details)	Vaughan (1920); Wells (1933); Baron-Szabo (2008)
			Jamaica (*)	Including *T. matleyi* (Wells)	Wells (1934); Baron-Szabo (2008)
s	?*Trochocyathus* sp.	–	USA (*)	No information provided	Gill et al. (1966)
s	?*Trochocyathus* sp.	–	USA (3)	No information provided	Bryan & Jones (1989)
s–l	*Trochocyathus speciosus* (Horn, *in* Gabb, 1860)	d (max): 3.4–16 mm; d (min): 3.5–10 mm; d(min)/d(max): 0.5–1; s in juvenile corallites of 4–6 mm up to around 40; s (adult): 48+s5; h: 3–20 mm	Madagascar (*)	Referring to material described as *Paratrochocyathus epicharis* (Wanner)	Alloiteau (1958); Baron-Szabo (2008)
			Mexico (*)	Referring to material described as *Trochocyathus gardnerae* (Wells)	Wolleben (1977); Baron-Szabo (2008)
			USA (*, 3)	Including *Trochocyathus woolmani* (Vaughan, 1900a) and *T. egerius* which, based on the results by Wells (1933, p. 132), closely correspond to the juvenile stage of *T. speciosus;* also included is some material of *T. gardnerae* (Wells) (see Baron-Szabo, 2008 for details)	Vaughan (1900a, 1990b); Wells (1933); Stephenson (1941); Baron-Szabo (2008); updated herein

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Table 4. (*Continued*)

Integration–group of corallite size	Maastrichtian coral species	General range of dimensions of skeletal elements	Maastrichtian locality	Remarks	References
s–l	*Trochoseris aperta* (Duncan, 1864)	d (max): 6–74 mm; d (min): 7–70 mm; s (adult): 300–500; s/mm: 12–14 (16 areas of intense budding)/5; d (min)/d (max) (adult): 0.70–0.89; d (min)/d (max) (juvenile): 0.53–0.68	Jamaica (*, 3)	Referring to material of Mitchell (2002) described as *Trochoseris catadupensis* (Vaughan)	Mitchell (2002); Baron-Szabo (2008)
			Mexico (*)	Including material of Filkorn et al. (2005) described as *Trochoseris catadupensis* (Vaughan) and *Trochosmilia hilli* (Vaughan)	Filkorn et al. (2005); Baron- Szabo et al., (2006); Baron-Szabo (2008)
s–l	*Trochosmilia subrudis* (d"Orbigny, 1980)	d: 14 × 28 mm; s: around 60; h: 35 mm	Ukraine (*)	Referring to material described as *Trochosmilia cernua* but with significantly smaller number of septa, more closely corresponding to *T. subrudis*	Siemiradzki (1927); updated herein
s–l	*Trochosmilia faujasi* (Milne Edwards & Haime, 1848c)	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	Netherlands-Belgium (3)	See Fig. 3C herein	Leloux (1999): Baron-Szabo (2008)
s–l	*Trochosmilia* cf. *brevicula* (Stoliczka, 1873)	d: 20 × 24 mm; s: around 96; h: 19 mm	Iran (3)		Kühn (1933); Kiessling & Baron-Szabo (2004)
s–l	*Vaughanoseris catadupensis* (Wells, 1934)	d: 30 × 32 mm; s: 192; h: 15 mm	Jamaica (*)		Mitchell (2002); Baron-Szabo (2008)
s–m	*Wadeopsammia nodosa* (Wade, 1926)	d: 3.3 mm; s: 36; h: 3 mm	USA (*)		Wade (1926); Baron-Szabo (2008); Baron-Szabo & Cairns (2019)
s–m	*Wellsotrochus cyathiformis* (Squires, 1958)	d (min): 3.5–8 mm; d (max): 5–9.5 mm; d (min)/d (max): 0.61–1; s: 24–48+s5; h: 3–6.3 mm	Antarctica (*)	Including *Levicyathus cairnsi*	Filkorn (1994); Baron-Szabo (2008)

Maastrichtian coral fauna known (Baron-Szabo, 2002, 2006, 2008). The corals inhabited a mixed volcaniclastic-carbonate platform (Mitchell, 2002; Mitchell et al., 2004) at shallow subtidal depths. They are distinctly dominated by zooxanthellate forms (Tables 4 and 5).

Maastrichtian corals from Mexico have been described from both northern (Myers, 1968; Schafhauser et al., 2003; Baron-Szabo et al., 2006) and southern areas (Filkorn et al., 2005; Löser, 2012), from both reefal environments (Schafhauser et al., 2003) and non-reefal mixed clastic/carbonate sequences (Baron-Szabo et al., 2006). The Mexican assemblages consist nearly exclusively of colonial forms and are characterised by a moderate to high species richness.

Very little is known about the coral facies of Peru. Wells (1941) noted one colonial coral species from lithologically unspecified sedimentary rocks. In contrast, coral occurrences have been reported from numerous localities across the USA (Table 3). However, these are rather monospecific, consisting almost exclusively of solitary forms such as *Micrabacia* and *Trochocyathus* (Stephenson, 1916; Vaughan, 1920; Wells, 1933; Gill et al., 1966; Sohl & Koch, 1984; Bryan & Jones, 1989) (Tables 4, 5). The sole colonial forms known from the Maastrichtian of North America belong to *Astrangia* and *Hindeastraea* (Table 4).

Antarctica: James Ross Basin (Seymour Island, Snow Hill Island)

A rather small coral occurrence has been described from James Ross Basin (Filkorn, 1994; Videira-Santos et al., 2022), comprising nearly exclusively solitary forms with medium- to large-sized corallites. The sole colonial species is the subplocoid-subbranching *Pleurocora haueri*. These corals have been recovered from both the inner shelf and estuarian or bay environments (Tables 3–5).

Asia: India, Iran, Kazakhstan, Oman, Russia, Türkiye, Turkmenistan and United Arab Emirates

Maastrichtian corals from India are known from old reports based on stratigraphical data that are difficult to reassign to or fit in with modern chronostratigraphy. In the present study, only the material described by Forbes (1846) and Stoliczka (1873) is included and compared to data presented by Sundaram et al. (2001). No bioconstructions have been reported from this area. Corals described are solitary forms, belonging exclusively to the large-polyp group (Tables 4, 5).

Maastrichtian corals from Iran were first assessed taxonomically on the basis of material from the coral-rudist limestone of the Neyriz area by Kühn (1933). Recently, new material from various localities across Iran has been recorded (Khazaei et al., 2009; Baron-Szabo et al., 2023), thus significantly increasing the number of coral species to the level of moderate to high species richness. The corals originate from sedimentary rocks assigned to the upper Maastrichtian Tarbur Formation, interpreted to have formed under shallow subtidal conditions.

A small number of predominantly solitary corals were described from various countries of the former Soviet Union (Kazakhstan, Russia and Turkmenistan) by Kuzmicheva

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Table 5. List of localities with Maastrichtian strata from which the coral material was collected, number of species (colonial/solitary), and palaeoenvironment recorded for each area (*palaeoecological data retrieved from original publications with updates provided by Paleobiology Database [paleobiodb.org]). For co-ordinates/palaeo co-ordinates of localities, see Table 3

Localities with Maastrichtian strata [corresponding number in Fig. 1]	Number of coral species recorded (colonial/solitary)	Palaeoenvironment
*Antarctica [1]	8 (1/7)	Estuary or bay, inner shelf; no bioconstructions reported
*Australia [2]	12 (1/11)	Deep subtidal; no bioconstructions reported
Bulgaria [15]	8 (2/6)	Reefal; biostrome, 25–30 m in size in some places
Denmark [20]	4 (1/3)	Hardground; no bioconstructions reported
Germany [22]	2 (–/2)	Marine; no information provided
Greenland [27]	2 (–/2)	Non-reefal, coastal
India [5]	3 (–/3)	Non-reefal
*Iran [8]	27 (16/11)	Shallow subtidal; no bioconstructions reported
*Jamaica [37]	63 (53/10)	Open shallow subtidal, shallow subtidal; no bioconstructions reported
Kazakhstan [12, 13]	6 (1/5)	Marine; no information provided
Libya [25]	10 (1/9)	Marine; no information provided
Madagascar [3, 4]	15 (3/12)	Offshore; no bioconstructions reported
*Mexico [35–36]	29 (26/3)	Deltaic, shallow subtidal; reefal and non-reefal
*The Netherlands-Belgium [21]	32 (23/9)	Hardground; shallow subtidal; no bioconstructions reported; clumps of scleractinians do occur, often associated with radiolitid and hippuritid rudists
*Oman [6[	8 (7/1)	Lagoonal or restricted shallow subtidal, perireef or subreef, reef, bioherm, build-up
Peru [38]	1 1/–)	Marine; no information provided
Poland [19]	1 1/–)	Non-reefal; deep subtidal shelf (100–150 m depth)
Russia [14]	5 (–/5)	Marine; no information provided
Senegal [26]	6 (2/4)	Marine; no information provided
eastern Serbia [17]	9 (3/6)	Marine; no information provided
Spain [24]	6 (6/–)	Reefal, shallow subtidal
*Türkiye [10, 16]	2 (1/1)	Shallow subtidal (western Türkiye), reef, bioherm, build-up (eastern Türkiye)
Turkmenistan [11]	2 (–/2)	Marine; no information provided
*United Arab Emirates [7]	1 1/–)	Open shallow subtidal
Ukraine [9, 18, 19]	8 (–/8)	Marine; no information provided
USA [28–34]	17 (2/15)	Shallow subtidal, coastal, offshore, shallow water of neritic zone near shore

(1985, 1987). The sole (branching-) colonial species (*Ogilviastraea bigemmis*) was reported from Kazakhstan. Solitary forms comprise caryophylliids, parasmiliids and smilotrochids. All of the corals have large-sized corallites. In most cases, information on the lithology of the coral-bearing sedimentary rocks was not supplied (Tables 3–5).

Coral-bearing sedimentary rocks of the latest Cretaceous age in the Arabian Peninsula were described from several sections in Oman and the United Arab Emirates (Metwally, 1996; Baron-Szabo, 2000). Stratigraphically, most of these strata are assigned to the time period upper Campanian–lower Maastrichtian interval. Only nine taxa, nearly all of which are colonial, were collected from rocks dated as Maastrichtian. The single solitary form from this region belongs to *Cunnolites*, while colonial taxa comprise cerioid-plocoid and (hydno-) thamnasterioid-meandroid species (Tables 4, 5).

Very little is known about the Maastrichtian coral facies of Türkiye. From the southeastern part of the country, at Gevaş-Van, Özer (1992) figured material that is here assigned to the colonial form *Aspidastraea orientalis*. Recently, Görmüş et al. (2019) have mentioned an abundant occurrence of *Cunnolites* sp. from the Ankara area in the northwest. Reefal developments were reported from the Gevaş-Van locality in southeastern Türkiye, and shallow-subtidal conditions were described from the western part of the country (Tables 3–5).

Australasia: Australia

In a recent review of Cretaceous corals, Jell et al. (2011) described the first scleractinian coral fauna from deep subtidal sedimentary rocks in Western Australia, the assemblage consisting of 12 taxa is distinctly dominated by solitary species having conical growth forms. The sole colonial taxon is the cerio-plocoid *Astrangia*. The solitary species belong to a fairly large number of families: Caryophylliidae, Dendrophylliidae, Flabellidae, Fungiacyathidae, Parasmiliidae, Smilotrochidae and Turbinoliidae (Tables 1, 3–5).

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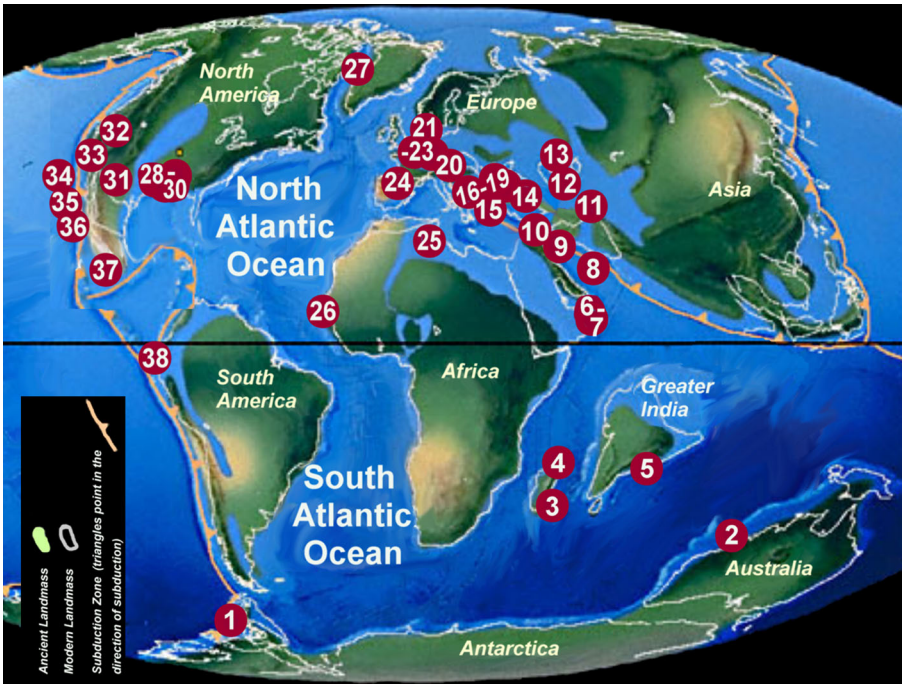

Figure 1. Palaeomap showing localities with Maastrichtian coral faunas included in the present study. 1 = Antarctica; 2 = Australia; 3–4 = Madagascar; 5 = India; 6 = Oman; 7 = UAE; 8 = Iran; 9 = Ukraine; 10 = Türkiye; 11 = Turkmenistan; 12–13 = Kazakhstan; 14 = Russia; 15 = Bulgaria; 16 = Türkiye; 17 = eastern Serbia; 18–19 = Ukraine; 20 = Poland; 21 = Denmark; 22 = the Netherlands-Belgium; 23 = Germany; 24 = Spain; 25 = Libya; 26 = Senegal; 27 = Greenland; 28–34 = USA; 35–36 = Mexico; 37 = Jamaica; 38 = Peru. Palaeomap modified from Paleomap project (Scotese, 2014; www.scotese.com). For palaeo co-ordinates, see Table 3.

Europe: Bulgaria, Denmark, Germany, the Netherlands-Belgium, Poland, eastern Serbia, Spain and Ukraine

The diversity of Maastrichtian coral occurrences across Europe varies significantly. With the exception of the coral assemblage described from the southern Netherlands and northeast Belgium (Leloux, 1999, 2004; Figs. 2–9 herein), European coral faunas consist of nine species or less (Table 5). The Dutch-Belgian coral fauna from the Liège-Limburg area (i.e. the type area of the Maastrichtian Stage) represents the second most diverse coral occurrence known from the Maastrichtian. It is composed mainly of colonial taxa, having all types of corallite integration (Tables 4, 5). Reefal developments were reported from coral-bearing sedimentary rocks of Bulgaria and Spain.

General attributes of scleractinian corals from the Maastrichtian

A total of 205 taxa, belonging to 116 genera and 37 families, are recognised from 94 localities in 26 regions with Maastrichtian strata world-wide (i.e. 170 species identified, 35 taxa kept in open nomenclature). Most of the taxa belong to solitary (41 genera = 35%; 83 species = 40.5%) and cerioid-plocoid forms (41 genera =%; 64 species = 31.2%) followed by corals having various kinds of (hydno-) thamnasterioid-meandroid integration (25 genera = 22%; 42 species = 20.5%) and branching types (9 genera = 8%; 16 species = 7.8%) (Tables 2, 4).

With regard to corallite size, 186 taxa are included in the present evaluation (19 species were omitted due to a lack of sufficient data) (Table 4). In Maastrichtian corals, corallite diameters range from less than 1 mm (e.g. *Actinacis martiniana, Heterocoenia gracilis* [see Fig. 9B], *Stylophora garumnica*) up to around 100 mm (e.g. species of *Cunnolites* such as *C. rugosus*) (Table 4) and fall into three major corallite-size groups: small (up to 2.5 mm), medium (>2.5–9 mm) and large (>9 mm). However, Maastrichtian scleractinians are nearly equally dominated by forms with medium-size (80 species = 43%) and large-size corallites (71 species = 38.2%), followed by small-corallite forms (35 species = 18.8%).

Based on the model of evolution of scleractinian corals using microstructural data (Roniewicz & Morycowa, 1993), Maastrichtian coral faunas show a distinct predominance of taxa belonging to modern microstructural groups (86 genera = 74%; 145 species = 70.7%) (Tables 1, 4). In comparison with the situation of both the lowermost Cretaceous (Berriasian), which showed that 91% of species and 83% of genera belonged to previously established microstructural groups (Baron-Szabo, 2018), and to the uppermost Lower Cretaceous (Albian), which ended with modern microstructural groups having become dominant (genera = 51.7%; species = 50.1%; see Baron-Szabo, 2021a, 2021b), previously established microstructural groups were of minor importance during the latest Cretaceous.

The most extensive records of Maastrichtian corals are from warm-temperate (53 out of 94 localities = 56.4%) and arid areas (20 out of 94 localities = 21.3%), including the USA, Australia and various European and Asian countries (Table 3). The most diverse coral assemblages have been reported from arid (Jamaica, Mexico), warm-temperate (the Netherlands-Belgium) and tropical regions (Iran) (Tables 3–5). As far as genus-level distribution is concerned, 34 genera (out of 116 genera = 29.3%) have been recorded from two or more localities (Table 4). The most widely distributed of these genera during the Maastrichtian belong to various solitary and colonial taxa, including *Actinacis, Actinastrea, Actinhelia, Aspidastraea, Caryophyllia, Cunnolites, Dendrophyllia,*

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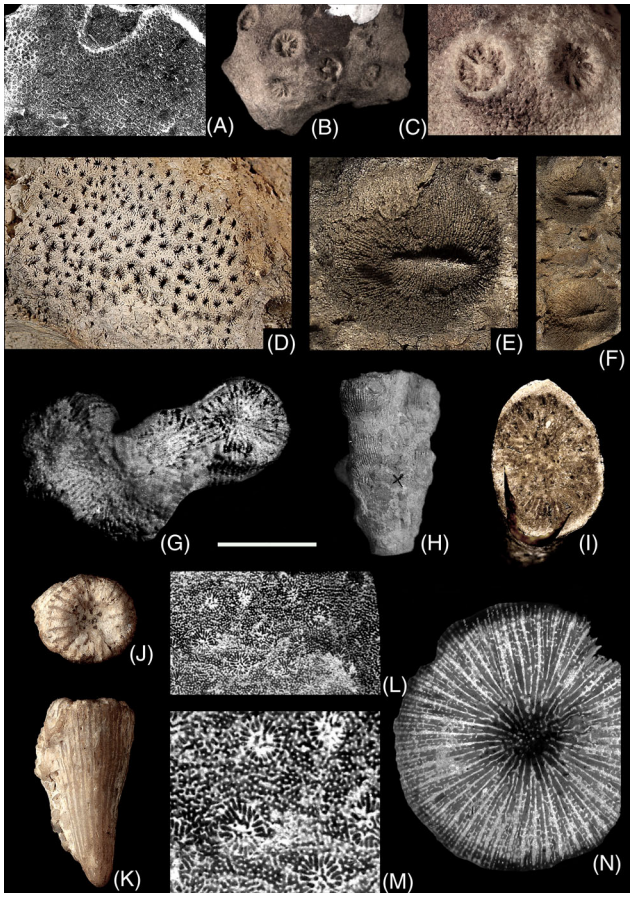

Figure 2. Maastrichtian scleractinian corals from localities in the Netherlands-Belgium, Jamaica, Senegal and Madagascar (*denoting images derived from http://colhelper.mnhn.fr, by permission of Dr Sylvain Charbonnier, Muséum national d'Histoire naturelle, Paris, August 2020). (A) *Actinastrea goldfussi* (d'Orbigny, 1850) (MB.K 3742), upper Maastrichtian, southern Limburg, the Netherlands; upper surface of colony, corallite view, contrast inverted, mouldic preservation (scale bar equals 22 mm). (B) **Dendrophyllia* sp. (MNHN.F.R10840), Maastrichtian, Popenguine, Senegal; upper surface of colony, corallite view (scale bar equals 7 mm). (C) **Dendrophyllia* sp. (MNHN.F.R10840), Maastrichtian, Popenguine, Senegal; upper surface of colony, close-up view of corallites (scale bar equals 3.5 mm). (D) *Actinhelia elegans* (Goldfuss, 1826) (MB.K 3688); upper Maastrichtian, southern Limburg, the Netherlands; upper surface of colony, mouldic preservation (scale bar equals 13.5 mm). (E) *Cunnolites polymorphus* (Goldfuss, 1826) (MB.K3103); upper Maastrichtian, southern Limburg, the Netherlands; close-up of Fig. 2F (scale bar equals 14 mm). (F) *Cunnolites polymorphus* (Goldfuss, 1826) (MB.K 3103); upper Maastrichtian, southern Limburg, the Netherlands; upper surface, corallite view, mouldic preservation (scale bar equals 35 mm). (G) *Latomeandra boltonae* (Wells, 1934) (holotype, USNM I 74479), upper Maastrichtian, Catapudensis, Jamaica; upper surface of colony, corallite view (scale bar equals 11.5 mm). (H) *Latomeandra boltonae* (Wells, 1934) (holotype, USNM I 74479), upper Maastrichtian, Catapudensis, Jamaica; upper surface of colony, lateral view (scale bar equals 45 mm). (I) **Balanophyllia caulifera* (Conrad, 1848), holotype of *Palaeopsammia mitsinjoensis* (Alloiteau, 1958) (MNHN.F.J08195); Maastrichtian, Mitsinjo, Madagascar; corallite view of corallum, polished (scale bar equals 7.5 mm). (J, K) **Stephanosmilia madagascariensis* (Alloiteau, 1958) (MNHN.F.M05336); Maastrichtian, Popenguine, Senegal; (J) upper surface of corallum, corallite view, (K) lateral view (scale bar equals 3 mm). (L, M) *Actinacis reussi* (Oppenheim, 1930) (USNM field number 363); *Titanosarcolites* Limestone, Maastrichtian, Jerusalem Mountain Inlier, Parish of Hanover; Jamaica; (L) corallite view of colony, thin section (scale bar equals 5 mm), (M). close-up of Fig. 1K (scale bar equals 2.5 mm). (N) *Paracycloseris nariensis* (Duncan, 1880) (USNM field number 557a); upper Maastrichtian, Rio Minho, Jamaica; corallite view of corallum, thin section (scale bar equals 4 mm).

Desmophyllum, Goniopora, Neocoenia, Palaeopsammia, Paracycloseris, Parasmilia, Smilotrochus, Stylophora, Synastrea and *Trochocyathus* (Figs. 2–9; Table 4). With regard to species distribution, a clear

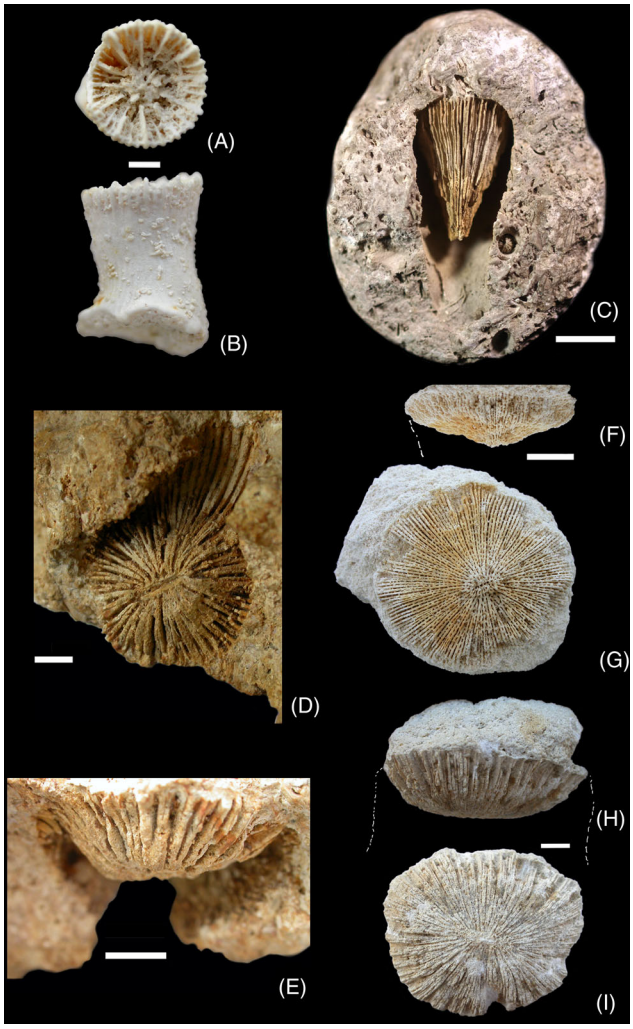

Figure 3. Maastrichtian solitary corals from the Maastrichtian type area (the Netherlands-Belgium). (A, B) *Caryophyllia konincki* (Milne Edwards & Haime, 1848a) (NHMM RH 204), upper Maastrichtian, Meerssen Member, Maastricht Formation, Eben Emael (Marnebel quarry complex), northeast Belgium (scale bar equals 2 mm). (C) *Trochosmilia faujasi* Milne Edwards & Haime, 1848c (RGM.29137), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area; mouldic preservation, lateral view (scale bar equals 10 mm). (D, E) *Peplosmilia latona* (Felix, 1903) (RGM.29036, leg. J.H.F. Umbgrove); lectotype of *Placosmilia robusta* (Umbgrove, 1925), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area; mouldic preservation (scale bar equals 10 mm). (F, G) *Areopsammia alacca* (Morren, 1828) (RGM 841362, formerly RGM 212452, ex Leloux Collection, Jx. 903), upper Maastrichtian, Maastricht Formation, upper Nekum or lower Meerssen members, western side of former ENCI Quarry; mouldic preservation, lateral view (scale bar equals 10 mm). (H, I) *Montlivaltia angusticostata* (Umbgrove, 1925) (RGM.29142, leg. J.H.F. Umbgrove), upper Maastrichtian, Maastricht Formation, 'Houthemerberg, Vilt'; mouldic preservation, basal and lateral view (scale bar equals 5 mm).

majority of taxa (155 taxa = 75.6%) has been recorded from only one geographic region during the Maastrichtian (Table 4).

In general, Maastrichtian coral diversity is very low with many occurrences consisting of 10 or fewer taxa (Table 5). The four most diverse coral assemblages recorded for this time slice are those from Jamaica (51 genera, 63 species), the Netherlands-Belgium (28 genera, 32 species), Mexico (24 genera, 29 species) and Iran (20 genera, 27 species) (Tables 4, 5). Comparing the species of the most diverse faunas, the coral assemblages from Jamaica and Mexico show the greatest correspondence (17.4%), followed by Mexico and the Netherlands-Belgium (4.9%) and Jamaica and Iran (3.3%).

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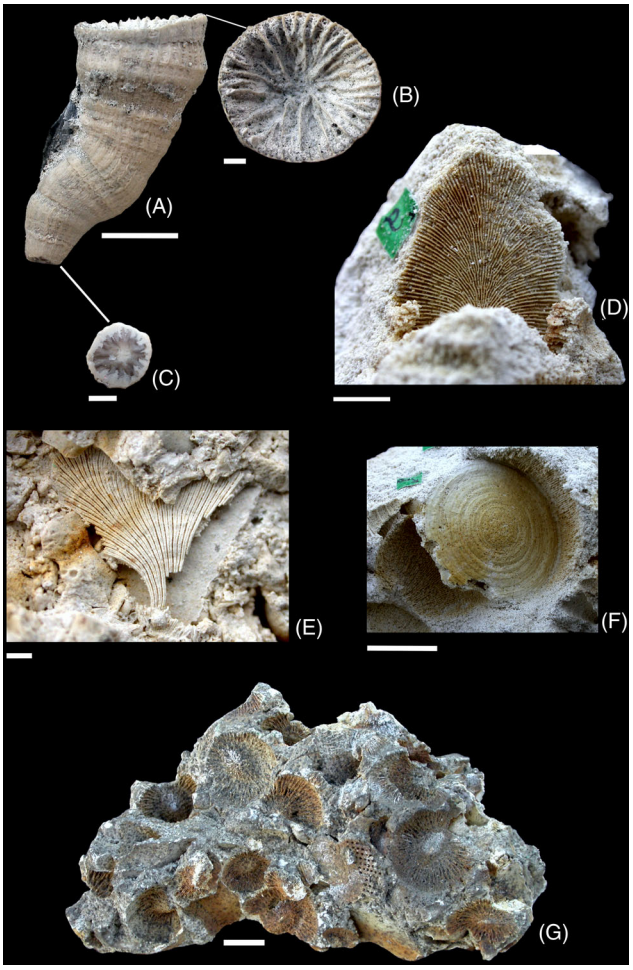

Figure 4. Maastrichtian solitary corals from the Maastrichtian type area (the Netherlands-Belgium). (A–C) *Parasmilia centralis* (Mantell, 1822) (RGM 841366, formerly RGM 212465, leg. Kit Liem Oen) upper lower Maastrichtian, Gulpen Formation, Vijlen Member, CBR-Lixhe quarry; lateral, top and basal view (scale bars equal 10 (A) and 2 mm (B, C)). (D) *Diploctenium cordatum* (Goldfuss, 1826) (RGM.212454.a), upper Maastrichtian, Maastricht Formation, top Nekum Member, western side of former ENCI Quarry; lateral view, mouldic preservation (scale bar equals 5 mm). (E) *Diploctenium pluma* (Goldfuss, 1826) (RGM.29135, STA.8167, leg. Thierens, 1857), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area; lateral view, mouldic preservation (scale bar equals 2 mm). (F) *Cunnolites cancellata* (Goldfuss, 1826) (RGM 841354, formerly RGM 212454.b, ex Leloux Collection, Jx 1022), upper Maastrichtian, Maastricht Formation, top Nekum Member Member to base of Meerssen Member, Maastricht (former ENCI Quarry); top view, mouldic preservation (scale bar equals 10 mm). (G) *Cunnolites cancellata* (Goldfuss, 1826) (RGM.33844), upper Maastrichtian, Maastricht Formation, Sint-Pietersberg area; mouldic preservation (scale bar equals 10 mm).

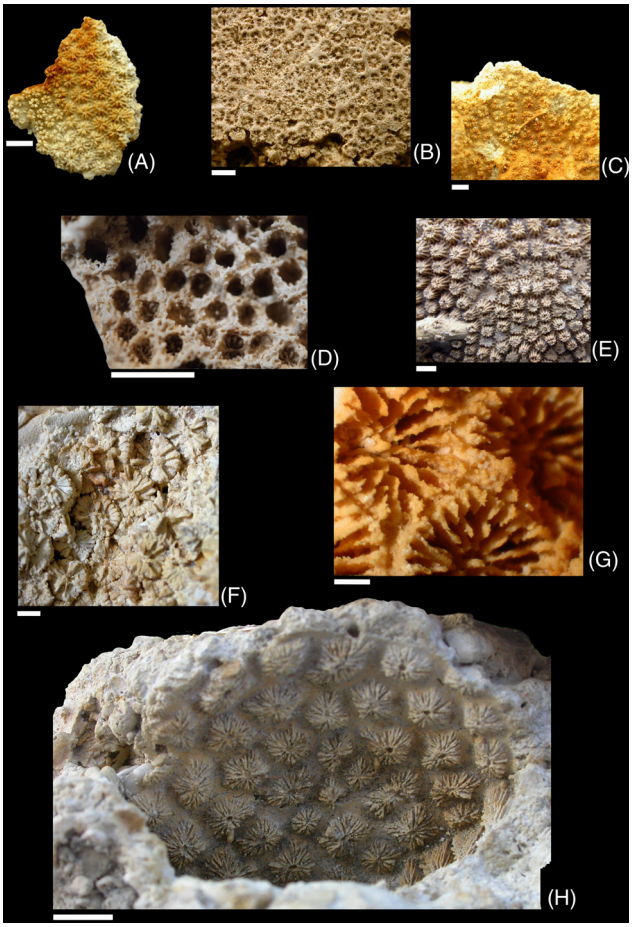

Figure 5. Maastrichtian colonial scleractinians from localities in the type area of the Maastrichtian Stage (the Netherlands-Belgium). (A) *Actinastrea goldfussi* (d'Orbigny, 1850) (RGM.841363, formerly RGM.212459, ex Leloux Collection, Jx.2120), upper Maastrichtian, Maastricht Formation, Meerssen Member (IVf -4/-5), Maastricht (former ENCI Quarry); mouldic preservation, corallites with predominantly 6-6 septal pattern (scale bar equals 2 mm). (B) *Actinastrea goldfussi* (d'Orbigny, 1850) (RGM.29070), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area; recrystallised skeletal preservation (scale bar equals 2 mm). (C) *Actinastrea goldfussi* forma *faujasi* (Milne Edwards & Haime, 1857) (RGM.841360.a, formerly RGM.212458.a, ex Leloux Collection, Jx.2115), upper Maastrichtian, Maastricht Formation, Meerssen Member (IVf-4/-5), Maastricht (former ENCI quarry); corallites with predominantly 8-8 septal pattern, basal view, mouldic preservation (scale bar equals 2 mm). (D) *Aplosastrea geminata* (Goldfuss, 1826), lectotype (IPB GOLDFUSS 233a) designated by Löser (2011); Sint-Pietersberg area, Maastricht. Recrystallised skeletal or cast preservation (scale bar equals 5 mm). (E) *Columactinastraea fallax* (Umbgrove, 1925), lectotype (RGM.29074), Maastricht Formation, South Limburg; mouldic preservation (scale bar equals 2 mm). (F, G) *Columnactinastrea anthonii* (Leloux, 2003), holotype (RGM.216001, ex Leloux Collection), upper Maastrichtian, Maastricht Formation, Meerssen Member, basal IVf-4, former ENCI Quarry; mouldic preservation (scale bar equals 2 mm); recrystallised skeletal preservation (scale bar equals 2 mm). (H) ?*Isastrea angulosa* (Goldfuss, 1826) (THDN.2438, now at Naturalis, Leiden), upper Maastrichtian, Maastricht Formation, southern Limburg; mouldic preservation (scale bar equals 5 mm).

Discussion and conclusions

Material derived from coral-bearing Maastrichtian sedimentary rocks from 94 localities in 26 regions world-wide has been considered in the present study (Fig. 1, Table 3). A total of 205 taxa in 116 genera, belonging to 37 families, are recorded (170 taxa assigned to species, 35 taxa are kept in open nomenclature) (Tables 1, 4, 5). In general, the corals inhabited various non-reefal settings, including coastal, deltaic, lagoonal and shallow to deep subtidal palaeoenvironments. Only from Bulgaria, Mexico, Oman, Spain and western Türkiye have corals been recorded from various types of reefal bioconstructions (Table 5). The most extensive records of Maastrichtian corals are from warm-temperate settings (53 out of 94 localities = 56.4%) followed by arid areas (20 out of 94 localities = 21.3%), including the USA, Australia and various European and Asian countries (Table 3).

Corals occurring in reefal developments have been recorded mainly from para- to subtropical (Bulgaria, Spain, western Türkiye) palaeoenvironments, followed by arid (Mexico) and tropical (Oman) areas. The most diverse corals faunas, however, are those from non-reefal sedimentary rocks of arid (Jamaica) and warm-temperate (the Netherlands-Belgium) regions (Tables 3, 5).

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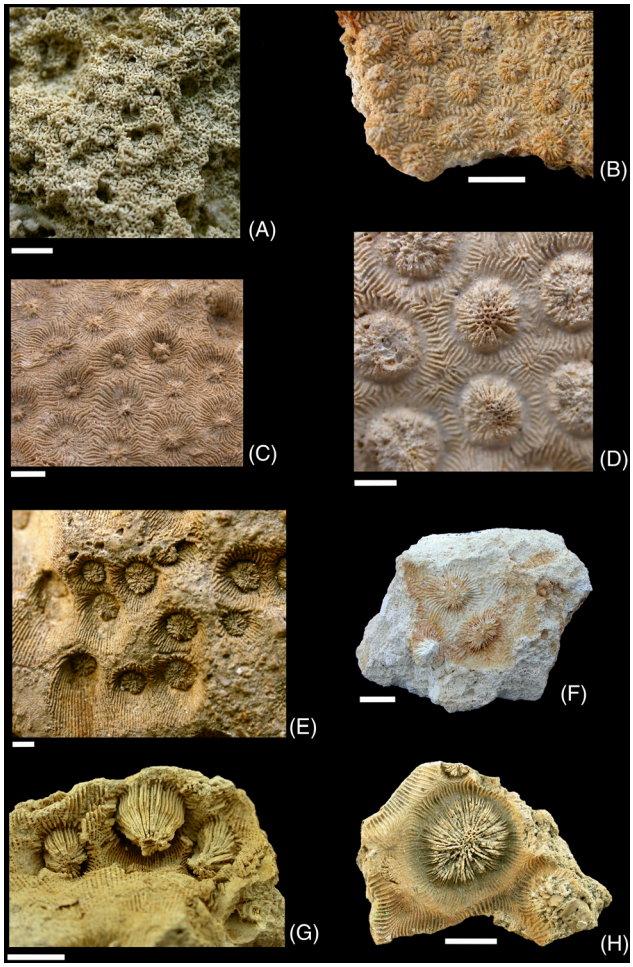

Figure 6. Maastrichtian colonial scleractinians from localities in the type area of the Maastrichtian Stage (the Netherlands-Belgium). (A) *Montipora cretacea* (Umbgrove, 1925), holotype (RGM.29072), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Maastricht area, mouldic preservation (scale bar equals 2 mm). (B) *Neocoenia* (*Placocaeniopsis*) *rotula* (Goldfuss, 1826) (RGM.841361, formerly RGM.212455, ex Leloux Collection, Jx.1188), upper Maastrichtian, Maastricht Formation, Meerssen Member (IVf-3/-4), former ENCI Quarry; mouldic preservation, basal view (scale bar equals 5 mm). (C) *Pleurocora arachnoides* (Walch, 1775) forma *minor* (Quenstedt, 1881) (RGM.72658, leg. J.H.F. Umbgrove), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, southern Limburg; mouldic preservation (scale bar equals 2 mm). (D) *Pleurocora arachnoides* (Walch, 1775) (RGM.76612, leg. J.H.F. Umbgrove), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, southern Limburg ove; mouldic preservation (scale bar equals 2 mm). (E) *Pleurocora arachnoides* (Walch, 1775) forma *conica* (Umbgrove), lectotype (RGM.29037), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Maastricht area; mouldic preservation (scale bar equals 2 mm). (F) *Heliastrea francqana* H. (Milne Edwards & Haime, 1857), grouped herein with Placocoenia macrophthalma (RGM.841352, formerly RGM.212451, ex Leloux Collection, Jx.2144), upper Maastrichtian, Maastricht Formation, Meerssen Member (IVf-4/-5), former ENCI Quarry; mouldic preservation (scale bar equals 10 mm). (G) *Placocoenia macrophthalma* (Goldfuss, 1826) (RGM 29044, probably Staring Collection no. 14198), southern Limburg; mouldic preservation (scale bar equals 10 mm). (H) *Baryphyllia maxima* (Umbgrove, 1925), holotype; RGM.29030, 'Maastricht'; mouldic preservation (scale bar equals 10 mm).

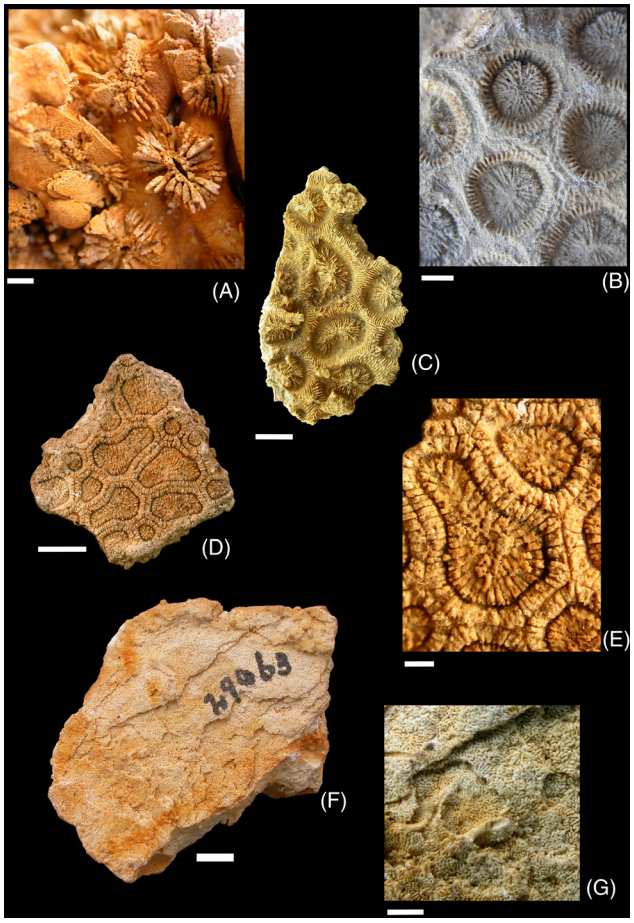

Figure 7. Maastrichtian colonial scleractinians from localities in the type area of the Maastrichtian Stage (the Netherlands-Belgium). (A) *Placocoenia macrophthalma* (Goldfuss, 1826); NHMM K.552, Blom Quarry, Meerssen Member IVf-3 to IVf-5, Maastricht Formation, upper Maastrichtian; mouldic preservation (scale bar equals 2 mm). (B) *Ellipsocoenia conferta* (Umbgrove, 1925), holotype; RGM.29039, 'Maastricht', Maastricht Formation; mouldic preservation (scale bar equals 2 mm). (C) *Ellipsocoenia conferta* (Umbgrove, 1925), formerly Favia maastrichtensis (Umbgrove, 1925); Collection Landbouwhogeschool Wageningen no. 1227, now at Naturalis, Leiden; Keerderberg, southern Limburg; mouldic preservation (scale bar equals 5 mm). (D, E) *Favia planissima* (Umbgrove, 1925), holotype, subjective junior synonym of *Dictuophyllia reticulata* (Goldfuss, 1826) (RGM.20940), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area; mouldic preservation (scale bar equals 10 mm) and detail (E, scale bar equals 2 mm). (F, G) *Meandrophyllia velamentosa* (Goldfuss, 1826), formerly *Meandrophyllia gyrosa* (Goldfuss, 1825) (RGM.29063), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area; mouldic preservation; overview and detail, respectively (scale bars equals 5 and 2 mm, respectively).

The most dominant group of coral taxa comprises forms that have no or very low corallite integration (48.3%: 83 solitary species = 40.5%; 16 branching forms = 7.8%), followed by those with cerioid-plocoid (64 species = 31.2%) and various kinds of (hydno-) thamnasterioid-meandroid integration (42 species = 20.5%) (Table 3).

As far as corallite size is concerned, 186 taxa have been included in the present evaluation (19 species were omitted due to a lack of sufficient information). In Maastrichtian coral assemblages, species with medium- and large-sized corallites predominate: 80 species (43%) belong to the medium-sized group, 71 species (38.2%) have large-sized corallites, and 35 species (18.8%) show smallcorallite diameters (Table 3). Nearly a third of the Maastrichtian corals are large-polyp solitary forms (55 species = 29.6%), while most of the cerioid-plocoid species have either medium- (31 taxa = 16.7%) or small-sized (26 taxa = 14%) corallites (Table 2). As a trend, it may be stated that the degree of corallite integration correlates to the size of the corallites. The least integrated forms have the largest corallite diameters: 59 species (out of 71 species) of the large-sized corallite group

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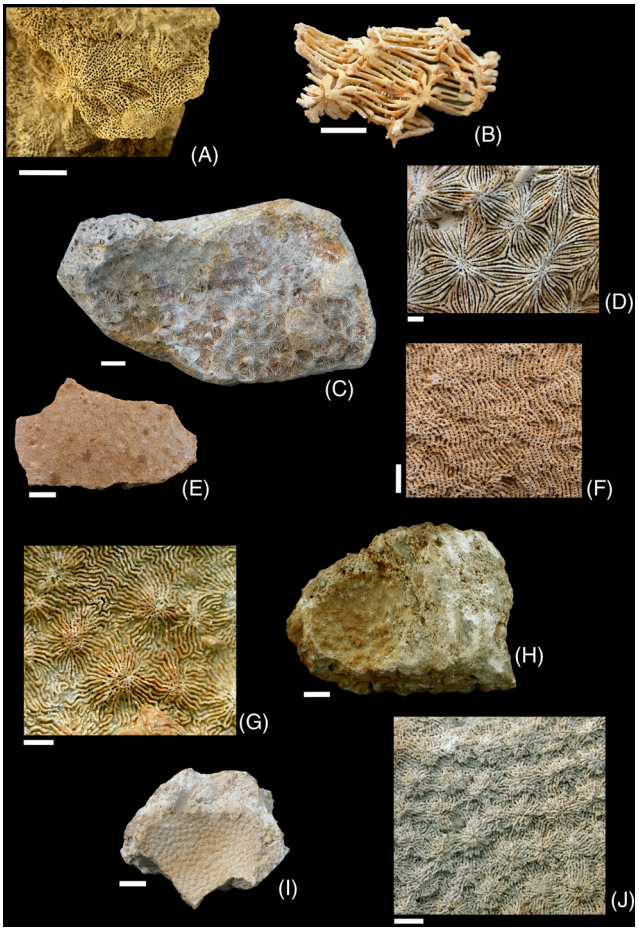

Figure 8. Maastrichtian colonial scleractinians from localities in the type area of the Maastrichtian Stage (the Netherlands-Belgium). (A) *Aspidastraea clathrata* (Goldfuss, 1826) (RGM.29101), upper Maastrichtian, Maastricht Formation, southern Limburg; mouldic preservation (scale bar equals 10 mm). (B) *Dimorphastrea solida* (Umbgrove, 1925) (RGM.841365, formerly RGM.212457, ex Leloux Collection, Jx. 1646), upper Maastrichtian, Meerssen Member (IVf-4/-5) former ENCI Quarry; mouldic preservation (scale bar equals 5 mm). (C, D) *Synastrea geometrica* (Goldfuss, 1826) (RGM.14054), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area; mouldic preservation, overview and detail, respectively (scale bar equals 10 and 2 mm, respectively). (E, F) *Morphastrea escharoides* (Goldfuss, 1826) (RGM.33826), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area; mouldic preservation (scale bar equals 10 and 2 mm, respectively). (G, H) *Fungiastraea flexuosa* (Goldfuss, 1826) (RGM.76625, leg. J.H.F Umbgrove, December 8, 1918), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area (Lichtenberg); mouldic preservation (scale bar equals 2 and 10 mm, respectively). (I, J) *Meandrophyllia velamentosa* (Goldfuss, 1826) (RGM.29050), upper Maastrichtian, Maastricht Formation, Meerssen Member inferred, Sint-Pietersberg area; mouldic preservation (scale bar equals 10 and 2 mm, respectively).

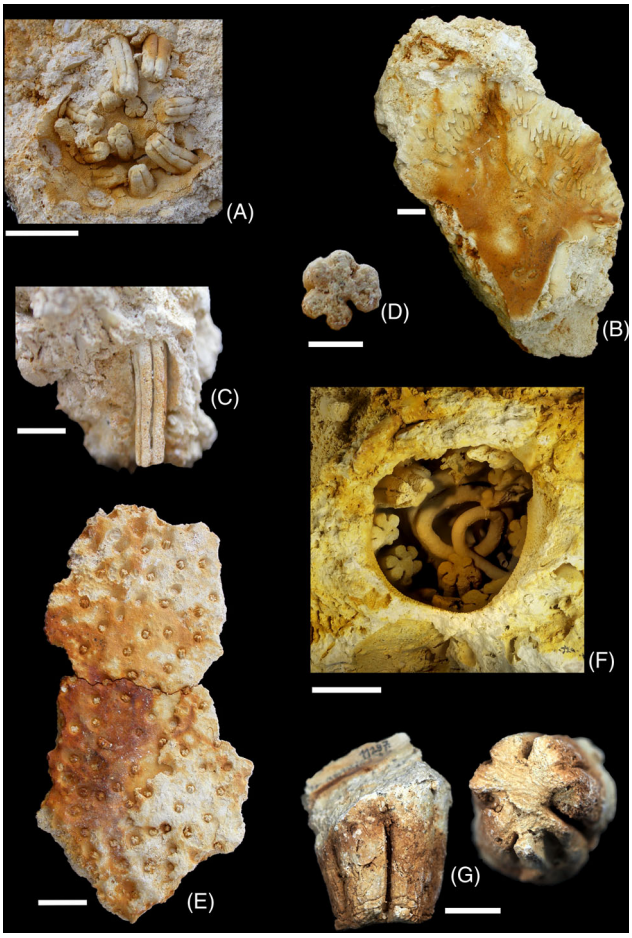

Figure 9. Maastrichtian colonial scleractinians from localities in the type area of the Maastrichtian Stage (the Netherlands-Belgium). (A) *Heterocoenia grandis* (Reuss, 1854) (RGM.841350, formerly RGM.212448), upper Maastrichtian, Maastricht Formation, Meerssen Member, former ENCI Quarry, Meerssen Member, Maastricht Formation, upper Maastrichtian; mouldic preservation (scale bar equals 10 mm). (B) *Heterocoenia gracilis* (Quenstedt, 1881) (RGM.841358, formerly RGM.212453, ex Leloux Collection, Jx.1122), upper Maastrichtian, Maastricht Formation, Meerssen Member (IVf-4\-5), former ENCI Quarry; mouldic preservation (scale bar equals 10 mm). (C, D) *Heterocoenia grandis* (Reuss, 1854) (RGM.841364, formerly RGM.212450), upper Maastrichtian, Maastricht Formation, Meerssen Member (IVf-4), former ENCI Quarry; mouldic preservation, lateral view (scale bar equals 5 mm) and basal view (scale bar equals 2 mm). (E) Heterocoenia gracilis (Quenstedt, 1881) (RGM 841351, formerly RGM.212456), upper Maastrichtian, Maastricht Formation, Meerssen Member (IVf-3/-4), former ENCI Quarry; mouldic preservation (scale bar equals 10 mm). (F) Heterocoenia grandis (Reuss, 1854) with bioerosional trace fossil (NHMM K 548), upper Maastrichtian, Maastricht Formation, Meerssen Member, southern Limburg; basal view, mouldic preservation (scale bar equals 5 mm). (G) *Heterocoenia*? sp. (sensu Goldfuss, 1826), cf. '*Bacillastraea*' sensu Umbgrove (1925, pl. 11, Fig. 22) (NHMM JJ 11287), upper Maastrichtian, Maastricht Formation, Meerssen Member (IVf-4), former ENCI Quarry; lateral and basal view of 'corallite', mouldic preservation (scale bar equals 10 mm).

(83%) belong to solitary or branching types; 31 species (out of 35 species = 88.6%) of the small-sized corallite group have medium- (cerioid-plocoid) to highly integrated ([hydno-] thamnasterioid-meandroid) corallites.

A clear majority of the species (152 taxa = 74.2%) has been recorded from a single region only. The taxa were thoroughly revised applying the exact same taxonomic model to all forms. Possible reasons for this feature of apparent endemism might include, for instance, ecological/environmental issues and/or the fact that sampling efforts were not the same at each site. In some areas (the Netherlands-Belgium, Jamaica, etc.), Maastrichtian coral research has a long history (over two centuries), whereas in other regions (e.g. Türkiye, India, Peru and Russia), coral research has been limited in scope and extent to nearly non-existent.

Only 23 species (11.2%) that have been found in more than one locality are cosmopolitan to subcosmopolitan during the Maastrichtian, most of which are solitary (16 species): *Bathycyathus lloydi, Caryophyllia koninckii* [(see Fig. 3A, B), *Cunnolites cancellata* (see Fig. 4F, G), *Cunnolites giganteus, Cunnolites polymorphus* (see Fig. 2E, F), *Deltocyathus cupuliformis, Desmophyllum excavatum,* ?*Flabellosmilia vaughani, Micrabacia radiata, Palaeopsammia zitteli, Paracycloseris nariensis, Parasmilia elongata, Smilotrochus milneri,*

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Smilotrochus ponderosus, Trochocyathus mitratus and *Trochocyathus speciosus*. Seven cosmopolitan to subcosmopolitan species belong to colonial forms: *Actinhelia elegans* (see Fig. 2D), *Columactinastraea fallax* (see Fig. 4E), *Fungiastraea flexuosa* (see Fig. 8G, H), *Goniopora imperatoris, Neocoenia* (*Placocaeniopsis*) *rotula* (see Fig. 6B), *Ogilviastraea bigemmis* and *Stylophora octophylla* (Table 4).

With regard to both genus and species levels, a significant majority of the taxa (82 genera out 116 = 70.7%; 155 taxa out of 205 = 75.6%) appears to be endemic during the Maastrichtian, having been reported from a single locality only (Table 4). The four most diverse coral assemblages recorded for the Maastrichtian are those from Jamaica (63 species), the Netherlands-Belgium (32 species), Mexico (29 species) and Iran (27 species). A comparison of the species of the most diverse faunas reveals that the assemblages from Jamaica and Mexico show the greatest correspondence (17.4%).

Coral faunas of the Maastrichtian show a distinct predominance of those taxa that represent modern microstructural groups (86 genera = 74%; 145 species = 70.7%) (Tables 1, 4).

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