



**Bayerische
Staatssammlung**

für Paläontologie und Geologie

- München, 01.07.2017
- Manuscript received 20.06.2016; revision accepted 30.09.2016
- ISSN 0373-9627
- ISBN 978-3-946705-00-0

Taxonomy and distribution of the coral genus *Placophora* (Cretaceous; Scleractinia)

Hannes Löser

*Estación Regional del Noroeste, Instituto de Geología,
Universidad Nacional Autónoma de México
Blvd. Luis Donaldo Colosio S/N y Madrid
83250 Hermosillo, Sonora, Mexico*

E-mail: loeser@paleotax.de

Zitteliana 89, 151–160.

Abstract

The Early to early Late Cretaceous Scleractinian coral genus *Placophora* is revised on the basis of the type material of all known species and additional material from various outcrops worldwide. The genus has an ambivalent position between the families Agatheliidae, Columastraenidae, Placocoeniidae, and Stylinidae. The genera *Pseudoheliastrea* and *Mckenziephyllia* are considered junior synonyms. Eleven species are known, four of which remain in open nomenclature. The genus is relatively rare but it achieved a wide geographic distribution with indications from the western Atlantic, the European Boreal, the central, eastern and southern Tethys, and was even found near Antarctic areas. It ranges from the Valanginian to the Cenomanian.

Key words: Corals, Cretaceous, Taxonomy, Scleractinia

Zusammenfassung

Die Korallengattung *Placophora* (Unterkreide bis frühe Oberkreide) wird auf der Basis des Typusmaterials aller bekannter Arten und zusätzlichen Materials revidiert. Die Gattung hat eine ambivalente Position zwischen den Familien Agatheliidae, Columastraenidae, Placocoeniidae und Stylinidae. Die Gattungen *Pseudoheliastrea* und *Mckenziephyllia* werden als jüngere Synonyme von *Placophora* aufgefasst. Elf Arten sind bekannt, von denen vier in offener Nomenklatur verbleiben. Die Gattung ist relativ selten aber erreichte eine hohe geographische Verbreitung mit Nachweisen vom westlichen Atlantik, dem Europäischen Boreal, der zentralen, östlichen und südlichen Tethys und wurde sogar in der Nähe arktischer Regionen gefunden. Die Gattung reicht vom Valangin bis in das Cenoman.

Schlüsselwörter: Korallen, Kreide, Taxonomie, Scleractinia

1. Introduction

The genus *Placophora* was introduced by Fromentel (1879: 495) within the Stylophoridae family. It was based on *P. neocomiensis* Fromentel, 1879 from the basal Hauterivian of the Paris Basin. Although the genus was well described and excellently illustrated for the time, for about 80 years no more species were assigned to it. Vaughan & Wells (1943) moved *Placophora* into the family Faviidae, subfamily Montastraeinae, and compared it to the extant genus *Cyphastrea*. Alloiteau (1952) changed the position again to the family Placocoeniidae. The genus remained monospecific until Alloiteau (1958, 1960) and Reig Oriol (1989) established further species. Studies of published and unpublished material allow for assigning more species to the genus and for better limiting of its stratigraphic and palaeogeographic distribution.

2. Material

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

Australia: Queensland, 1 km west of the homestead on Accord Station, 46 km west of Barcaldine; Alaru Fm; Albian. The locality is described by Jell et al. (2011). QM F29065.

Czech Republic: Central Bohemian region, Kolín, Radovesnice [= Kolin, Radovesnitz] (CZ.732); Peruc-Korycany Fm, Korycany Mbr; Late Cenomanian. NM O 1878.

Table 1: The *Placophora* species with their septal symmetry, septal cycles and calicular dimensions.

Septal symmetry	Septal cycles	clmin (first interval)	Species
6	3	1.2-1.4	sp. 1
		1.4-1.6	<i>affinis</i>
		1.5-2.0	<i>accordensis</i>
		1.8-2.3	<i>granulata</i>
		2.1-2.6	cf. <i>granulata</i>
	4	4.6-5.1	<i>neocomiensis</i>
8	3	3.1-3.7	sp. 2
		3.8-4.1	sp. 3
8-10	2	1.7-2.4	sp. 4
10	3	3.3-4.3	<i>charollaisi</i>

Central Bohemian region, Korycany, Netřeba, Kopeck (CZ.3063); Peruc-Korycany Fm, Korycany Mbr; Late Cenomanian. CGS HF 1565, 2413.

Central Bohemian region, Korycany, Netřeba (CZ.1746); Peruc-Korycany Fm, Korycany Mbr; Late Cenomanian. CGS HF 1407, 1517, 1525–1528, 1555, 1571, 1573.

Central Bohemian region, Lobkovic, Mlékojedy (CZ.741); Peruc-Korycany Fm, Korycany Mbr; Late Cenomanian. NM O 3080.

France: Ardèche, St.Remèze, Pont de Laval; Late Barremian. BSPG 2003 XX 5222.

Haute-Marne, Morancourt (F.531); Calcaire à Spatangues; Early Hauterivian. MNHN M03723, MNHN M03767.

Haute-Savoie, Synclinal de Cenise; Barremian to Aptian. MNHN A30253.

Germany: Bayern, Allgäuer Helvetikum, Falkenberg (D.2295); Schrattenkalk; Late Barremian to Early Aptian. BSPG 1994 XI 385.

Sachsen, Dresden-Plauen, Ratssteinbruch, southern quarry (D.756); Dölzchen Fm; Late Cenomanian. BSPG 2009 XVII 118, 123, SNSD-MMG SaKL218, SaKL219.

Sachsen, Dresden-Plauen (D.606); Dölzchen Fm; Late Cenomanian. SNSD-MMG SAK 821.

Sachsen, Meißen-Zscheila, Trinitatis church (D.697); Meissen Fm; Early Cenomanian. SNSD-MMG SaKL215, SaKL539, SaKL571.

Italy: Abruzzi, L'Aquila, Monti d'Ocre, Fossa Cera-setti (I.1734); Early Aptian. PU 18146.

Abruzzi, L'Aquila, Monti d'Ocre, Fossa Mezza Spada (I.1732); Early Aptian. PU 18147.

Mexico: Puebla, San Juan Raya (MEX.97); San Juan Raya; Aptian. IGM 9195.

Spain: Murcia, Sierra Larga; Late Valanginian. ERNO L-071502, L-132602. The Sierra Larga with sediments of the almost entire Cretaceous in the Prebetic zone encompasses various coral faunas that are partly under investigation. See Vilas et al. (2003) for details on the geology.

Switzerland: Vaud, Arzier; Valanginian. MGL nn. - This imprecise name probably encompasses the La Violette quarries (CH.268 in Löser et al. 2005).

Tanzania: Tanganyika, Mtwara, Kiturika Mts, Naiwanga, Ndalakasha Mt (EAT.13); Kiturika mbr; Early Aptian. MB K1453, K1492.

3. Methods

Corals were cut and polished and thin sections were prepared if possible. Microphotographs for measurements and illustrative purposes were obtained using a transparency scanner. Their quality was improved using histogram contrast manipulation (contrast stretching) where possible. The measurements and septal counts in the descriptions are based on systematic measurements of the calicular dimensions and counts of the septa, carried out using the computer program PaleoTax/Measure (<http://www.paleotax.de/measure>).

For each type of measurement (calicular diameter and distance) in one thin section the following values were obtained:

n	number of measurements
min-max	lowest and highest measured value
μ	arithmetic mean (average)
s	standard deviation
v	coefficient of variation according to K.Pearson
$\mu \pm s$	first interval

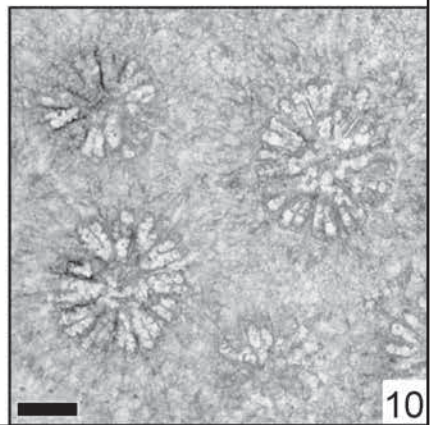
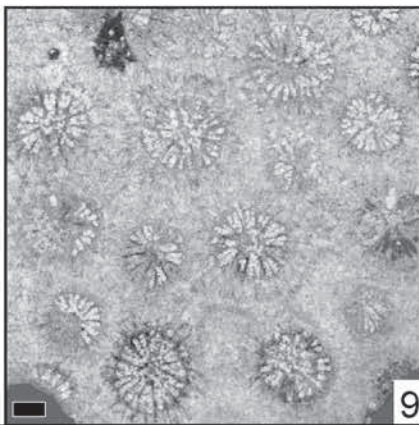
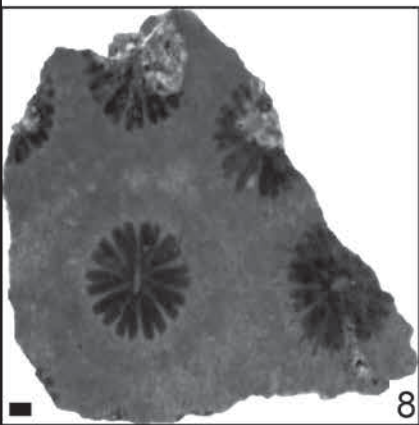
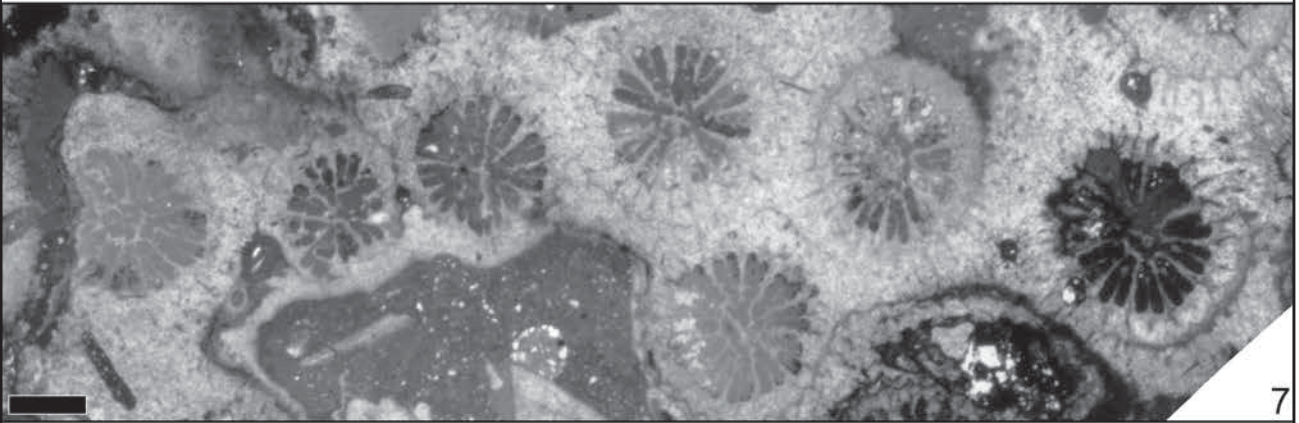
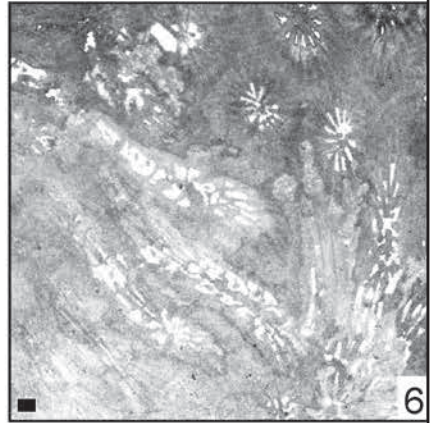
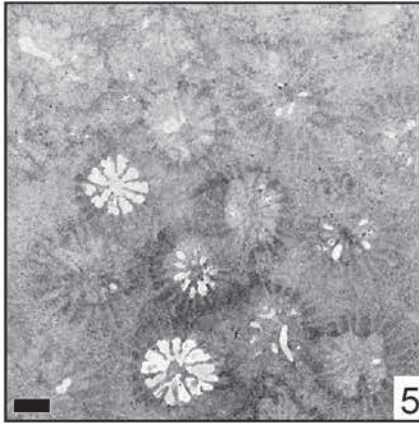
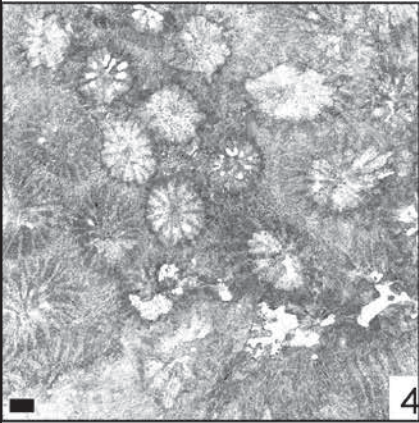
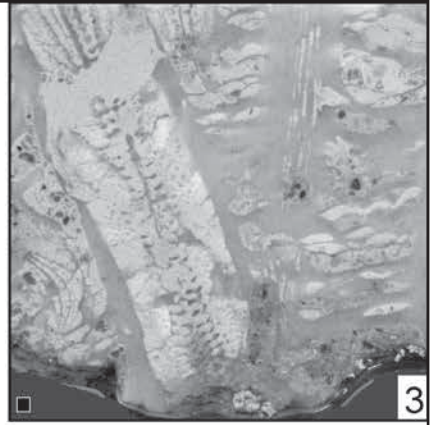
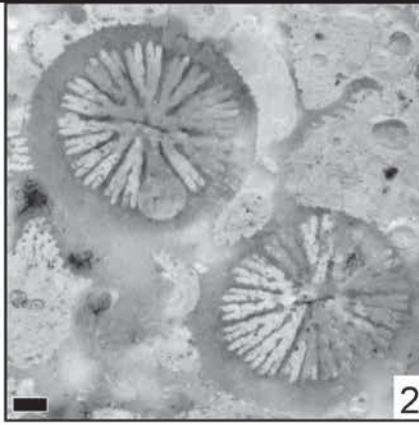
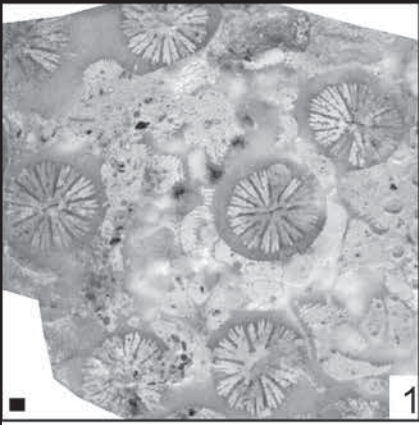
The methods are described in detail in Löser et al. (2013).

4. Systematic part

Collection abbreviations are as follows:

BSPG: Bayerische Staatssammlung für Paläontologie und Geologie, München, Germany;

Plate 1: (1–3) *Placophora neocomiensis* Fromentel, 1870, MNHN M03767. 1: transversal section. 2: transversal section, detail. 3: longitudinal section. (4–6) *Placophora accordensis* (Jell et al., 2011), QM F29065. 4: transversal thin section. 5: transversal thin section. 6: longitudinal thin section. (7) *Placophora accordensis* (Jell et al., 2011), BSPG 2009 XVII 123. 4: transversal thin section. (8) *Placophora granulata* Bölsche, 1871, NM O 3080. Transversal thin section. (9–10) *Placophora granulata* Bölsche, 1871, CGS HF 1571. 9: transversal thin section. 10: transversal thin section, detail. Scale 1 mm.



CGS:	Ceská geologická sluzba, Praha, Czech Republic;
IGM:	Instituto de Geología, Mexico City, Mexico;
MB:	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany;
MGL:	Musée Géologique, Lausanne, Switzerland;
MNHN:	Muséum National d'Histoire Naturelle, Paris, France;
NM:	Národní Muzeum, Praha, Czech Republic;
PU:	Museo di Geologia e Paleontologia dell' Università di Torino, Italy;
QM:	Queensland Museum, Brisbane, Australia;
SNSD-MMG:	Senckenberg Naturhistorische Sammlungen Dresden, Museum für Mineralogie und Geologie, Germany.

The following abbreviations are used describing the dimensions of the corals:

ccd: distance between calicular centres;
 clmin: small calicular diameter (lumen, calicular pit);
 clmax: large calicular diameter;
 s: number of septa in the adult corallite.

Uncertain suborder
 Uncertain family

Placophora Fromentel, 1879

Type species: *Placophora neocomiensis* Fromentel, 1879, by monotypy.

Description: Plocoid colony. Calicular outline circular. Septa compact. Microstructure of septa probably of medium-sized trabeculae. Septa in cross-section externally slightly thicker, becoming slightly thinner towards the centre. Symmetry of septa regularly radial, in varying systems. Cycles of septa regular. Septal cycles differ in length and thickness. First two septal cycles reach close to the calicular diameter, later cycles are shorter. Septa not connected to each other. Septal distal margin unknown, lateral face with thorns, inner margin slightly swollen in places. Pali or paliform lobes absent. Septa are not attached to the columella. Costae and synapticulae absent. Columella lamellar. Endotheca consists of thin tabulae. Wall compact, septothecal, thick. Coenosteum medium-broad, consists of exothecal dissepiments with short vertical trabeculae. Budding extracalicular.

Systematic position: The systematic position is

uncertain. The genus cannot be assigned to an existing suborder and family. Following the traditional classification, the genus is comparable to the suborder Faviina. Because the genus *Favia* is poorly defined (see Löser & Sklenar 2016 for details), neither the suborder Faviina nor the family Faviidae can be conserved. It would also be difficult to assign *Placophora* to an existing family among the families that were formerly assigned the suborder Faviina. Both members of the Columastraenidae and Placocoeniidae show costae and a more or less extended coenosteum (Löser 2011, Löser & Zell 2015) whereas *Placophora* shows no costae at all. The genus also shows a certain affinity to the family Stylinidae, but clearly lacks auriculae. It can also be compared to the family Agatheliidae (Löser 2014a), but differs by the well developed columella and a septal ornamentation that is different from this family.

Species: Eleven species are distinguished, four of which are without name and one that could be compared to an existing species (see Table 1). The species are distinguished on the basis of their septal symmetry, number of septal cycles and the smaller calicular diameter.

Placophora neocomiensis de Fromentel, 1879
 Pl. 1, Figs 1–3

*v 1879 *Placophora neocomiensis* Fromentel – p. 495, pl. 92, fig. 1, pl. 122, fig. 2

Material: MNHN M03723, MNHN M03767.

Dimensions:
 (MNHN M03767)

	n	min-max	μ	s	cv	$\mu \pm s$
clmin	7	4.58–5.25	4.86	0.22	4.6	4.63–5.08
clmax	7	4.93–5.65	5.23	0.25	4.8	4.97–5.48
ccd	9	7.16–12.47	9.86	1.93	19.6	7.93–11.80
s	48					

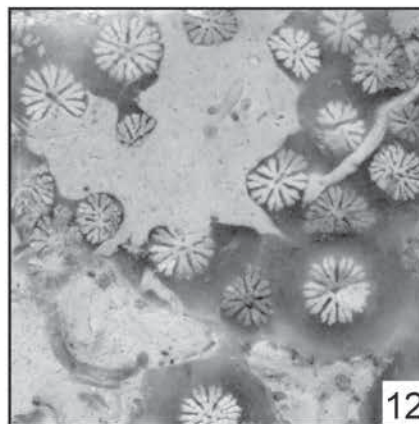
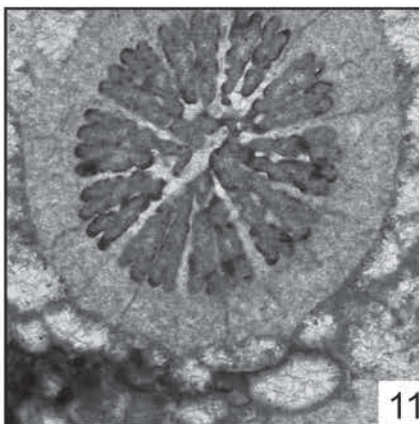
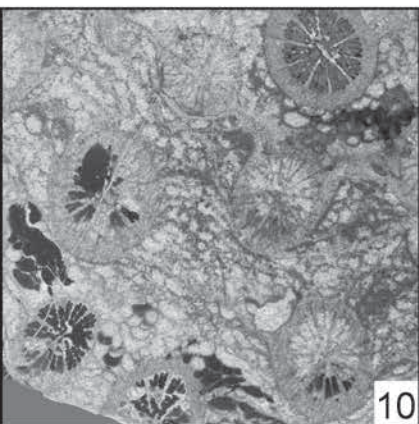
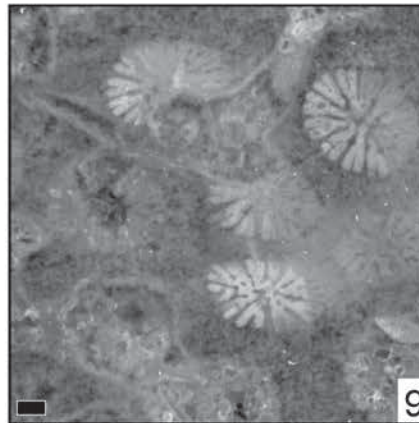
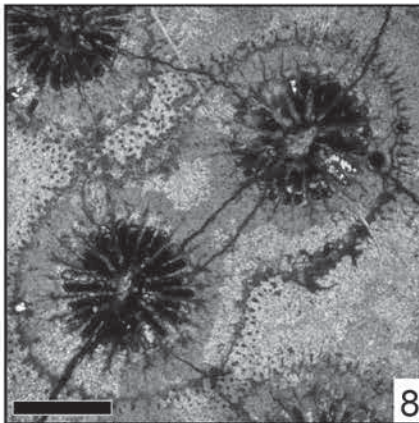
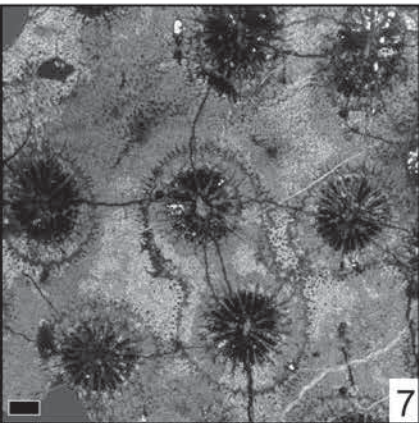
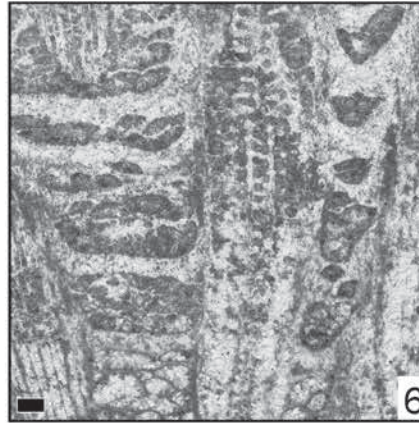
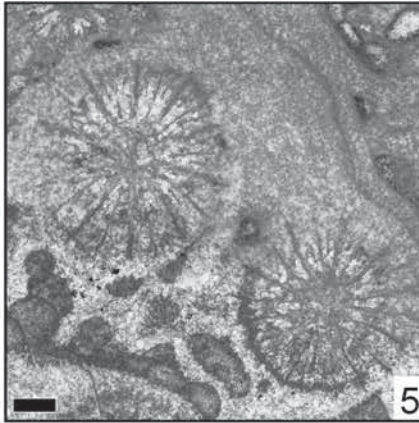
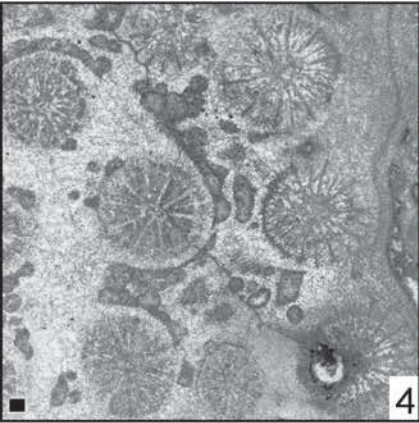
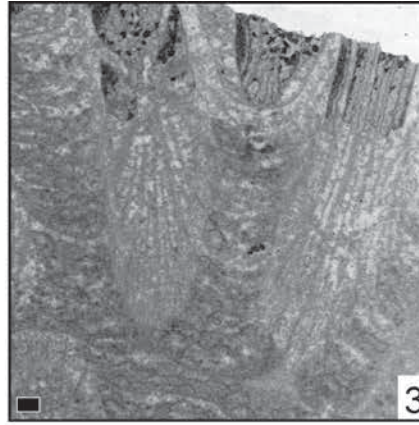
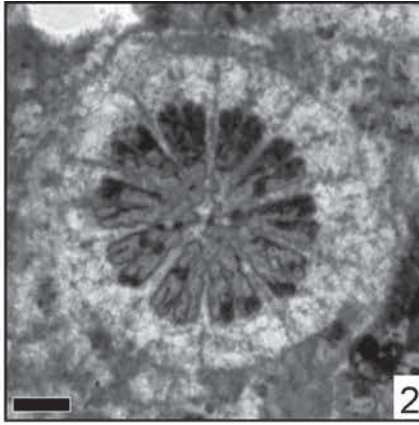
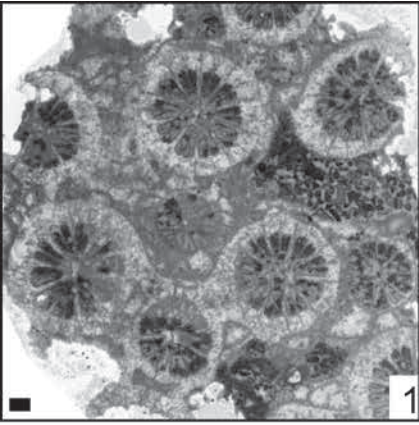
Remarks: There are two syntypes that are conspecific. MNHN M03723 is the specimen that can be compared to a figure in Fromentel (1870: pl. 92, fig. 1). Specimen M03767 was cut completely in chips. Thin sections were not found. The chips are illustrated here. It is possible that the former complete specimen corresponds to Fromentel (1870, pl. 122, fig. 2). The species is only known from the type locality.

Occurrence: Early Hauterivian (Radiatus zone) of France (Haute-Marne) Morancourt.

Placophora accordensis (Jell et al., 2011)
 Pl. 1, Figs 4–7

v part 1989 *Stylohelix granulata* (Bölsche 1871) – Löser, p.

Plate 2: (1–3) *Placophora charollaisi* (Alloiteau, 1965), MNHN A30253. 1: transversal thin section. 2: transversal thin section, detail. 3: longitudinal thin section. **(4–6)** *Placophora charollaisi* (Alloiteau, 1965), ERNO L-132602. 4: transversal thin section. 5: transversal thin section, detail. 6: longitudinal thin section. **(7–8)** *Placophora* cf. *granulata* Bölsche, 1871, SNSD-MMG SaKL 539. 7: transversal thin section. 8: transversal thin section, detail. **(9)** *Placophora* cf. *granulata* Bölsche, 1871, BSPG 1994 XI 385. 9: transversal section. **(10–11)** *Placophora urgonica* (Dietrich, 1926), ERNO L-071502. 10: transversal thin section. 11: transversal thin section, detail. **(12)** *Placophora* sp. 4, MGL nn. Transversal section. Scale 1 mm.



- 110, text-figs 16, 17, pl. 23, figs 1–4
 *v 2011 *Mckenziephyllia accordensis* Jell, Cook & Jell – p. 252, figs 5–7
 v 2014b *Placophora granulata* (Bölsche, 1871) – Löser, p. 26, fig. 2j

Material: BSPG 2009 XVII 118, 123, CGS HF 1517, 1525, 1528, 1565, 1573, 2413, QM F29065, SNSD-MMG SaKL219; 12 thin sections.

Dimensions
(QM F29065)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	10	1.49–2.26	1.78	0.27	15.6	1.50–2.06
clmax	10	1.86–2.47	2.18	0.24	11.3	1.93–2.43
ccd	15	2.00–3.75	3.06	0.51	16.8	2.54–3.57
s	24					

(BSPG 2009 XVII 123)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	20	1.57–1.99	1.76	0.11	6.7	1.64–1.8
clmax	20	1.72–2.45	2.00	0.18	9.3	1.81–2.19
ccd	15	1.86–3.80	2.81	0.50	18.0	2.30–3.32
s	24					

Remarks: The genus *Mckenziephyllia* is considered a junior synonym of *Placophora*. The type material of *M. accordensis* is not well preserved and details of the coenosteum are difficult to recognise. The identity of the material from the Cenomanian of the Bohemian and Saxonian Cretaceous Basin with *M. accordensis* could be confirmed by systematic measurements on scans from thin sections obtained from the holotype. Jell et al. (2011) did not provide precise measurements.

Occurrence: Albian of Australia (Queensland) 1 km west of the homestead on Accord Station, 46 km west of Barcaldine. Late Cenomanian (Guerangeri zone) of Czech Republic (Central Bohemian region) Korycany, Netřeba (CGS HF 1517). Czech Republic (Central Bohemian region) Korycany, Netřeba, Kopec (CGS HF 2413). Late Cenomanian (Plenus zone) of Germany (Sachsen) Dresden-Plauen, Ratssteinbruch, southern quarry.

Placophora charollaisi (Alloiteau, 1965)

Pl. 2, Figs 1–6

- *v 1965 *Pseudoheliastrea charollaisi* Alloiteau – p. 558, pl. 1, figs 1–3

Material: ERNO L-132602, MNHN A30253; 4 thin sections.

Dimensions:
(MNHN A30253)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	8	3.04–4.36	3.66	0.37	10.2	3.29–4.04
clmax	5	3.80–4.29	3.98	0.20	5.2	3.77–4.19
ccd	8	4.35–7.01	5.59	0.91	16.3	4.67–6.50
s	40					

(ERNO L-132602)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	17	3.22–4.64	3.78	0.41	10.8	3.37–4.20
clmax	17	3.35–5.57	4.32	0.50	11.6	3.81–4.82

ccd	17	6.44–9.67	7.82	1.05	13.4	6.76–8.87
s	40					

Occurrence: Late Valanginian of Spain (Murcia) Sierra Larga (ERNO L-132602). Barremian to Aptian of France (Haute-Savoie) Synclinal de Cenise (MNHN A30253).

Placophora granulata (Bölsche, 1871)

Pl. 1, Figs 8–10

- *v 1871 *Psammohelia granulata* Bölsche – p. 50, pl. 11, figs 5, 6
 v 1887 *Cryptocoenia obscura* – Pošta, p. 46, text-fig. 24, pl. 2, fig. 4
 v 1887 *Stylina vadosa* – Pošta, p. 44, text-fig. 23, pl. 2, fig. 11
 v 1909 *Ulastraea elegans* – Prever, p. 90, pl. 5, fig. 4
 v part 1989 *Stylotella granulata* (Bölsche 1871) – Löser, p. 110, text-figs 16, 17, pl. 23, figs 1–4
 ? 1997 *Psammohelia granulata* Bölsche, 1871 – Eliášová, p. 62, pl. 2, figs 1 a–c

Material: CGS HF 1526, 1527, 1555, 1571, NM O 1878, 3080, PU 18147, SNSD-MMG SAK 821; 6 thin sections.

Dimensions
(SNSD SAK 821)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	10	1.68–2.12	1.89	0.13	7.0	1.76–2.03
clmax	10	2.01–2.36	2.17	0.11	5.2	2.06–2.29
ccd	10	3.69–4.88	4.32	0.39	9.1	3.93–4.72
s	24					

(CGS HF 1571)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	13	1.63–2.32	2.07	0.21	10.5	1.85–2.29
clmax	13	1.74–2.56	2.26	0.27	12.1	1.99–2.54
ccd	25	2.81–3.98	3.30	0.39	11.9	2.90–3.70
s	24					

Remarks: The material depicted by Eliášová (1997) cannot be clearly assigned to this species because there is no specimen number indicated that would allow comparison of the systematic measurements with the type material of *P. granulata*.

Occurrence: Early Aptian of Italy (Abruzzi, L'Aquila) Monti d'Ocre, Fossa Mezza Spada. Late Cenomanian of Czech Republic (Central Bohemian region) Kolín, Radovesnice [= Kolin, Radovesnitz]. Late Cenomanian (Guerangeri zone) of Czech Republic (Central Bohemian region) Korycany, Netřeba (CGS HF 1526). Late Cenomanian (Plenus zone) of Germany (Sachsen) Dresden-Plauen. Late Cenomanian (Geslinianum zone) of Czech Republic (Central Bohemian region) Lobkovic, Mlékojedy.

Placophora cf. granulata (Bölsche, 1871)

Pl. 2, Figs 7–9

- v part 1989 *Stylotella granulata* (Bölsche 1871) – Löser, p. 110, text-figs 16, 17, pl. 23, figs 1–4
 v 2014b *Placophora* sp. – Löser, p. 26, fig. 2k

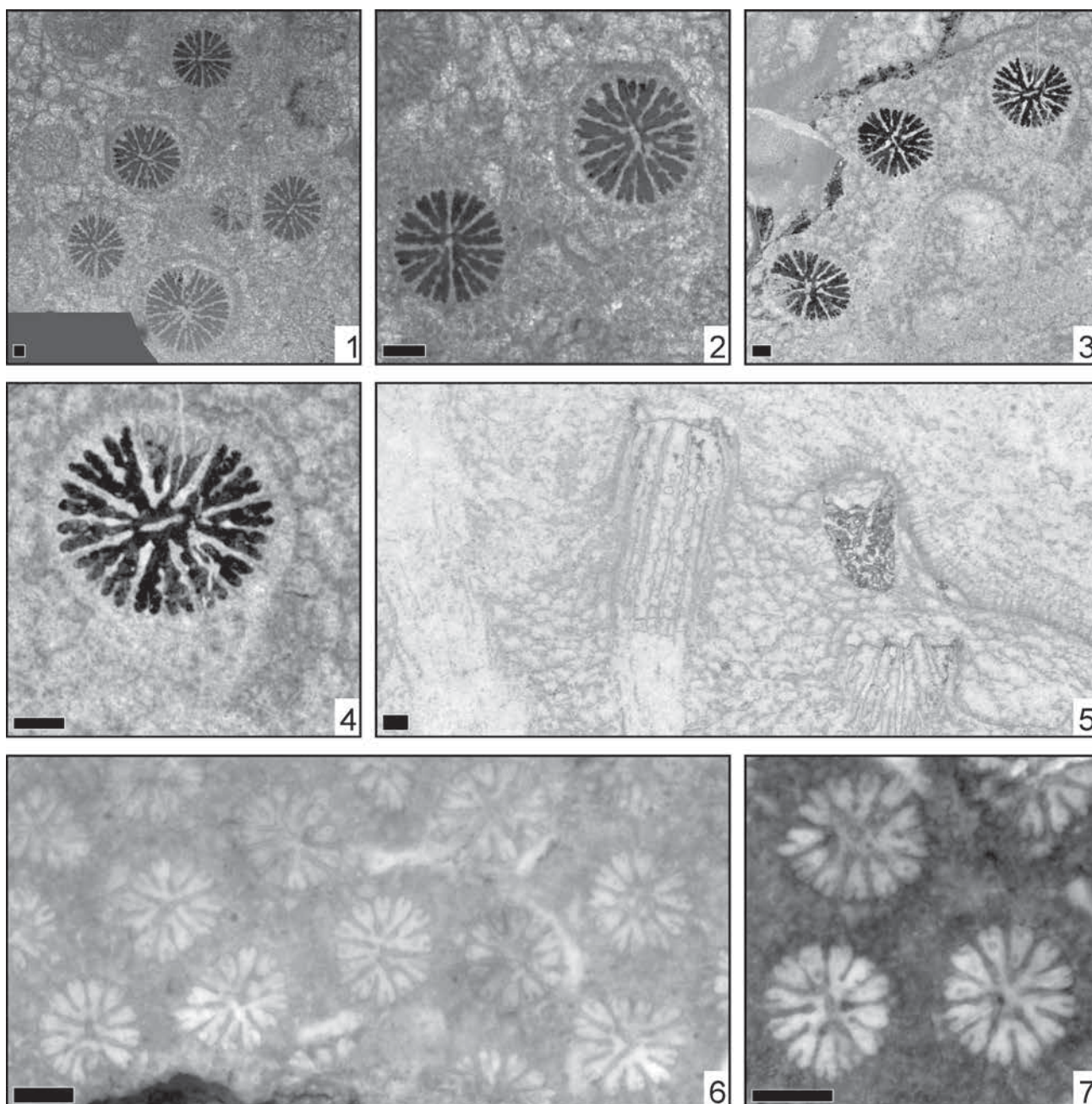


Figure 1: (1–2) *Placophora* sp. 2, IGM 9195. 1: transversal thin section. 2: transversal thin section, detail. (3–5) *Placophora* sp. 3, BSPG 2003 XX 5222. 1: transversal thin section. 2: transversal thin section, detail. 3: longitudinal thin section. (6–7) *Placophora* ? *affinis* Prever, 1909, PU 18146. 5: transversal section. 6: transversal section.

Scale 1 mm.

Material: BSPG 1994 XI 385, CGS HF 1407, SNSD-MMG SaKL215, SaKL539, SaKL571; 5 thin sections.

Dimensions
(SNSD SaKL 539)

	n	min-max	μ	s	cv	$\mu \pm s$
ccd	11	3.02–5.27	4.31	0.69	16.1	3.62–5.01
clmin	11	2.12–2.27	2.17	0.04	1.9	2.13–2.22
clmax	11	2.16–2.84	2.45	0.21	8.5	2.24–2.66
s	24					

(BSPG 1994 XI 385)

	n	min-max	μ	s	cv	$\mu \pm s$
ccd	15	2.22–5.37	3.78	0.91	24.2	2.86–4.70

clmin	12	2.11–2.81	2.44	0.21	8.7	2.22–2.65
clmax	12	2.50–3.41	2.91	0.26	8.9	2.65–3.18
s	24					

Remarks: The material differs from *P. granulata* by slightly larger calicular dimensions.

Occurrence: Late Barremian to Early Aptian (Sartousi - Weissi zone) of Germany (Bayern) Allgäuer Helvetikum, Falkenberg (BSPG 1994 XI 385). Early Cenomanian (Dixoni zone) of Germany (Sachsen) Meißen-Zscheila, Trinitatis church. Late Cenomanian (Guerangeri zone) of Czech Republic (Central Bohemian region) Korycany, Netřeba (CGS HF 1407).

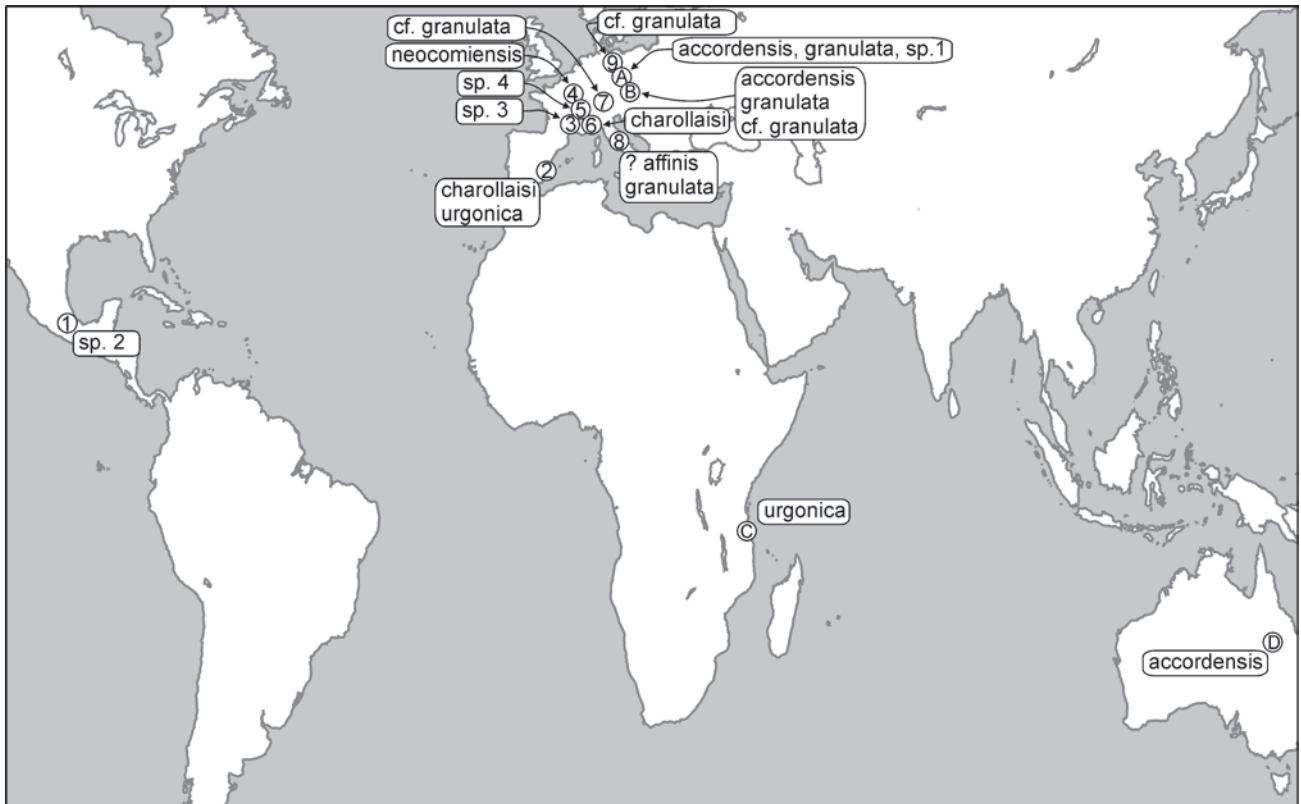


Figure 2: Geographical distribution of *Placophora* species. 1, Aptian of Puebla (Mexico); 2, Valanginian of the Prebetic zone (Spain); 3, Barremian of the Ardèche platform (France); 4, Hauterivian of the Paris Basin (France); 5, Valanginian of Vaud (Switzerland); 6, Barremian to Aptian of the French Alps (France); 7, Late Barremian to Early Aptian of the Helveticum (Germany); 8, Early Aptian of the Apennines (Italy); 9, Early Cenomanian of the Saxonian Basin (Germany); A, Late Cenomanian of the Saxonian Basin (Germany); B, Late Cenomanian of the Bohemian Basin (Czech Republic); C, Early Aptian of East Africa (Tanzania); D, Albian of the Great Basin (Australia).

Placophora urgonica (Dietrich, 1926)
Pl. 2, Figs 10–11

- *v 1926 *Agathelia urgonica* Dietrich – p. 75, pl. 5, fig. 1, pl. 8, fig. 2
v 2008 *Stylina* sp. – Löser, p. 44, pl. 2, fig. 4
v 2008 *Stylina urgonica* (Dietrich, 1926) – Löser, p. 44, pl. 2, fig. 3

Material: ERNO L-071502, MB K1453, MB K1492;
5 thin sections.

Dimensions:
(MB K1492)

	n	min–max	μ	s	cv	$\mu \pm s$
ccd	12	6.67–11.63	8.85	1.55	17.5	7.30–10.40
clmin	12	3.55–4.82	4.39	0.38	8.7	4.01–4.78
clmax	12	3.98–5.66	4.93	0.41	8.4	4.52–5.35
s	10+10+20					

Occurrence: Late Valanginian of Spain (Murcia) Sierra Larga (ERNO L-071502). Early Aptian (Weissi - Furcata zone) of Tanzania (Tanganyika, Mtwara) Kiturika Mts, Naiwanga, Ndalakasha Mt.

Placophora sp. 1

- v part 1989 *Stylohelina granulata* (Bölsche 1871) – Löser, p. 110, text-figs 16, 17, pl. 23, figs 1-4
v 2014b *Placophora affinis* (Prever, 1909) – Löser, p. 26, fig. 2i

Material: SNSD-MMG SaKL218; 1 thin section.

Dimensions:
(SNSD SaKL218)
clmin 1.2–1.4
clmax 1.3–1.6
ccd 2.5–5.3
s 24

Remarks: From this species in open nomenclature, only one small specimen is known.

Occurrence: Late Cenomanian (Plenus zone) of Germany (Sachsen) Dresden-Plauen, Ratssteinbruch, southern quarry.

Placophora sp. 2
Textfigs 1.1–2

Material: IGM 9195; 1 thin section.

Dimensions:
(IGM 9195)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	19	2.80–4.01	3.43	0.31	9.1	3.11–3.74
clmax	19	3.03–4.69	3.67	0.43	11.7	3.24–4.10
ccd	25	3.31–7.85	5.94	1.01	17.0	4.92–6.95
s	32					

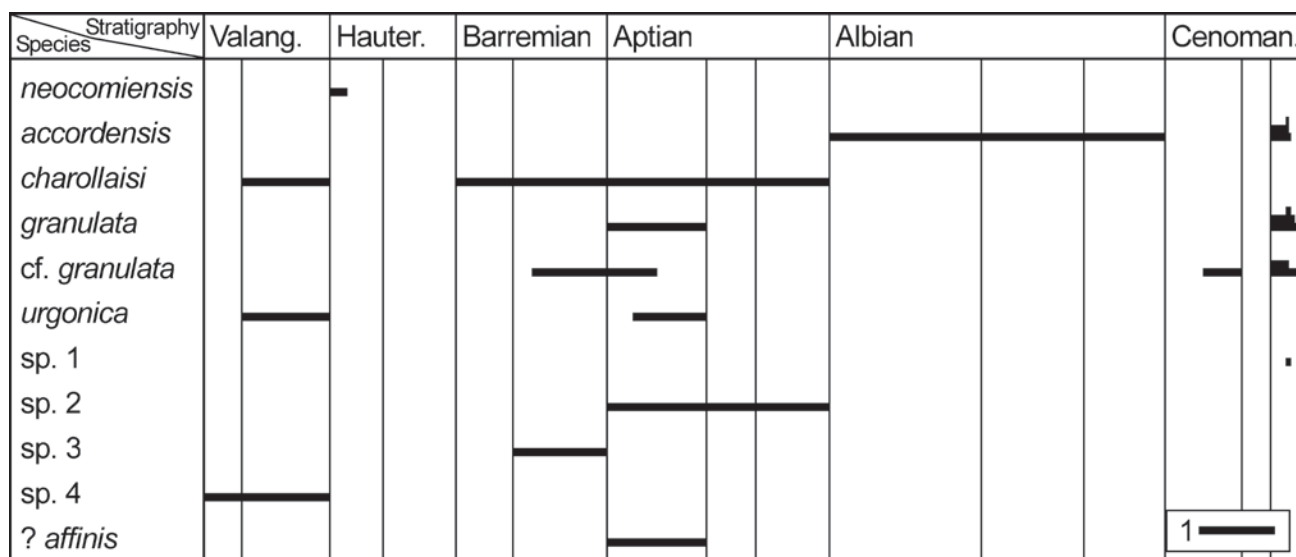


Figure 3: Stratigraphic distribution and commonness of *Placophora* species. The thickness of the bars indicates the number of localities where the concerned species was found.

Occurrence: Aptian of Mexico (Puebla) San Juan Raya (IGM 9195).

Placophora sp. 3
Textfigs 1.3–5

v 2006 *Placocoenia* sp. – Löser & Ferry, p. 482, fig. 4.10

Material: BSPG 2003 XX 5222; 1 thin section.

Dimensions:

(BSPG 2003 XX 5222)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	10	3.73–4.16	3.94	0.15	3.9	3.79–4.10
clmax	10	3.66–5.01	4.42	0.41	9.4	4.00–4.84
ccd	15	5.30–9.76	7.92	1.40	17.7	6.51–9.33
s	32					

Occurrence: Late Barremian of France (Ardèche) St.Remèze, Pont de Laval.

Placophora sp. 4
Pl. 2, Fig. 12

Material: MGL nn.

Dimensions:

(MGL nn)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	20	1.63–2.49	1.97	0.26	13.5	1.70–2.24
clmax	20	1.61–2.83	2.09	0.34	16.5	1.74–2.44
ccd	15	1.54–3.24	2.55	0.53	20.8	2.02–3.09
s	15	16–23	18.60	2.06	11.0	17–20

Remarks: The only specimen shows, contrary to other samples, a septal symmetry that varies in its basic number, from eight to ten.

Occurrence: Valanginian of Switzerland (Vaud) Arzier (MGL nn).

Placophora ? *affinis* (Prever, 1909)
Textfig. 1, Figs 6–7

*v 1909 *Ulastraea affinis* Prever – p. 92, pl. 5, fig. 8

non 2014b *Placophora affinis* (Prever, 1909) – Löser, p. 26, fig. 2i

Material: PU 18146.

Dimensions

(PU 18146)

	n	min–max	μ	s	cv	$\mu \pm s$
clmin	20	1.34–1.66	1.52	0.08	5.3	1.44–1.60
clmax	20	1.46–1.95	1.74	0.12	6.9	1.62–1.86
ccd	20	1.64–2.60	2.15	0.26	12.4	1.88–2.42
s	6+6+12					

Remarks: It is not certain that the species belongs to *Placophora*. The type (and only) specimen could also belong to *Eocolumastrea*. Thin sections would be needed to ascertain the taxonomy.

Occurrence: Early Aptian of Italy (Abruzzi, L'Aquila) Monti d'Ocre, Fossa Cerasetti.

Further species: *Placophora bassae* Alloiteau, 1958 from the Bathonian of Madagascar is unsectioned and does not allow a generic assignment. *Placophora valentiensis* Alloiteau, 1960 from the Late Jurassic of Spain belongs to *Stylina*. *Placophora viaderi* Reig Oriol, 1989 from the Late Campanian of Spain belongs to *Nefocoenia*. The types of all species were available for study.

5. Discussion

In total, 36 specimens were examined and assigned to 11 species, occurring at 14 principal localities (Textfigure 2). Although the number of localities is low, the genus shows a wide stratigraphical and geographical distribution. It occurs from the Valanginian to the Cenomanian with most species in the Aptian and Cenomanian (Textfigure 3). Except for the Late Valanginian and the Late Cenomanian, no more than one species was found in one locality. There is no palaeoecological preference; the species are found in carbonatic as well as siliciclastic environments. *Placophora* seemed to be resistant to low temperatures, with a certain abundance in the European Boreal and an occurrence in Australia. The palaeolatitude of the European Boreal was about 55°N and that of the type locality of *P. accordensis* was more than 60°S. The genus is very rare but it is possible that there are more species that are still with other genera, such as *Stylina*, for instance.

6. Acknowledgements

This article is dedicated to Winfried Werner on the occasion of his 65th birthday. I am grateful to Petr Budil (Prague), Dieter Korn (Berlin), Robin Marchant (Lausanne), Didier Merle (Paris), Daniele Ormezzano (Turin), Maria del Carmen Perrialliat (Mexico City), Jan Sklenar (Prague), and Winfried Werner (Munich) who allowed me to examine the material in their collections. I thank John Jell (Brisbane) who provided images from the holotype of *Mckenziephyllia accordensis*. English language correction by Proof-Reading-Services (Letchworth Garden City, England). A review by Jacob Leloux (Leiden) helped to improve the manuscript.

7. References

- Alloiteau J. 1952. Embranchement des coelentérés. In: J Piveteau (Ed), *Traité de Paléontologie*. Paris, Masson, 376–684.
- Alloiteau J. 1958. Monographie des Madréporaires fossiles de Madagascar. *Annales géologiques de Madagascar* 25, 1–218.
- Alloiteau J. 1960. Madréporaires portlandiens de la Querola près d'Alcoy (Espagne). *Bulletin de la Société géologique de France* (7) 2, 288–299.
- Alloiteau J. 1965. Sur un nouveau genre de la famille des Placocœniidae All. du faciès urgonien (Barrémien-Aptien inférieur (?)) des chaînes subalpines de Haute-Savoie (France): *Pseudoheliastrea charollaisi* Alloiteau. *Archives des Sciences* 18, 557–562.
- Bölsche W. 1871. Die Korallen des unteren Pläner im Sächsischen Elbthale. In: HB Geinitz (Ed), *Das Elbthalgebirge in Sachsen* (1: Der untere Quader. *Palaeontographica* 20: 46–57.
- Dietrich WO. 1926. Steinkorallen des Malms und der Unterkreide im südlichen Deutsch-Ostafrika. *Palaeontographica* (suppl.7) 1, 43–62.
- Eliášová H. 1997. Coraux pas encore décrits ou redécrits du Crétacé supérieur de Bohême. *Vestník Českého geologického ústavu* 72, 61–80.
- Fromentel E. 1870. Zoophytes, terrain crétacé (8). *Paléontologie française* (A.Orbigny ed.) 8, 337–384.
- Fromentel E. 1879. Zoophytes, terrain crétacé (11). *Paléontologie française* (A. Orbigny ed.) 8, 481–512.
- Jell J, Cook AG, Jell PA. 2011. Australian Cretaceous Cnidaria and Porifera. *Alcheringa* 35, 241–284.
- Löser H. 1989. Die Korallen der sächsischen Oberkreide (1: Hexacorallia aus dem Cenoman. *Abhandlungen des Staatlichen Museums für Mineralogie und Geologie zu Dresden* 36, 88–154.
- Löser H. et al. 2005. List of Localities. *Catalogue of Cretaceous Corals* 3, 1–366.
- Löser H. 2008. Early Cretaceous coral faunas from East Africa (Tanzania, Kenya; Late Valanginian-Aptian) and revision of the Dietrich collection (Berlin, Germany). *Palaeontographica* 285, 23–75.
- Löser H. 2011. Systematic revision of the Placocœniidae (Scleractinia; Late Cretaceous). *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* 261, 195–200.
- Löser H. 2014a. Revision of the family Agatheliidae (Scleractinia; Cretaceous). *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* 273, 299–318.
- Löser H. 2014b. 3. Korallen / 3. Corals. In: B Niebuhr, M Wilmsen (Eds), *Kreide-Fossilien in Sachsen, Teil 1. Geologica Saxonica* 60, 17–56.
- Löser H, Ferry S. 2006. Coraux du Barrémien du Sud de la France (Ardèche et Drôme). *Geobios* 39, 469–489.
- Löser H, Sklenár J. 2016. The Scleractinian coral genus *Glenarea* (Bohemian Cretaceous Basin). *Acta Musei Nationalis Pragae* (B) *Historia Naturalis* 71, 365–376.
- Löser H, Werner W, Darga R. 2013. A Middle Cenomanian coral fauna from the Northern Calcareous Alps (Bavaria, Southern Germany) – new insights into the evolution of Mid-Cretaceous corals. *Zitteliana* A53, 37–76.
- Löser H, Zell P. 2015. Revision of the family Columastraeridae (Scleractinia; Cretaceous). *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* 277, 153–166.
- Počta F. 1887. Die Anthozoen der boehmischen Kreideformation. *Abhandlungen der Königlichen Boehmischen Gesellschaft der Wissenschaften* (7), 2, 1–60.
- Prever PL. 1909. Anthozoa. In: CF Parona (Ed.), *La fauna coralligena del Cretaceo dei Monti d'Ocre nell'Abruzzo Aquilano. Memorie descrittive della carta geologica d'Italia* 5, 51–147.
- Reig Oriol J. 1989. Sobre varios géneros y especies de escleractinias fósiles del Cretácico Catalán. Barcelona, privately published, 69 p.
- Vaughan TW, Wells JW. 1943. Revision of the suborders, families and genera of Scleractinia. *Special Papers. Geological Society of America* 44, 1–363.
- Vilas L, Martín-Chivelet J, Arias C. 2003. Integration of subsidence and sequence stratigraphic analyses in the Cretaceous carbonate platforms of the Prebetic (Jumilla-Yecla Region), Spain. *Palaeogeography, Palaeoclimatology, Palaeoecology* 200, 107–129.