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The Mesozoic scleractinian genus *Adelocoenia* (Stylinidae) and its Jurassic species

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Abstract: The genus *Adelocoenia* ORBIGNY, 1849, is revised and a neotype is designated for its type species *Astrea castellum* MICHELIN, 1844. For various reasons that lie in the taxonomic history of scleractinian corals, it has become a difficult task to reliably assign Mesozoic corals having the combined features of plocoid corallite integration and the absence of a columella. Therefore, many such genera are in need of revision, one of which is *Adelocoenia*. In addition to the revision of the type species, Jurassic species grouped within *Adelocoenia* are revised using type material when it was possible. Many new synonymies are proposed based mainly on characters such as symmetry and dimensions of skeletal features. Another consequence is that most species previously grouped with *Pseudocoenia* ORBIGNY are transferred to *Adelocoenia*. Furthermore, we present a clarified view of the paleogeographical and stratigraphical distributional patterns of the genus *Adelocoenia*, according to which *Adelocoenia* had its first appearance during the Early Jurassic, represented by a single specimen known from the Sinemurian of France. Subsequently, this genus had a significant increase in both distribution and diversity during the Middle Jurassic. The pinnacle of its success followed in the Late Jurassic during which *Adelocoenia* had its greatest morphological disparity and taxonomical diversity, and its largest geographical distribution. The genus survived in the Cretaceous record. Throughout its history, *Adelocoenia* predominantly occurred in inner platform environments that were located in low latitudes.

Key-words:

- taxonomy;
- nomenclature;
- coral;
- Scleractinia;
- Mesozoic;
- Jurassic;
- paleogeography

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Résumé : Adelocoenia *(Stylinidae), genre scléractiniaire mésozoïque, et ses espèces jurassiques.-* Le genre *Adelocoenia* ORBIGNY, 1849, est révisé et un néotype est désigné pour son espèce type *Astrea castellum* MICHELIN, 1844. Pour diverses raisons qui tiennent à l'histoire taxinomique des coraux scléractiniaires, il est devenu difficile d'identifier de manière fiable des coraux mésozoïques combinant les caractéristiques d'une structure coloniale plocoïde et une absence de columelle. C'est pourquoi de tels genres ont besoin d'être révisés, et parmi eux, *Adelocoenia*. En complément à la révision de l'espèce type, les espèces jurassiques regroupées au sein d'*Adelocoenia* sont révisées en utilisant le matériel type lorsque cela était possible. De nombreuses nouvelles synonymies sont proposées, fondées principalement sur des caractères tels que la symétrie et les dimensions squelettiques. Une autre conséquence est que la plupart des espèces précédemment groupées au sein de *Pseudocoenia* Orbigny sont transférées vers *Adelocoenia*. En outre, nous présentons une vue clarifiée des distributions paléogéographiques et stratigraphiques du genre *Adelocoenia*, selon laquelle ce genre a fait sa première apparition au cours du Jurassique inférieur, représenté par un seul spécimen connu du Sinémurien de France. Par la suite, ce genre a connu une augmentation significative de sa répartition et de sa diversité au cours du Dogger. L'apogée de son succès a suivi au Jurassique supérieur au cours duquel *Adelocoenia* a montré ses plus grandes disparité morphologique et diversité taxinomique, ainsi que son aire de répartition la plus vaste. Le genre a survécu dans l'enregistrement fossile du Crétacé. Tout au long de son histoire, *Adelocoenia* a principalement vécu dans des environnements de plates-formes internes de basses latitudes.

Mots-clefs :

- taxinomie ;
- nomenclature ;
- coraux ;
- Scleractinia ;
- Mésozoïque ;
- Jurassique ;
- paléogéographie

1. Introduction

Confusion reigns about the names that have been applied to plocoid Mesozoic corals. In this paper we are dealing especially with the plocoid scleractinian stylinid coral genera lacking a columella, specifically *Pseudocoenia* and *Adelocoenia*. In many works, the genus concept applied to *Pseudocoenia* is that proposed by RONIEWICZ (1966, p. 179). However, although it is an excellent description, it is unfortunately based on an erroneous type species designation. In order to resolve the issue, in a case submitted to the ICZN, LÖSER (2007, case 3386) proposed the conservation of usage of *Pseudocoenia*. Unfortunately, the proposal was rejected (Opinion 2321, March 2013), leaving the *Pseudocoenia* issue unresolved. For this reason, and because this genus plays a key role in the revision of the upcoming Treatise on Invertebrate Palaeontology (for progress see http://www.corallosphere.org/ under CAIRNS *et al.*, 2010), we propose another solution by establishing a clarifying taxonomic concept of the senior synonym genus *Adelocoenia* ORBIGNY, 1849, which was erected one year before *Pseudocoenia* ORBIGNY, 1850.

Plocoid Jurassic scleractinian corals have been reported from a large number of localities (see for instance MARTIN-GARIN *et al.*, 2012). They form a diverse group that has been for over one and a half centuries the subject of most controversial discussions with regard to the variation of certain skeletal structures. The question as to whether the axial structure called a columella was a labile or stable character was discussed as early as in the mid 19th century between ORBIGNY (1849, p. 7; 1850) and MILNE EDWARDS (1857, p. 234-235). Modern authors generally consider that, in these plocoid genera, the presence or absence of a columella is a character that is stable enough to be genus-defining (*e.g.*, RONIEWICZ, 1966; ZAMAN, 2012). Consequently, in modern taxonomic usage, genera such as *Stylina* LAMARCK, 1816, *Heliocoenia* ÉTALLON, 1859, and their junior synonyms are distinguished by the presence of a columella from genera such as *Adelocoenia*, *Solenocoenia* RONIEWICZ & GILL, 1976, *Cyathophora* MICHELIN, 1843, and their junior synonyms. Figure 1 shows the differences between these genera which are the basis for the synonymies adopted in the current paper. Excluded from the current work is the rhipidogyrid genus *Bracthelia* BEAUVAIS & BEAUVAIS, 1975 (including its junior synonym *Starostinia* DOWELD, 2014 [= replacement name for *Ironella* STAROSTINA & KRASNOV, 1970, non *Ironella* COBB, 1920]), which is characterized by a great variability of its axial structures, ranging from the absence of a columella to the presence of different columellar types.

2. Characters and their variations

Columella

The variability of the columella has been discussed for a long time. ORBIGNY (1849, p. 7; 1850) considered the presence/absence of a columella as a stable character that can be used to distinguish many plocoid forms. In contrast, MILNE EDWARDS and HAIME (1857, p. 234-235) considered this character to be of no significant value and grouped many species, often with doubt, within *Stylina* (see for instance MILNE EDWARDS & HAIME, 1851b, p. 58-62; 1857, p. 234-249). While the latter interpretation was followed by some authors (*e.g.*, THOMAS, 1935; WELLS, 1956), other coral workers took into consideration the possibility that, in some forms, in a small number of corallites a columella might not be preserved and that, in other forms, in transverse section, a convex tabula can mimic a styliform columella due to

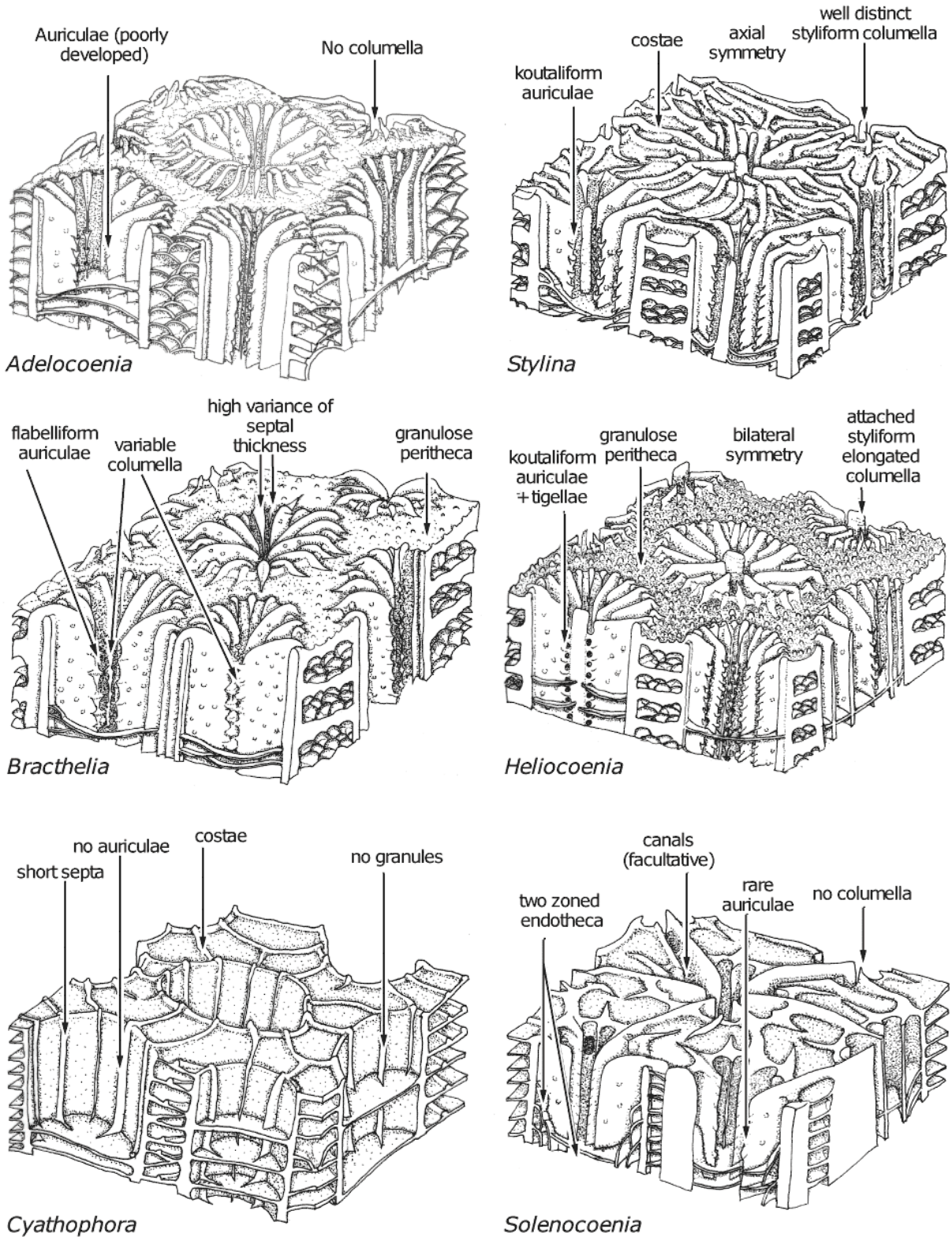

Figure 1: Comparison between macroscopic characters of key Mesozoic plocoid coral genera.

poor preservation (RALPH & SQUIRES, 1962; BEAUVAIS, 1964; TURNŠEK & POLŠAK, 1978; LAUXMANN, 1991; BARON-SZABO, 1993, 1997). Therefore, this character has been interpreted by subsequent authors as stable enough to be used as a genus-level character.

Wall

ALLOITEAU (1958, p. 109) and BEAUVAIS (1964, p. 118, 123) used the nature of the wall as the basis for generic distinctions, such as both the presence of a septothecal wall in *Pseudocoenia* and the occurrence of a parathecal wall in *Cryptocoenia* ORBIGNY, 1849, and *Adelocoenia*. Inte-

restingly, BEAUVAIS described forms that have mixed wall structures. One example is "*Pseudocoenia subloevis*" which she described as having both a septotheca and a stereozone (BEAUVAIS, 1964, p. 123). With regard to the variability of the wall in the genera concerned, the key feature lies in the occurrence of costae that do not have a septal counterpart (*exocostae* of ZAMAN, 2012, p. 53), which, consequently, leaves less space for the paratheca. Conversely, when the number of septa is equal to the number of costae, a wider space is left for the paratheca. Neighboring septa are connected in continuity with the septal thickening deposits.

Coenosteum

The development of costae varies within the coenosteum depending on their growth stage. As in other plocoid stylinid corals, the peritheca in *Adelocoenia* has a biphasic development whereby phases of dissepimental growth follow phases of costal growth. These developmental phases are not synchronous across the same colony.

Endotheca

The endotheca seems to be a defining character in several genera. *Adelocoenia* differs from *Solenocoenia* in the structure of the endotheca. In *Adelocoenia* it is tabuloid. In *Solenocoenia*, a two-zoned endotheca is present that consists of an external zone made of small dissepiments and a central zone formed by tabuloid dissepiments. *Cyathophora* was believed to be characterized by complete tabulae as well; however, this is not completely true as reported in recent works (PANDEY *et al.*, 2002, Figs. 3-5; ZAMAN & LATHUILIÈRE, 2014, p. 199; MORYCOWA & RONIEWICZ, 2016, p. 5). In *Adelocoenia*, some incomplete tabulae occur in the endotheca.

Costae

In *Adelocoenia*, the relationship of the number of costae to the number of septa is a species-defining characteristic. In some species, the number of costae is equal to the number of septa, whereas in others due to the presence of exocostae, the number of costae is twice the number of the septa. Exocostae were defined as a subcategory of costae characterized by the absence of a septal counterpart (ZAMAN, 2012). Regarding their confluence, there exists a rather wide variability as the occurrence of the "subconfluent" character state (= state between "confluent" and "non confluent") cleary indicates a great variability.

Auriculae and granulae

The development of auriculae is variable among plocoid corals. The terminology used for their description is based on the initial work of GILL (1977), which was later completed by ZAMAN and LATHUILIÈRE (2011). Figure 2 gives the distinctive characters of the main types of auriculae. Size and shape as well as frequency of their development vary in each genus. In *Cyathophora*, auriculae are absent. In *Solenocoenia*, they are developed most feebly, whereas in *Bracthelia* they are abundant and large. According to increasing development of auriculae, the genera dealt with in the current work form the succession *Solenocoenia-Adelocoenia-Stylina-Heliocoenia-Bracthelia*. In the first two genera, the auriculae are both hastiform to koutaliform and poorly developed. In *Stylina*, koutaliform auriculae are dominant. In *Heliocoenia*, koutaliform auriculae are dominant as well but, in addition, they are more frequently associated with the development of "*tigelles*" (= small rods that stand off of the auriculae, connecting septa with the columella; as defined by GILL, 1977). Flabelliform auriculae are dominant in *Bracthelia.*

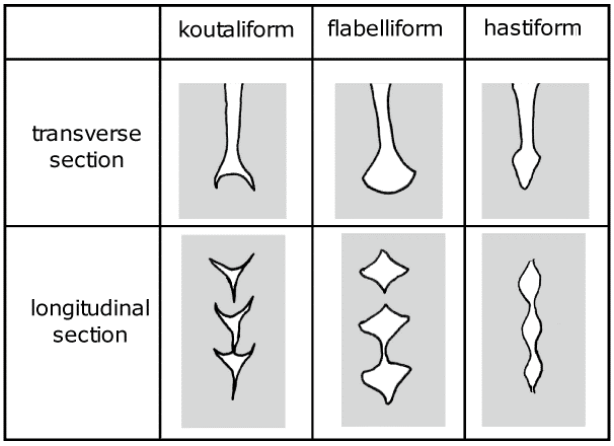

Figure 2: Different types of auriculae recognized from standard sections of inner edge of septa.

With regard to the general development of septal ornamentation, the genera follow the same pattern: from most weakly developed in *Solenocoenia* to most elaborately developed in *Bracthelia*.

Geometry of the septal apparatus

The geometry of the septal apparatus varies in different taxa according to two distinct criteria. One is characterized by either the predominance of bilaterality (*Heliocoenia*, *Bilaterocoenia* MORYCOWA, 1974) or axial symmetry (*Stylina*, *Adelocoenia*, *Solenocoenia*, *Cyathophora*). The other criterium is the order of symmetry of the corallite axis, septa are generally arranged in symmetries of 6, 8 and 10. This is true for plocoid genera with or without a columella, but also occurs in phaceloid genera of the family Stylinidae ORBIGNY, 1851. Other types of symmetrical developments are rather rare and found only in a few cases, for instance *Adelocoenia novemseptata* (RONIEWICZ, 1966), known from a single nonameral specimen, or *Pseudocoenia breviseptata* RONIEWICZ, 1976, which is generally octameral but can have corallites with hexameral or heptameral septal developments. In addition, it seems that in some species with octameral septal development, hexameral or tetrameral arrangements occur in early septal developmental stages (ZAMAN, 2012, Pl. XXIV).

Shape of interseptal chambers

ZAMAN (2012) distinguished several morphological types of interseptal chambers: triangular, box-like ("en boîte"), and round. He considered that this character could be significant at the species rank. Based on the observation of these patterns and their variability, we rather suggest that these shapes are related to the capacity of corals to produce their skeletal carbonate. Angular morphologies (triangular and box-like) are related to low production rates and round chambers are rather linked to high production rates. These parameters can be driven by ontogeny and environmental conditions. The same kind of ecophenotypic variations are observed today in transplanted *Montastrea annularis* (ELLIS & SOLANDER, 1786) (BUDD FOSTER, 1980, Fig. 3).

Canals

The presence of canals has been considered as one of the synapomorphic characters of species of *Solenocoenia* (RONIEWICZ, 1976, p. 112). RONIEWICZ (2008, p. 131), followed by ZAMAN (2012, tabl. 48), even considered this character to be of such great importance among scleractinian corals that it justified the establishing of a new family, the Solenocoeniidae. These canals have been described in detail by RONIEWICZ (1976, p. 112). Nevertheless, two issues need to be taken into further consideration. First, the well-known species *S. sexradiata* (GOLDFUSS, 1826), which was initially grouped with the genus *Solenocoenia*, has no canals. LAUXMANN (1991, p. 116) and BARON-SZABO (2014, p. 79) observed that in specimens of *S. sexradiata* from the type locality (Upper Jurassic of southern Germany) the distribution of canals was much too irregular within the same colony and also among different colonies of this species to justify that this feature could be used as a taxonomic criterion. Our observations confirm the latter conclusion. It seems that these canals are present only in some particular species of plocoid corals, for instance we never find them in *Adelocoenia* which has exocostae. Consequently, we prefer to interpret these canals as the result of symbiotic or commensal relationships between *Solenocoenia*-like corals and an unknown soft-bodied organism. This conclusion is based on the fact that, because the canals are filled with dissepiments, they cannot be considered to be the result of post-mortem bioerosion.

The whole set of characters described above confirms the placement of *Adelocoenia* within the family Stylinidae ORBIGNY, 1851. The most obvious synapomorphies are the septal microstructure and the presence of auriculae. Furthermore, we see no more reason to place *Solenocoenia* in a separate family as it has been proposed (RONIEWICZ, 2008) and no reason to place together *Solenocoenia* and *Adelocoenia* in a separate family Solenocoeniidae without synapomorphic characters as proposed by LÖSER (2016).

3. Material, methods and abbreviations

The material included in the current studies is housed at the following institutions:

- CPUN Collections Paléontologiques Universitaires de Nancy, Vandoeuvre-lès-Nancy (France),
- FSL Université Claude Bernard Lyon1 (France),
- Geological Museum of Cairo (Egypt),
- IGPS Institute of Geology and Paleontology, Sendai/ Tohoku University Museum (Japan),
- IPB Institut für Paläontologie Bonn (Germany),
- LPB (FGGUB) Laboratory of Paleontology, Faculty of Geology and Geography, University of Bucharest (Romania),
- MG Museu Geológico Lisboa (Portugal),
- MGL Musée de Géologie, Lausanne (Switzerland),
- MHNG Musée d'Histoire naturelle de Genève (Switzerland),
- MJSN Musée Jurassien des Sciences Naturelles, Porrentruy (Switzerland),
- MNHN Muséum national d'Histoire naturelle, Paris (France),
- MSNUP Museo di Storia Naturale, Universita di Pisa, Calci (Italy),
- NHMUK (formerly BM [NH]) Natural History Museum, London (UK),
- NHMW Naturhistorisches Museum in Wien (Austria),
- NIGP Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (China),
- NMB Naturhistorisches Museum in Basel (Switzerland),
- NMBE Naturhistorisches Museum Bern (Switzerland),
- PU Museo di Geologia e Paleontologia dell' Universita di Torino (Italy),
- RUC Rajasthan University Jaipur (India.
- SAZU Paleontological Institute of the Slovene Academy of Sciences and Arts, Ljubljana (Slovenia),
- CAMSM Sedgwick Museum Cambridge (UK),
- SMF Forschungsinstitut Senckenberg, Senckenberg Museum, Frankfurt/Main (Germany),
- SMNS Staatliches Museum für Naturkunde Stuttgart (Germany),
- SNSB-BSPG Bayerische Staatssammlung für Paläontologie und Geologie, Munich (Germany),
- ÚÚG Ústředního Ústavu Geologického (Geological Institute), University of Prague (Czech Republic),
- ZPAL Polish Academy of Sciences, Institut of Paleobiology, Warsaw (Poland).

For open nomenclature we follow the recommendations by BENGSTON (1988, p. 226):

- Genus? = genus uncertain;
- Genus species? = species uncertain.

Abbreviations

* = first description of taxon.

v = the material has been studied by at least one of the authors.

p = partial synonymy.

Dimensions:

D = diameter of calices;

c-c = distance of corallite centers;

Ns = number of septa;

Nc = number of costae;

De = density of endothecal dissepiments.

Septal formula of 6S1 + 6S2 + nS3 means: 6 septa of the first size order, 6 septa of the second size order, and a variable number of septa of the third size order.

4. The genus *Adelocoenia* and its type species

Adelocoenia ORBIGNY, 1849, p. 7.

Originally included species: only *Astrea castellum* MICHELIN, 1844.

Type species: *Astrea castellum* MICHELIN, 1844, p. 118, Pl. 27, fig. 4, by original monotypy.

Short diagnosis: Plocoid Stylinidae without columella, one-zoned endotheca and a weak development of ornamentation and auriculae.

Synonymy: We propose here that the vast majority of the species assigned to *Pseudocoenia* based on the usage of the genus as defined by RONIEWICZ (1966) closely correspond to the taxonomic concept of *Adelocoenia*. The present concept of *Adelocoenia* is also in accordance with recent usages of the term by LÖSER (2016, p. 151) and BARON-SZABO (2018, p. 76). The name *Pseudocoenia* itself as defined by the type specimen of its type species is not a synonym of *Adelocoenia* (see remarks under the description of "*Pseudocoenia bernardina*"). In addition to the species formerly grouped with *Pseudocoenia*, the genus *Elasmophora* ALLOITEAU, 1958, is also considered as a junior synonym of *Adelocoenia*. Furthermore, a significant number of species which were originally grouped with the genus *Cryptocoenia* by KOBY (1881) are also transferred here to *Adelocoenia*. However, the type species of *Cryptocoenia* (*Astrea alveolata* GOLDFUSS, 1826) itself is placed with *Cyathophora*.

Status: available and valid.

Adelocoenia castellum (MICHELIN, 1844)

(Fig. 3)

Originally included specimens: MICHELIN mentioned the two collections of MICHELIN and MOREAU, which included syntypes from the Oxfordian (Upper Jurassic) of three localities in France: Bay-Bel (Ardennes), Goussaincourt (Meuse), and Sampigny (Meuse). The number of samples was not specified.

Type material: original syntypes at MNHN are lost. We designate herein a neotype. It is MNHN. F.M00001 (MICHELIN coll.) from the Oxfordian of Stenay, Ardennes, France.

Type locality: Oxfordian of Stenay, Ardennes, France.

Remarks: The concept of *Adelocoenia* by ALLOITEAU was based on a topotype from Sampigny he selected from the collection of ORBIGNY no. 4452 - MNHN.F.A09413. In 1966, RONIEWICZ erroneously considered this specimen as a neotype.

In order to clarify the taxonomic position of *Adelocoenia*, we see no solution other than to carry out a correct designation of a valid neotype. In complying with the ICZN rules (ICZN Art. 75.3. 1-7), we clarify the following issues.

1. We affirm that the designation of a neotype is necessary in order to establish a clear characterization of the type species, thereby defining the genus *Adelocoenia*, and providing the basis for distinguishing it from closely corresponding taxa, especially *Pseudocoenia*.
2. The following characters have been identified: massive plocoid corallum. Radial elements are compact, free, bicuneiform costosepta, nonconfluent, mostly attenuated (occasionally a small enlargement at the inner edge), straight, unequal in length and clearly organized according to an octameral plan with 8 major septa and 8 minor septa. Bilateral arrangement might occur as a result of elongation of both calices and calicular fossae. The ornamentation of septa is very weak and the initial relief of the ornamentation becomes smooth as a result of thickening deposits. Secondary trabecular axes irregularly emerge from the mid-septal plan toward the septal faces. No pali. Endotheca made of tabulae or tabuloid dissepiments, rarely vesicular. Peritheca made of vesicular dissepiments. Columella absent but a clear central subcircular fossa present (in one out of 32 corallites, however, structures are present which may or may not correspond to a columella). Wall parathecal, developed in continuity with thickening deposits of septa.

Dimensions:

Diameter of colony 11 cm; height of the colony: 12.5 cm.

Diameter of calices: lumen: 2.2 to 3.2 mm; middle of the wall 3.2- to 4.1 mm; external diameter (from costa to costa): 4.1 to 5.4 mm.

Number of septa: 16.

Septal density (measured at the wall): 1-2 per mm.

3. The specimen designated here as neotype is MNHN.F.M00001 (MICHELIN coll.) of Stenay (Ardennes) (Oxfordian) and figured on Figure 3.
4. We decided to designate a neotype because, as already stated by ALLOITEAU (1949, p. 701), the original type series appears to be lost. After numerous attempts carried out over a long period of time by the authors of the current work in the MNHN collections to track down the original material, we as well came to the conclusion that the original type series has to be considered lost.
5. The specimen chosen as the neotype agrees very closely with the original description by MICHELIN (1844, p. 118). Despite his rather basic description compared to modern ones, we understand from the description that this coral has octameral septal arrangement with two size orders of septa. In addition, in the original figure it can be seen that MICHELIN'S material represents a colonial form that is characterized by 1) plocoid corallite integration, 2) a costulated peritheca, and 3) lacks a columella.
6. In order to comply with the ICZN recommendation 75A, we have looked for a new sample from the same locality or neighbouring localities. In the original work of MICHELIN, the type localities are Bay-bel (Ardennes), Sampigny and Goussaincourt (Meuse). Bay-bel is a locality that does not exist anymore in the Ardennes department. There is a village named Bay in which strata occur that are Cretaceous in age. The development of the strata at the localities of Sampigny and Goussaincourt are associated with the middle Oxfordian reefal event. The specimen we selected from MICHELIN's collection is labelled Stenay (Ardennes). Despite the fact that it is a place without any known reefal sediments, it is located in the type area in the vicinity of these previously mentioned middle Oxfordian reefs. We assume that the specimen was most likely derived from one of the small localities nearby Stenay. Further reason for selecting this specimen is its excellent state of preservation, especially when compared to contemporaneous reefal material, including the topotype of ORBIGNY's collection mentioned under remarks above.
7. The neotype designated herein is housed at MNHN Paris under MNHN.F.M00001.

Synonymy of *Adelocoenia castellum* (MICHELIN, 1844):

v* 1844 *Astrea castellum* MICHELIN, p. 118, Pl. 27, fig. 4.
1848 *Stylina* ? *castellum* (MICHELIN) - MILNE EDWARDS & HAIME, p. 292.
1849 *Adelocoenia castellum* (MICHELIN) - ORBIGNY, p. 7.
1850 *Adelocoenia castellum* (MICHELIN) - ORBIGNY, p. 32.
v 1850 *Pseudocoenia suboctonis* - ORBIGNY, p. 34.
v 1850 *Pseudocoenia digitata* - ORBIGNY, p. 34.
1851b *Stylina castellum* (MICHELIN) - MILNE EDWARDS & HAIME, p. 59.
v 1851b *Stylina digitata* (ORBIGNY) - MILNE EDWARDS & HAIME, p. 61.
1851b *Stylina* ? *suboctonis* (ORBIGNY) - MILNE EDWARDS & HAIME, p. 61.
1857 *Stylina* sub*octonaria* (ORBIGNY) - MILNE EDWARDS, p. 248.
1857 *Stylina castellum* (MICHELIN) - MILNE EDWARDS, p. 243.
1861 *Speudocoenia* ? *suboctonis* (suboctonaria) ORBIGNY - FROMENTEL, p. 192.
v 1864 *Stylina Waldeckensis* ÉTALLON, p. 372, Pl. 52, fig. 7.
non 1864 *Stylina castellum* (MICHELIN) - ÉTALLON, p. 366, Pl. 51, fig. 7.
v non 1864 *Stylina octosepta* ÉTALLON - ÉTALLON, p. 369, Pl. 51, fig. 12.
1865 *Stylina* ? *suboctonaria* (ORBIGNY) - FROMENTEL, p. 22.
? 1865 *Stylina castellum* (MICHELIN) - FROMENTEL, p. 21.
1865-1869 *Stylina solida* (MCCOY) - EICHWALD, p. 133.
v 1880 *Cryptocoenia colturensis* ACHIARDI, p. 297, Pl. 20, fig. 3.
v 1881 *Cryptocoenia octosepta* ÉTALLON - KOBY, p. 91, Pl. 29, fig. 1.
1881 *Cryptocoenia octonaria* ORBIGNY - KOBY, p. 92, Pl. 18, figs. 4-5.
1888 *Cryptocoenia octosepta* ? (ÉTALLON) - SOLOMKO, p. 153.
v 1889 *Convexastraea schardti* KOBY, p. 469, Pl. 122, figs. 1-3.
v 1889 *Cryptocoenia waldeckensis* (ÉTALLON) - KOBY, p. 466, Pl. 125, fig. 5.
v non 1897 *Stylina waldeckensis* ÉTALLON - OGILVIE, p. 172, Pl. 17, fig. 3.
1913 *Cryptocoenia Böhmi* PRATZ in SPEYER, p. 211, Pl. 21, fig. 10-10a.
v 1931 *Pseudocoenia digitata* ORBIGNY - COTTREAU, p. 160/28.
v 1931 *Pseudocoenia suboctonis* ORBIGNY - COTTREAU, p. 158.
1937 *Cryptocoenia octosepta* (ÉTALLON) - MIRCHINK, p. 77.
1949 *Pseudocoenia suboctonis* ORBIGNY - ALLOITEAU, p. 704, Figs. 4-5.
1949 *Adelocoenia heberti* ALLOITEAU, p. 701, Fig. 1.
1949 *Adelocaenia castellum* (MICHELIN) - ALLOITEAU, p. 702, Fig. 2.
v non 1955b *Stylina waldeckensis* ÉTALLON - GEYER, p. 184.
non 1957 *Stylina waldeckensis* ÉTALLON - FRAJOVÁ, p. 53.
1960 *Cryptocoenia octosepta* (ÉTALLON) - BENDUKIDZE, p. 17.
? 1960 *Cryptocoenia octonaria* ORBIGNY - BENDUKIDZE, p. 17.
non 1960 *Cryptocoenia castellum* (MICHELIN) – BENDUKIDZE, p. 18, Pl. 2, fig. 5; Pl. 3, figs. 1-2.
1963 *Stylina castellum* (MICHELIN) - BABAEV & GASANOV, p. 4.
1963 *Cryptocoenia castellum* (MICHELIN) - BABAEV, p. 36.


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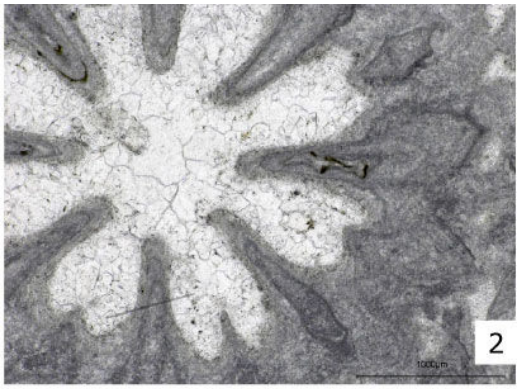
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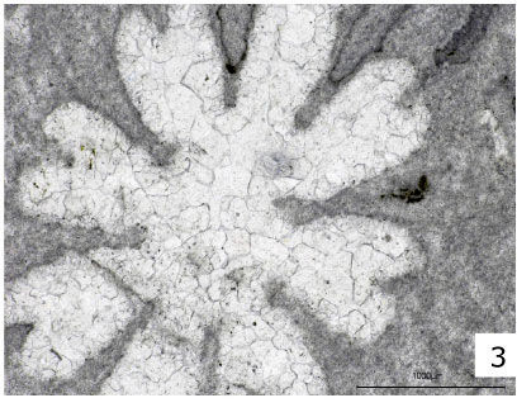
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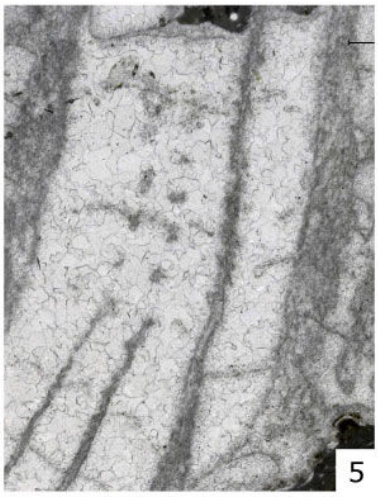
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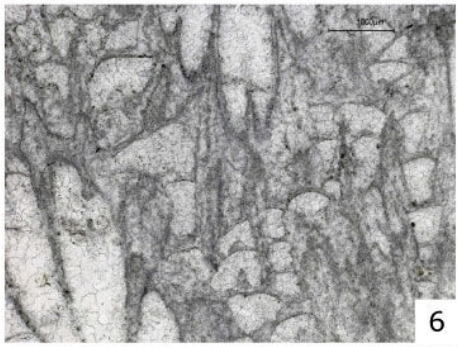
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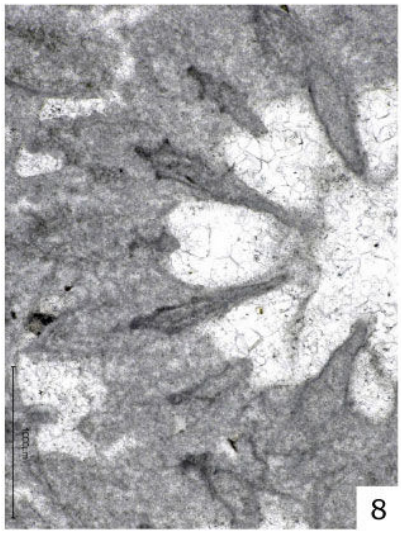
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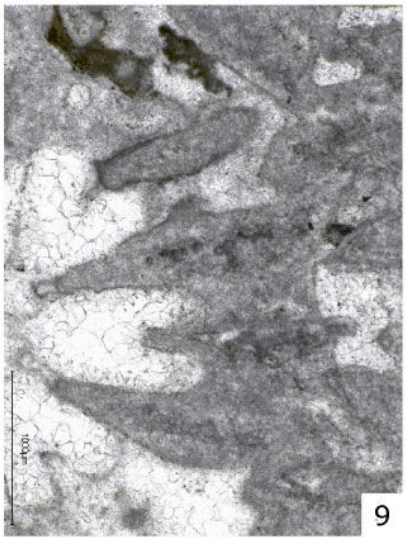
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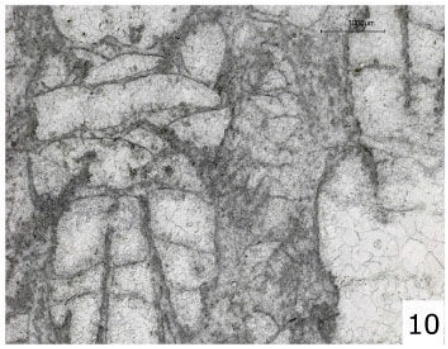
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◀ **Figure 3:** Neotype herein designated of *Adelocoenia castellum* (MICHELIN, 1844), MNHN.F.M00001, type species of *Adelocoenia*; neotype designation herein. 3.1. General view of colony in transverse thin section. 3.2. Close-up of Figure 3.1, showing partly preserved microstructure with growth lines inside septa. 3.3. Close-up of Figure 3.1, showing auriculae. 3.4. Thin section showing general longitudinal view of colony, partially oblique. 3.5. Close-up of Figure 3.4, showing periodic arrangement of poorly developed auriculae. 3.6. Close-up of Figure 3.4, showing microstructural features in form midseptal black lines. 3.7. Close-up of Figure 3.4, showing the inclination of trabecular axes within costae (center of the photo). 3.8. Close-up of Figure 3.1, showing both structure of septa and section of a tabula. 3.9. Remains of trabecular axes in the mid-septal plan. 3.10. Close-up of Figure 3.4, showing both tabulae and inclination of trabecular axes.

1963 *Cryptocoenia octosepta* (ÉTALLON) - BABAEV, p. 36.
1963 *Stylina* (*Convexastrea*) *somaensis* MORI, p. 57, Pl. 21, figs. 4-5.
1964 *Adelocoenia heberti* ALLOITEAU - BEAUVAIS, p. 119, Pl. 2, fig. 8.
1964 *Pseudocoenia octonaria* ORBIGNY - BEAUVAIS, p. 122, Pl. 5, figs. 4-5.
1965 *Stylina castellum* (MICHELIN) - GEYER, p. 231.
1966 *Pseudocoenia suboctonis* ORBIGNY - RONIEWICZ, p. 185, Figs. 6-7; Pl. 4, figs. 1-2.
1967 *Cryptocoenia castellum* (MICHELIN) - BABAEV, p. 140.
1967 *Cryptocoenia octosepta* (ÉTALLON) - BABAEV, p. 140.
1973 *Cryptocoenia octosepta* (ÉTALLON) - BABAEV, p. 77, Pl. 3, fig. 4.
1973 *Cryptocoenia castellum* (MICHELIN) - BABAEV, p. 74, Pl. 3, fig. 1.
1975 *Adelocoenia schardti* (KOBY) - BEAUVAIS, p. 32.
? 1980 *Cryptocoenia suboctonis* (ORBIGNY) - LJULEVA & PERMYAKOV, p. 134, Pl. 63, figs. 1-2.
1981 *Pseudocoenia* cf. *suboctonis* ORBIGNY - TURNŠEK in TURNŠEK & MIHAJLOVIĆ, p. 16, Pl. 10, figs. 1-2.
non 1982 *Cryptocoenia castellum* (MICHELIN) – BENDUKIDZE, p. 11.
1982 *Cryptocoenia* cf. *octosepta* (ÉTALLON) – BENDUKIDZE, p. 11, Pl. 1, fig. 4.
1985 *Cryptocoenia octosepta* (ÉTALLON) - LIAO & XIA, p. 138, Pl. 5, figs. 4-5; Pl. 6, fig. 2.
1985 *Pseudocoenia suboctonis* ORBIGNY - ROSENDAHL, p. 35, Pl. 3, fig. 4.
1988 *Pseudocoenia suboctonis* (ORBIGNY) - FEZER, p. 87.
1990 *Pseudocoenia suboctonis* ORBIGNY - ERRENST, p. 171, Pl. 3, fig. 7a-b.
1991 *Cryptocoenia castellum* (MICHELIN) - LEBANIDZE, p. 8, Pl. 1, fig. 1.
1991 *Cryptocoenia suboctonis* ORBIGNY - LEBANIDZE, p. 9, Pl. 1, fig. 2.
1994 *Cryptocoenia octosepta* (ÉTALLON) - LIAO & XIA, p. 144, Pl. 36, fig. 3; Pl. 37, figs. 2-4.
1994 *Pseudocoenia suboctonis* ORBIGNY - ELIÁŠOVÁ, p. 66.
2001 *Pseudocoenia* cf. *suboctonis* ORBIGNY - REUTER *et al.*, p. 37.
2001 *Pseudocoenia suboctonis* ORBIGNY - LATERNSER, p. 162.
2002 *Adelocoenia somaensis* (MORI) - LÖSER & MORI, p. 82, Fig. 1.6.
2003 *Pseudocoenia suboctonis* ORBIGNY - HELM *et al.*, p. 82.

Remarks: *Stylina castellum* (MICHELIN) in ÉTALLON, 1864, is excluded from the synonymy because it has 32 costae. In addition, it seems to have a columella. In having a very low number of septa (8-10), the material assigned to *Cryptocoenia castellum* (MICHELIN) in BENDUKIDZE (1960, 1982) is excluded here. Because, in addition to features seen in *Adelocoenia*, the material assigned to *Cryptocoenia suboctonis* (ORBIGNY) in LJULEVA & PERMYAKOV (1980) also shows characteristics of *Cyathophora*, it is only tentatively grouped with the species *castellum*.

Synonymized nominal species:

- *Pseudocoenia suboctonis* ORBIGNY, 1850

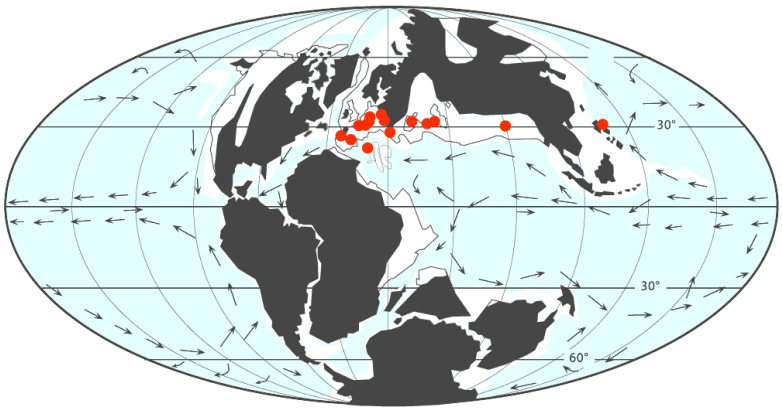
Type material: lectotype MNHN.F.A53898 designated by ALLOITEAU, 1949 (ICZN art. 74.5). Type locality: Oxfordian-Kimmeridgian of Tonnerre (France).

Remarks: S3 visible as costae only in adult stages; granules on lateral faces and enlarged inner edges forming auriculae clearly visible in longitudinal section. Endotheca with tabulae fairly constant, vesicular dissepiments present only in peritheca.

- *Pseudocoenia digitata* ORBIGNY, 1850

Type material: syntypes MNHN.F.A09448 MNHN.F.A09449 MNHN.F.A09450 MNHN.F.A09451; thin section of the last specimen available.

Type locality: Upper Jurassic from Tonnerre (Yonne, France).



◀ **Figure 4:** Paleobiogeographical distribution of *A. castellum* (MICHELIN, 1844). For the following maps, the paleoposition of continents corresponds to Dogger. Note that, consequently, a detailed palaeogeography of every chron is not displayed. Paleogeographic map and currents adapted form HAQ & EYSINGA (1987).

Dimensions of the type specimens:

A09451: D = 1.1 -1,3mm; c-c = 1.4-2.2 mm septal formula = 8S1 + 8S2.

A09449: D = 1.9- 2.6 mm, c-c = 3.2-4.6 mm septal formula = S1 + 8S2 + C3 (preserved in a very few places).

A09448: an imprint (moldic porosity). D = 1.4 mm, c-c = 1.8-4.2 mm, septal formula developed in the pattern of Nc = 2Ns (number of costae twice the number of septa).

A09450 groups several specimens, 2 thin sections are available: D = 1.3-2 mm; c-c = 2.4-4 mm. Septal formula = 8S1 + 8S2.

Remarks: The species has never been described in detail and the dimensions of its skeletal elements were unknown until now. This species was synonymized with *Astrea limbata* Goldfuss, 1826, by Cottreau (1931, p. 160/28), a decision that was subsequently accepted by Roniewicz (1966). While the colonial shape of *digitata* is similar to *limbata*, the development of both septal formula and dimensions of skeletal elements in *digitata* more closely correspond to *A. castellum.*

- *Stylina waldeckensis* Étallon, 1864

Type material: syntype *Stylina waldeckensis* (coll. Thurmann MJSN O106).

Type locality: Kimmeridgian of Waldeck, Croix dessus? (Switzerland).

As already mentioned by Étallon (1864), despite its dominant octameral character, the septal symmetry varies in *A. waldeckensis* as it is hexameral in young corallites which is clearly visible in the syntype. The original drawing by Étallon suggests the presence of a columella which, however, could not be confirmed for the syntype that was investigated by the authors of the current work. The material from Štramberk described by Ogilvie (1897) differs from *S. waldeckensis* in having a columella.

- *Cryptocoenia colturensis* Achiardi, 1880

Type material: holotype by monotypy. MSNUP no. I 2520.

Type locality: lower Tithonian of Monte Cavallo, Italy.

- *Convexastraea schardti* Koby, 1889

Type material: among the three available syntypes, MGL. Geolreg 4020, 2B, 8/1, 4965, we designate here as the lectotype the material figured by Koby (1889, Pl. 122, fig. 1) which corresponds to the largest specimen.

Type locality: Couches à *Mytilus* (Bathonian), Rochers des Rayes and Chateau d'Oex, Switzerland.

Remarks: inner edges of septa are clearly ornamented.

- *Cryptocoenia boehmi* Pratz in Speyer, 1913

Type material: holotype by monotypy, probably lost (SNSB-BSPG, Munich) (last attempt to track down the material by one of the authors [RBS] carried out in March of 2019).

Type locality: Upper Jurassic, Kehlheim, Germany.

Status: Because the number of costae is unknown, the species cannot be reliably compared to other species.

- *Adelocoenia heberti* Alloiteau, 1949

Type material: type specimen (MNHN coll. Hebert, not found. Beauvais (1964, p. 119) described the microstructure, suggesting that a thin section was available.

Type locality: Oxfordian-Kimmeridgian of Tonnerre (Yonne, France).

- *Stylina (Convexastrea) somaensis* Mori, 1963

Type material: holotype IGPS 85531.b.

Type locality: Oxfordian-Kimmeridgian of Minaminosawa, Soma city, Fukushima Prefecture, Japan.

Remarks: Löser & Mori (2002) suggested the possible synonymy with *Pseudocoenia suboctonis* Orbigny, 1850.

Paleobiogeography of *A. castellum* (Fig. 4): Bathonian of Switzerland; Oxfordian of France, Switzerland, Azerbaijan, Georgia, Poland, Czech Republic, Germany; Kimmeridgian of Germany, Spain, Georgia, France, Switzerland, Portugal; Oxfordian or Kimmeridgian of Japan, Portugal; Kimmeridgian-Tithonian of Crimea; Tithonian of Crimea; Upper Jurassic of Azerbaijan, Crimea, Italy, Tibet; Barremian of Serbia.

5. Further Jurassic species grouped with *Adelocoenia*

Due to the very large number of nominal taxa, the revision in the present paper is restricted to species that have their type material originating from the Jurassic. A revision of the Cretaceous nominal taxa will be presented in a separate work.

5.1. Hexameral species of *Adelocoenia*

Adelocoenia bacciformis (Michelin, 1846)

(Fig. 5)

Type material: syntype MNHN.F.M00045 (coll. Michelin). L. Beauvais (1967, p. 13) mentioned a lost holotype and designated a neotype. In fact, no holotype was ever designated but a syntype has now become available (illustrated on the MNHN website). Consequently, the neotype designated by Beauvais is invalid.

Type locality: Bathonian of Langrune (France).

Dimensions of the type specimen (from Beauvais, 1967, p. 13): D = 1-1.5mm, c-c = 1.5-2mm depth of corallite 0.2 mm Ns = 12, Septal formula = 6S1 + 6S2, Nc = 12.

v* 1846 *Astrea bacciformis* Michelin, p. 225; Pl. 54, fig. 11.

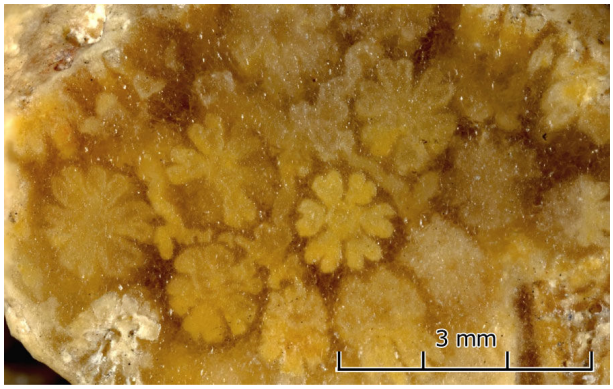


Figure 5: Syntype of *A. bacciformis* (MICHELIN, 1846), MNHN.F.M00045, polished distal surface.

1848 *Stylina* ? *bacciformis* (MICHELIN) - MILNE EDWARDS & HAIME, p. 292.
1850 *Cryptocoenia bacciformis* (MICHELIN) - ORBIGNY, p. 322.
pars 1850 *Prionastraea limitata* ORBIGNY t. 1 - ORBIGNY, p. 322 (according to BEAUVAIS, 1967).
1851a *Convexastrea waltoni* - MILNE EDWARDS & HAIME, p. 109, Pl. 23, figs. 5-6.
1851 *Cryptocoenia bacciformis* (MICHELIN) - ORBIGNY, p. 164, Fig. 302.
1851b *Stylina* ? *bacciformis* (MICHELIN) - MILNE EDWARDS & HAIME, p. 59.
1857 *Convexastrea waltoni* MILNE EDWARDS & HAIME – MILNE EDWARDS, p. 279.
1857 *Stylina* ? *bacciformis* (MICHELIN) - MILNE EDWARDS, p. 241.
1861 *Convexastrea waltoni* MILNE EDWARDS & HAIME – FROMENTEL, p. 195.
non 1879 *Astrea bacciformis* (MICHELIN) - QUENSTEDT, p. 623, Pl. 166, fig. 13 (has a columella).
1864 *Stylina bernensis* ÉTALLON - ÉTALLON, p. 366, Pl. 51, fig. 5.
1865 *Convexastrea waltoni* MILNE EDWARDS & HAIME – FROMENTEL, p. 22.
? 1883 *Convexastrea waltoni* MILNE EDWARDS & HAIME – TOMES, p. 178.
? 1884 *Convexastrea waltoni* MILNE EDWARDS & HAIME – TOMES, p. 706.
v 1889 *Convexastrea gillieroni* - KOBY, p. 470, Pl. 122, figs. 7-10.
v 1958 *Elasmophora Collignoni* - ALLOITEAU, p. 32, Pl. 22, figs. 7-8.
1966a *Adelocoenia gillieroni* (KOBY) - BEAUVAIS, p. 119.
v 1967 *Adelocoenia bacciformis* (MICHELIN) - BEAUVAIS, p. 13, Fig. 2 ; Pl. 1, fig. 4; Pl. 4, fig. 6.
1970 *Orbignycoenia waltoni* (MILNE EDWARDS & HAIME) – BEAUVAIS, p. 47, Pl. C, fig. 1; Pl. D, fig. 4.
1971 *Adelocoenia bacciformis* (MICHELIN) - BEAUVAIS, p. 2.
1971 *Adelocoenia gillieroni* (KOBY) - BEAUVAIS, p. 2.
1971 *Orbignycoenia waltoni* (MILNE EDWARDS & HAIME) – BEAUVAIS, p. 2.
1975 *Adelocoenia gillieroni* (KOBY) - BEAUVAIS, p. 32.
1983 *Adelocoenia bacciformis* (MICHELIN) - BEAUVAIS, p. 47, Pl. 3, fig. 2.
1984 *Adelocoenia bacciformis* (MICHELIN) - BEAUVAIS, p. 26.
1989 *Adelocoenia bacciformis* (MICHELIN) - BEAUVAIS, p. 257.

Status: valid.

Synonymized nominal species:

- *Convexastrea waltoni* MILNE EDWARDS & HAIME, 1851a

Type material: lectotype designation by BEAUVAIS (1970, p. 47) by inference of specimen CAMSM no. J 5843 as holotype. In his list of types, WOODS (1891, p. 1) mentioned two syntypes. Type locality: Great Oolite (Bathonian) of Hampton Cliff near Bath (Somerset, UK).

- *Convexastrea gillieroni* KOBY, 1889

Type material: syntypes MGL, Geolreg4011, 2B, 8/1, 4964.

Type locality: Couches à *Mytilus* (Bathonian), Rochers des Rayes and Chateau d'Oex, Switzerland.

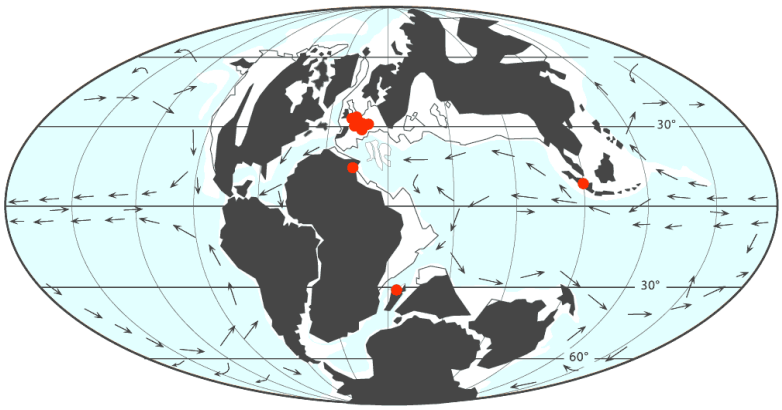
- *Elasmophora collignoni* ALLOITEAU, 1958

Type material: holotype by original designation; MNHN.F.M05061.

Type locality: Callovian of Amboromihanto, Madagascar.

Remarks: ALLOITEAU (1958, p. 31) created the new genus *Elasmophora* (type species *E. collignoni*). In order to clarify whether ALLOITEAU's genus belonged to *Adelocoenia* or *Solenocoenia*, the polished surface of the holotype was studied, revealing structures that support our proposed synonymy with *Adelocoenia*. In contrast to the original description, the septal formula is 6S1 + 6S2, Nc = 12 (and not 24 as stated by ALLOITEAU, 1958).

Paleobiogeography of *A. bacciformis* (Fig. 6): Bajocian? of England and France; Bathonian of England, France; Callovian of Madagascar, Switzerland, Tunisia; Dogger of Indonesia (Sumatra); Oxfordian of Switzerland.



◀ **Figure 6:** Paleobiogeographical distribution of *A. bacciformis* (MICHELIN, 1846).

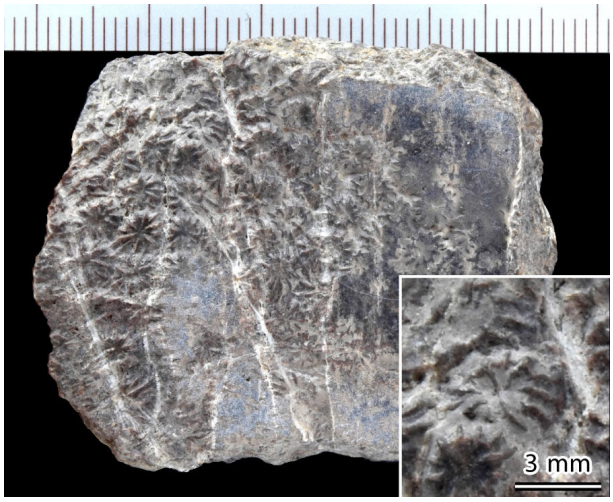


Figure 7: Lectotype of *A. bachmanni* (KOBY, 1881), NMBE 5015320.

Adelocoenia bachmanni (KOBY, 1881)

(Fig. 7)

Type material: lectotype fixed by inference of a holotype (ICZN 74.6) in BEAUVAIS (1966b, p. 992), coll. KOBY, Museum Bern.

Type locality: Couches à *Mytilus*, Bathonian of Boltigen.

Dimensions of the type specimen, from BEAUVAIS (1966b, p. 992): D = 2.3-3mm, c-c = 2.8-5 mm Ns = 12, septal formula = 6S1 + 6S2, Nc = Ns.

v* 1881 *Convexastraea bachmanni* KOBY, p. 103, Pl. 23, fig. 5.
v 1905a *Convexastrea kiliani* KOBY - KOBY, p. 854, Pl. 54, fig. 1.
1958 *Adelocoenia madagascariensis* ALLOITEAU, p. 19, Pl. 8, fig. 4; Pl. 22, fig. 16; Pl. 25, fig. 5.
1966b *Adelocoenia bachmanni* (KOBY) - BEAUVAIS, p. 992, Pl. 2, fig. 1.
1971 *Adelocoenia bachmanni* (KOBY) - BEAUVAIS, p. 2.
1975 *Adelocoenia bachmanni* (KOBY) - BEAUVAIS, p. 32.
1987 *Adelocoenia bachmanni* (KOBY) - BEAUVAIS in MANIVIT, tab. B 15a.

Status: valid. However, assignment to *Solenocoenia* cannot be excluded. Only the study of a longitudinal section of the type material could clarify its taxonomic position.

Synonymized nominal species:

- *Convexastrea kiliani* KOBY, 1905a

Type material: holotype MNHN.F.A32027 (coll. KOBY).

Type locality: Bathonian of Roquefort Clamarquier (Alpes Maritimes, France) (figured on the MNHN website).

- *Adelocoenia madagascariensis* ALLOITEAU, 1958

Type material: holotype MNHN.F.M05007 (coll. BASSE).

Type locality: upper Bathonian-lower Callovian of Ankazomiheva, Madagascar (figured on the MNHN website).

Paleobiogeography of *A. bachmanni* (Fig. 8): Bathonian of France; Bathonian or Callovian of Switzerland (Couches à *Mytilus*); upper Bathonian-lower Callovian of Madagascar; Callovian of Tunisia; Oxfordian of Saudi Arabia.

Adelocoenia compressa (KOBY, 1881), nov. comb.

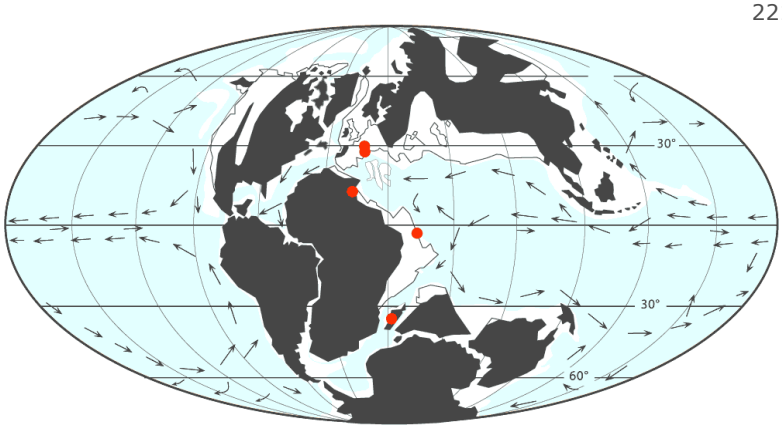
(Fig. 9)

Type material: lectotype by inference of a holotype in BEAUVAIS (1966b, legend of Pl. 3; Pl. 31, fig. 1), NMBE 5015323 figured by KOBY (1881, Pl. 31, fig. 2) is the lectotype, NMBE 5015322 is the paralectotype.

Type locality: Couches à *Mytilus*, Bathonian of Boltigen (Switzerland).

Dimensions of the lectotype specimen according to BEAUVAIS (1966b, p. 993): D = 0.8-2 mm; up to 2.3 mm for the whole corallite according to our observation; c-c = 1-2.8 mm, Ns = 12 + s, septal formula = 6S1 + 6S2 + nS3 (often abortive), Nc = up to 24 according to our observation.

pars 1850 *Prionastraea limitata* ORBIGNY - ORBIGNY, p. 32.
v* 1881 *Cryptocoenia compressa* KOBY, p. 87, Pl. 31, figs. 1-2.
1883 *Cryptocœnia microphylla* TOMES, p. 179, Pl. 7, fig. 2.
1884 *Cryptocœnia microphylla* TOMES - TOMES, p. 708.
1894 *Convexastrea waltoni* MILNE EDWARDS & HAIME – KOBY, p. 9, Pl. 3, figs. 3-5.
1897 *Cryptocoenia compressa* KOBY - OGILVIE, p. 180.
? 1964 *Cryptocoenia compressa* KOBY - KOLOSVÁRY, p. 221.



◀ **Figure 8:** Paleobiogeographical distribution of *A. bachmanni* (KOBY, 1881).

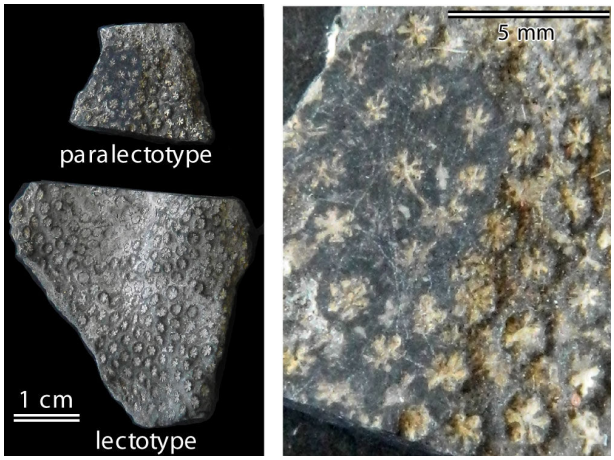


Figure 9: Lectotype of *A. compressa* (KOBY, 1881), NMBE 5015323.

1966a *Adelocœnia microphyllia* (TOMES) - BEAUVAIS, p. 119.
1966b *Adelocoenia microphyllia* (TOMES) - BEAUVAIS, p. 992, Pl. 2, fig. 2.
1966b *Adelocoenia microphyllia* var. *compressa* (KOBY) – BEAUVAIS, p. 993, Pl. 3, fig. 1; Pl. 4, fig. 1.
1967 *Adelocoenia microphyllia* (TOMES) - BEAUVAIS, p. 14, Pl. 1, fig. 6.
1971 *Adelocoenia microphyllia* (TOMES) - BEAUVAIS, p. 3.
1975 *Adelocoenia microphylla* (TOMES) - NEGUS & BEAUVAIS, p. 188, Pl. 1, fig. 2.
1975 *Adelocoenia microphyllia* var. *compressa* (KOBY) – BEAUVAIS, p. 32.
non 1983 *Adelocoenia microphyllia* (TOMES) - KRASNOV, p. 83, Fig. 38.
1987 *Adelocoenia microphyllia* (TOMES) - BEAUVAIS in MANIVIT, tab. B 15a.
1993 *Adelocoenia microphyllia* (TOMES) - BEAUVAIS & NOUIOUAT, p. 310, Pl. 3, fig. 2; Pl. 4, fig. 1.

Remarks: *A. compressa* differs from both *A. bachmanni* and *A. bacciformis* by the number of costae, which is 12 in *A. bachmanni* and *A. bacciformis*.

Status: valid.

Synonymized nominal species:

- *Cryptocoenia microphylla* TOMES, 1883

Type material: lectotype NHMUK R8473 fixed by NEGUS and BEAUVAIS (1975, p. 188) (inference of a holotype). In her previous work, while syntypes were available, BEAUVAIS (1967, p. 14) erroneously mentioned a holotype but gave no specimen number, making it impossible to identify a lectotype by inference of a holotype according to the ICZN 74-6. Type locality: Bathonian of Fairford (Gloucestershire, UK).

Remarks: Assignment to *Solenocoenia* is not excluded, especially with regard to the material described in BEAUVAIS (1966b, p. 992, Pl. 2, fig. 2f). Because the material assigned to "*A. microphyllia*" in KRASNOV (1983, Fig. 38) has a styliform columella, it is excluded from the synonymy of *A. microphylla*. KOLOSVÁRY (1964, p. 221) mentioned material he assigned to the species *compressa* from the Upper Jurassic of Romania, neither providing sufficient information nor giving any illustration. Therefore, the synonymy of this material is doubtful.

Paleobiogeography of *A. compressa* (Fig. 10): Bathonian of Switzerland, France, England, Saudi Arabia; Callovian of Tunisia; Middle Jurassic of Algeria; Upper Jurassic of the Czech Republic? and Romania?

Adelocoenia luciensis (ORBIGNY, 1850)

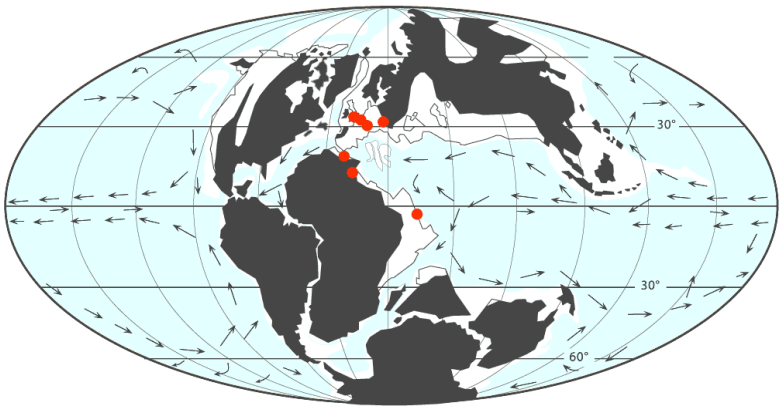
(Fig. 11)

Type material: lectotype MNHN.F.R54523 designated by BEAUVAIS (1967, p. 15), inference of a holotype ICZN (Art. 74-6). The material mentioned in BEAUVAIS (1966a, p. 12/124) is unrecognizable (no number and no photo).

Type locality: Bathonian of Luc sur mer, Normandy, France.

Dimensions of the type specimen: D = (1.5) 2-2.5 mm, c-c = 3.5-6.5 mm, Ns = 24-26, septal formula = 6S1 + 6S2 + 12S3 abortive + nS4, Nc = 24

v* 1850 *Cryptocoenia luciensis* - ORBIGNY, p. 322.
1851b *Stylina* ? *luciensis* (ORBIGNY) - MILNE EDWARDS & HAIME, p. 60.
1851a *Cyathophora luciensis* (ORBIGNY) - MILNE EDWARDS & HAIME, p. 107, Pl. 30, fig. 5.
1857 *Cyathophora luciensis* (ORBIGNY) - MILNE EDWARDS, p. 272.
? 1857 *Cyathophora luciensis* (ORBIGNY) - QUENSTEDT, p. 554, Pl. 72, fig. 11.
1861 *Cryptocoenia lucensis* ORBIGNY - FROMENTEL, p. 199.
1865-1869 *Cyathophora luciensis* (ORBIGNY) - EICHWALD, p. 140, Pl. 9, fig. 9.
? 1879 *Cyathophora luciensis* (ORBIGNY) - QUENSTEDT, p. 622, Pl. 166, fig. 12.



◀ **Figure 10:** Paleobiogeographical distribution of *A. compressa* (KOBY, 1881).

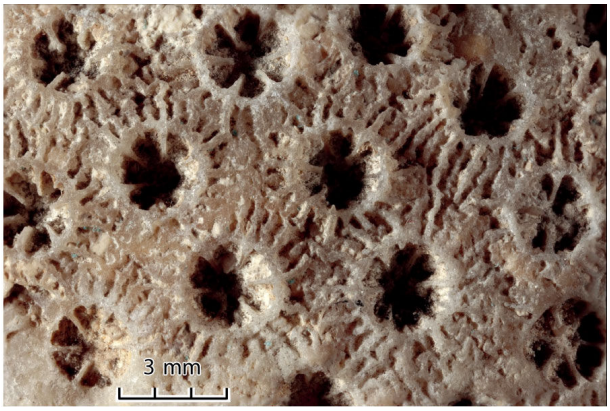


Figure 11: Lectotype of *A. luciensis* (ORBIGNY, 1850), MNHN F R54523.

1881 *Cryptocænia luciensis* ORBIGNY - TOMES, p. 156, 161.
1907 *Cryptocoenia luciensis* ORBIGNY - KOBY, p. 8.
v 1913 *Cryptocoenia luciensis* ORBIGNY - COTTREAU, p. 176, Pl. 32, figs. 9-11.
v 1958 *Cryptocoenia luciensis* ORBIGNY - ALLOITEAU, p. 30, Pl. 27, figs. 1, 9.
1964 *Adelocoenia luciensis* (ORBIGNY) - ALLOITEAU & FARAG, p. 59, Pl. 3, fig. 2.
1966a *Cryptocœnia luciensis* ORBIGNY - BEAUVAIS, p. 11 / 123.
v 1967 *Cryptocoenia luciensis* ORBIGNY - BEAUVAIS, p. 15.
1971 *Cryptocoenia luciensis* ORBIGNY - BEAUVAIS, p. 3.
1980 *Cyathophora luciensis* (ORBIGNY) - LJULEVA & PERMYAKOV, p. 127, Pl. 49, fig. 6, 7; Pl. 50, figs. 1-2.

Remarks: Because the material described in QUENSTEDT (1857, p. 554; 1879, p. 622) seems to show an S2 development that differs from ORBIGNY's species, it is grouped with *A. luciensis* only tentatively. In the lectotype of *A. luciensis*, especially in the proximal face of the colony, tabulae do exist and there is no two-zoned endotheca. S1 is occasionally slightly enlarged at the inner edge.

Status: valid.

Paleobiogeography of *A. luciensis* (Fig. 12): Bathonian of France, England, ?Germany, Madagascar; Callovian of Egypt, Crimea (Ukraine), Callovian? of Tunisia.

Adelocoenia tenuistriata (KOBY, 1889), nov. comb.

(Fig. 13)

Type material: syntypes MGL, Geolreg 4012, 2B, 8/1, 4965 (coll. SCHARDT and RITTENER). We designate here as the lectotype the specimen shown in fig. 14 on Pl. 122 of KOBY (1889), which is the best preserved specimen.

Type locality: Couches à *Mytilus*, Bathonian Rochers des Rayes / Château d'Oex (Switzerland).

Dimensions of the lectotype: D = 3-4mm, c-c = 4-8 mm, septal formula = 6S1 + 6S2 + 12S3, Nc = 32-48.

v* 1889 *Cryptocoenia tenuistriata* KOBY, p. 465, Pl. 122, figs. 13-15.
v 1907 *Cryptocoenia delaunayi* KOBY, p. 7, Pl. 2, figs. 8-9.
1964 *Adelocoenia trisexradiata* ALLOITEAU & FARAG, p. 61, Pl. 4, fig. 2.
v 1972a *Pseudocoenia delaunayi* (KOBY) - BEAUVAIS, p. 46, Pl. A, fig. 8.
v 1972a *Pseudocoenia kobyi* BEAUVAIS, p. 47, Pl. A, fig. 9.
v 1975 *Cryptocoenia tenuistriata* KOBY - BEAUVAIS, p. 32.

Status: valid.

Synonymized nominal species:

- *Cryptocoenia delaunayi* KOBY, 1907

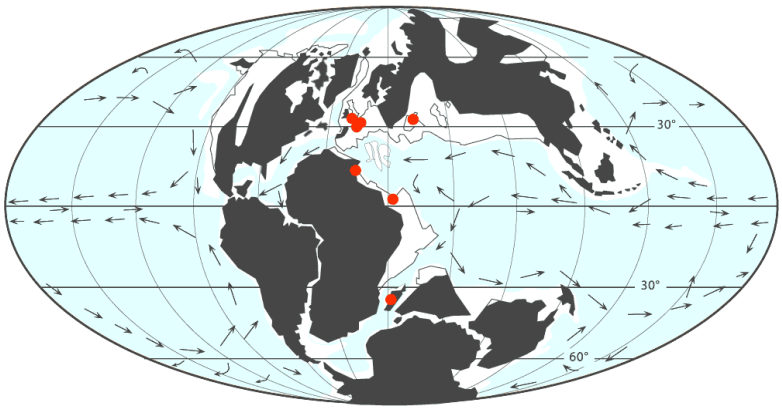
Type material: figured syntypes are available in Basel NMB under the inventory numbers D 6449 and 6450. In addition, a non-figured syntype is stored in Paris MNHN.F.B47514. A "neoholotype" proposed by BEAUVAIS (1972a, p. 14/46) cannot be accepted as a neotype because, among other reasons, syntypes are available. Because one of the syntypes seems to rather belong to the family Cyathophoridae, we designate herein the sample D6450 as the lectotype.

Type locality: Bathonian of Saint-Gaultier (Indre, France).

- *Adelocoenia trisexradiata* ALLOITEAU & FARAG, 1964

Type material: syntype. Geological Museum of Cairo (Egypt) under no. 25210-25268.

Type locality: Jeham (Risan Aneiza, Egypt).



◀ **Figure 12:** Paleobiogeographical distribution of *A. luciensis* (ORBIGNY, 1850).

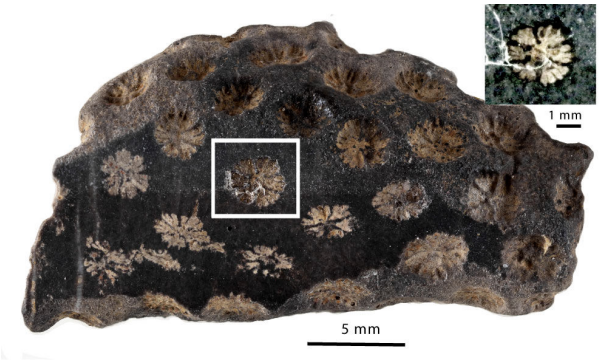


Figure 13: Lectotype of *A. tenuistriata* (KOBY, 1889), MGL Geolreg 4012, 2B, 8/1, 4965. Enlargement of a calice with reprocessed image.

- *Pseudocoenia kobyi* BEAUVAIS, 1972a

Type material: holotype by original designation MNHN.F.B47515.

Type locality: Bathonian of Saint-Gaultier (Indre, France).

Paleobiogeography of *A. tenuistriata* (Fig. 14): Bathonian of France; Callovian of Switzerland; Oxfordian-Kimmeridgian of Egypt.

Adelocoenia fallax (BECKER, 1875), nov. comb.

Type specimen: lost. A specimen considered as a syntype (= SMNS 60019) is figured on the website of the Museum in Stuttgart.

http://www.dbsmns.naturkundemuseum-bw.de/dev5/anzeigen.php?is=12&inv=60019&objekt=14382

However, it seems very unlikely that this sample is the figured syntype. According to the original description by BECKER (1875, p. 142, Pl. 36, fig. 12a-b), the species *fallax* is characterized by a septal formula of 6S1 + 6S2, whereas the specimen SMNS 60019 shows septa that are octamerally arranged. We have searched collections of various museums and paleontological institutions for a specimen corresponding to the description of BECKER in order to designate a neotype, but without success. The only samples available in the Stuttgart collection that, within a certain range, corresponds to the diagnosis by BECKER (1875) are specimens identified by GEYER.

Type locality: Kimmeridgian or Tithonian of Nattheim (Germany).

Dimensions of the type specimen: D = 0.6-1 mm according to BECKER; 1-1.5 mm according to GEYER, septal formula = 6S1 + 6S2, Nc = 24 costae.

Non-revised synonymy:

p 1866 *Stylina limbata* (GOLDFUSS) - BÖLSCHE, p. 451.
* 1875 *Stylina fallax* BECKER, p. 142, Pl. 36, fig. 12.
1877 *Stylina fallax* BECKER - STRUCKMANN, p. 536.
1878 *Stylina fallax* BECKER - STRUCKMANN, p. 26.
1881 *Cryptocoenia thiessingi* KOBY - KOBY, p. 86, Pl. 29, fig. 2.
1881 *Cryptocoenia compressa* KOBY - KOBY, p. 87, Pl. 31, figs. 1-2.
1914 *Stylina fallax* BECKER - SCHÖNDORF, p. 135.
1954 *Stylina fallax* BECKER - GEYER, p. 131.
1955b *Stylina fallax* BECKER - GEYER, p. 184.
1966 *Pseudocoenia fallax* (BECKER) - RONIEWICZ, p. 181, Pl. 9, fig. 4.
v. 1991 *Stylina ? fallax* BECKER - LAUXMANN, p. 120.

Status: doubtful (awaiting a redefinition on the basis of a neotype).

Adelocoenia parvistella ALLOITEAU, 1961

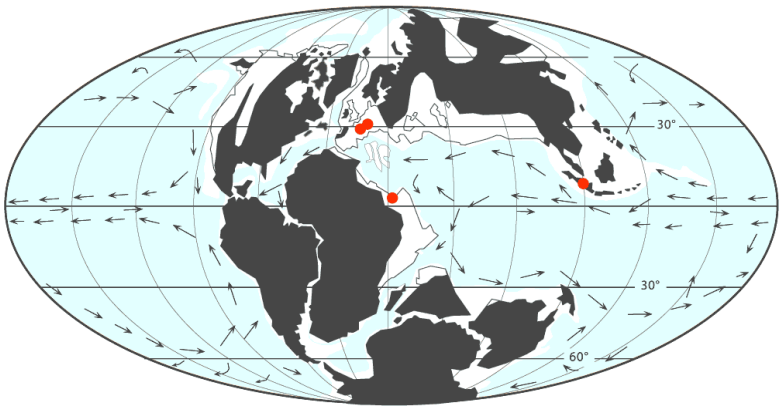
(Fig. 15)

Type material: holotype MNHN.F.R10866 (coll. DURAND-DELGA).

Type locality: Tithonian of La Querola (Spain).

Dimensions of the holotype: D = 1-1.75 mm, c-c = 1.25-2 mm, septal formula = 6S1 + 6S2, Nc = 12 and higher.

v* 1961 *Adelocoenia parvistella* ALLOITEAU, p. 289, Pl. 9, fig. 5; Pl. 10, fig. 9.
1972 *Pseudocoenia slovenica* TURNŠEK, p. 164, 227, Pls. 4-5.
1976 *Pseudocoenia slovenica* TURNŠEK - RONIEWICZ, p. 48, Pl. 5, fig. 5.
1981 *Pseudocoenia slovenica* TURNŠEK - ELIÁŠOVÁ, p. 125, Pl. 8, figs. 3-4.
1982 *Pseudocoenia slovenica* TURNŠEK - PAPOYAN, p. 65
1985 *Pseudocoenia slovenica* TURNŠEK - ROSENDAHL, p. 34, Pl. 3, fig. 2.
1990 *Pseudocoenia slovenica* TURNŠEK - ERRENST, p. 168, Pl. 3, fig. 1.



◀ **Figure 14:** Paleobiogeographical distribution of *A. tenuistriata* (KOBY, 1889).

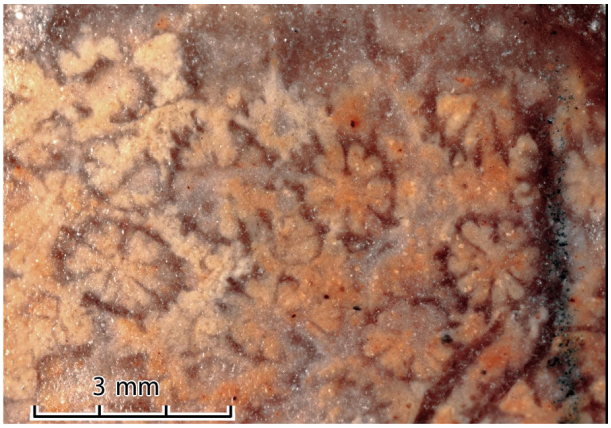


Figure 15: Holotype of *A. parvistella* (ALLOITEAU, 1961), MNHN.F.R10866.

v 1997 *Pseudocoenia slovenica* TURNŠEK - TURNŠEK, p. 171.
2001 *Pseudocoenia* cf. *slovenia* TURNŠEK - REUTER *et al.*, p. 37.
2001 *Pseudocoenia* cf. *slovenica* TURNŠEK - LATERNSER, p. 162.
2002 *Pseudocoenia slovenica* TURNŠEK - KASHIWAGI *et al.*, p. 10, Fig. 5.2.
? 2003 *Pseudocoenia slovenica* TURNŠEK - HELM *et al.*, p. 83, Fig. 7A.
p.? 2003 *Pseudocoenia slovenica* TURNŠEK - PANDEY & FÜRSICH, p. 27, Pl. 5, fig. 5; Pl. 6, figs. 1-6.
non 2003 *Pseudocoenia* cf. *slovenica* TURNŠEK - PANDEY & FÜRSICH, p. 27, Pl. 4, fig. 4.
2015 *Pseudocoenia slovenica* TURNŠEK - KOŁODZIEJ, p. 182.

The species is characterized by D = 0.8 to 1.5 mm and a septal formula of 6S1 + 6S2.

Status: we consider the species as valid. However, the taxonomic clarification of either *A. fallax* or *A. delemontana* could impact this status.

Remarks: In *Adelocoenia parvistella*, auriculae are present which clearly distinguishes it from genera such as *Cyathophora* (including its junior synonym *Cryptocoenia*). This represents an important fact, since ALLOITEAU (1958) also erected a species *Cryptocoenia parvistella*, using material from the Cretaceous of Madagascar (MNHN.F. M05039; and thin sections). Because the latter is here considered to belong to *Cyathophora*, the species is not a junior homonym.

Synonymized nominal species:

- *Adelocoenia slovenica* (TURNŠEK, 1972)

Type material: holotype by original designation SAZU P304.

Type locality: upper Oxfordian-lower Kimmeridgian of Col (Slovenia).

Some of the specimens from the Jurassic of Iran assigned to this species by PANDEY and FÜRSICH (2003, p. 27), are considered to be *Solenocoenia* (for instance material shown on Pl. 6, fig. 5). In addition, it should be noted that these authors place within *A. slovenica* material having dimensions that significantly differ from *slovenica* (*e.g.*, specimen SNSB-BSPG 1999VIII 874: D: 1.5-2.3 mm; and specimen SNSB-BSPG 1999VIII 1085: D: 1.5-2.6 mm). The consequence of such a wide grouping would be a much wider stratigraphic range for this species.

Paleobiogeography of *A. parvistella* (Fig. 16): Oxfordian of Germany, France; upper Oxfordian of Romania; Oxfordian-Kimmeridgian of Slovenia; lower Kimmeridgian of Romania; Kimmeridgian-Tithonian of Spain, Tithonian of Portugal; Tithonian-Berriasian of the Czech Republic and Poland; Upper Jurassic of Armenia and Japan; Valanginian of Switzerland (Alpstein area; Vitznau marl) (first time record herein; material provided by Peter KÜRSTEINER and Karl TSCHANZ, Switzerland; Naturmuseum St. Gallen, Coll. Peter KÜRSTEINER, NMSG-02.10.23 and 02.10 27 to 02.10.32).

Adelocoenia ? delemontana (KOBY, 1889), nov. comb.

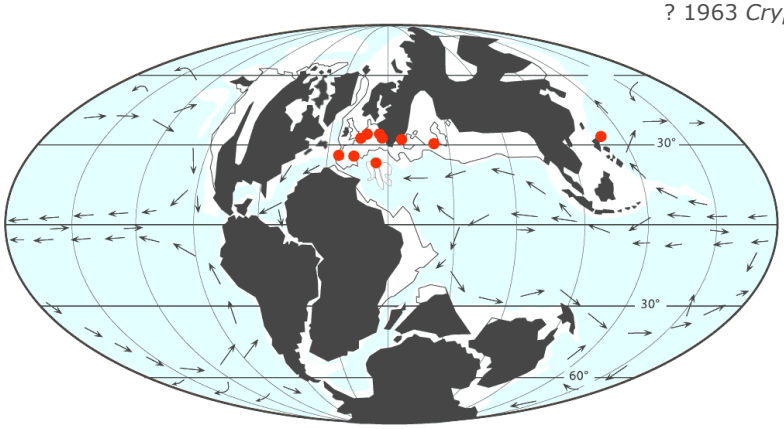
(Fig. 17)

Type material: syntype NMB D4924 (coll. KOBY), very poorly preserved.

Type locality: lower Kimmeridgian ("Ptérocérien") of Courroux Quarry, Vorbourg, near Delémont (Switzerland).

Dimensions of the syntype: D = 1 mm c-c = 2-3 mm, septal formula = 6S1 + 6S2.

v* 1889 *Cryptocoenia delemontana* KOBY, p. 468, Pl. 125, fig. 6 (not fig. 13 as mentioned by error).
non 1960 *Cryptocoenia delemontana* KOBY - BENDUKIDZE, p. 19.
? 1963 *Cryptocoenia delemontana* KOBY - BABAEV, p. 37.



◀ **Figure 16:** Paleobiogeographical distribution of *A. parvistella* ALLOITEAU, 1961.

Figure 17: Syntype of *A.* ? *delemontana* (KOBY, 1889), NMB D4924.

? 1967 *Cryptocoenia delemontana* KOBY - BABAEV, p. 140.

non 1982 *Cryptocoenia* aff. *delemontana* KOBY – BENDUKIDZE, p. 10.

Because the specimens described by BENDUKIDZE (1960, p. 19; 1982, p. 10) from the Upper Jurassic of Georgia (in Caucasus) show octameral (material described in 1960) and decameral (material described in 1982) septal arrangements, they are excluded from the species *delemontana*. In *A. delemontana*, the septa are arranged hexamerally.

Status: The generic assignation is doubtful due to poor preservation.

Paleobiogeography of *A. delemontana*: Kimmeridgian of Switzerland, possibly earlier.

Adelocoenia pustulosa (KOBY, 1905b), nov. comb.

(Fig. 18)

Type specimen: two syntypes are available in Paris: MNHN.F.A32063 is designated herein as the lectotype (Fig. 18) and MNHN.F.A72655 is a paralectotype.

https://science.mnhn.fr/institution/mnhn/collection/f/item/a32063?listIndex=2&listCount=6

Type locality: Upper Jurassic "Couches d'Abbadia" of Casal-Novo, Cesareda and "Coralligène d'Amaral" of Adas Sovellas, Amaral, near Alhandra, Portugal.

Dimensions of the lectotype: D = 1 mm c-c = 2-3 mm Ns = 12, septal formula = 6S1 + 6S2, Nc = 24.

v* 1905b *Cryptocoenia pustulosa* KOBY, p. 37, Pl. 7, figs. 8-10 (but not 5-7 as indicated by error on p. 37).

1955a *Convexastrea pustulosa* (KOBY) - GEYER, p. 324.

1985 *Convexastrea pustulosa* (KOBY) - ROSENDAHL, p. 36.

1995 *Convexastrea pustulosa* (KOBY) - NOSE, p. 109, Fig. 84.

Status: valid.

Remarks: *A. pustulosa* is distinguished from other *Adelocoenia* species by its: 1) rather small corallite diameter of 1 mm; 2) hexameral symmetry; 3) presence of non-confluent costae; and 4) the corallum shape, forming gibbose cylindrical branches.

Paleobiogeography of *A. pustulosa*: known only from the Kimmeridgian of Portugal.

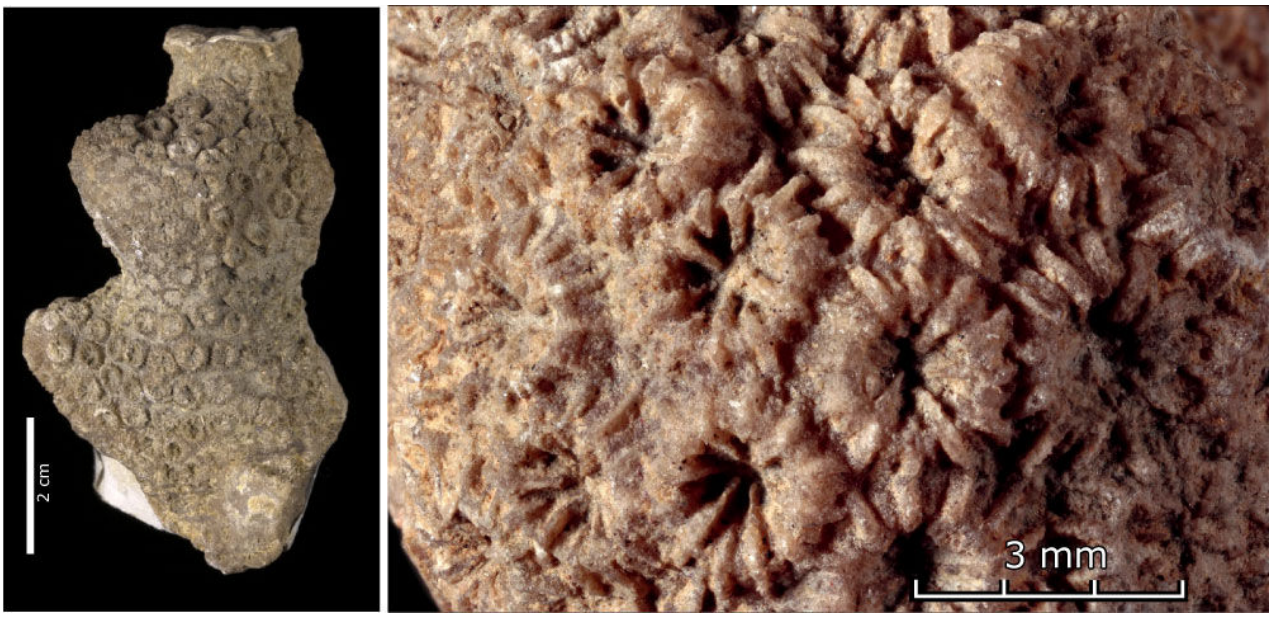


Figure 18: Lectotype of *A. pustulosa* (KOBY, 1905b), MNHN.F.A32063.

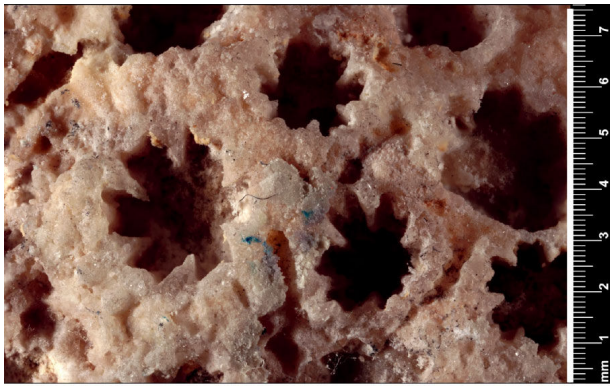


Figure 19: Lectotype of *A. radisensis* (ORBIGNY, 1850), MNHN.F.R09326.

Adelocoenia radisensis (ORBIGNY, 1850)

(Fig. 19)

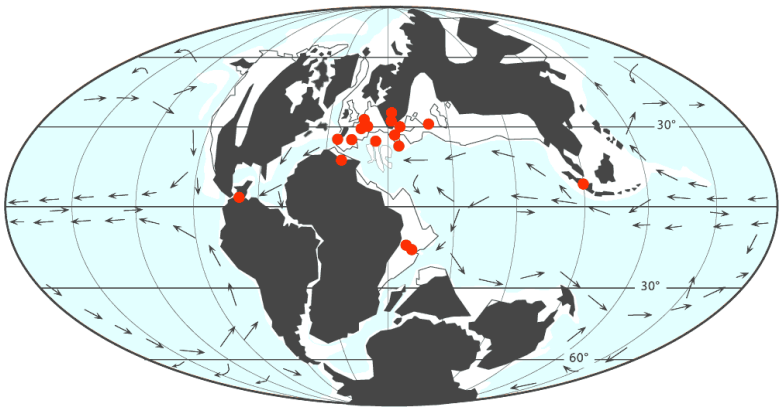
Type material: lectotype MNHN.F.R09326 designated by COTTREAU, 1931 (p. 158/26).

https://science.mnhn.fr/institution/mnhn/collection/f/item/r09326?listIndex=1&listCount=18

Type locality: Upper Jurassic of Loix (Ile de Ré, Charente, France).

Dimensions of the lectotype: D = 2-3 mm, septal formula = 6S1 + 6S2, Nc = more than 12. Remeasured: D = 1.7 to 3.2 mm c-c = 2.7-5.1 mm.

v* 1850 *Cryptocoenia radisensis* ORBIGNY, p. 33.
1851b *Stylina* ? *radisensis* (ORBIGNY) - MILNE EDWARDS & HAIME, p. 61.
1857 *Stylina radisensis* (ORBIGNY) - MILNE EDWARDS, p. 239.
1861 *Stylina* ? *radicensis* (ORBIGNY) - FROMENTEL, p. 187.
? 1861 *Convexastraea dendroidea* FROMENTEL, p. 195.
v 1881 *Convexastrea meriani* KOBY, p. 102, Pl. 23, figs. 1-4.
1896 *Cryptocoenia Lort-Phillipsii* GREGORY, p. 291.
v 1897 *Convexastraea sexradiata* GOLDFUSS - OGILVIE, p. 179, Pl. 17, fig. 11.
1900 *Stylina lort-phillipsi* GREGORY - GREGORY, p. 31.
1925 *Stylina lort-phillipsi* GREGORY - GREGORY, p. 24.
1925 *Stylina subtabulata* GREGORY - GREGORY, p. 24.
1929 *Stylina lort-phillipsi* GREGORY - LATHAM, p. 274.
v 1931 *Cryptocoenia radisensis* ORBIGNY - COTTREAU, p. 157, Pl. 61, fig. 5.
non 1932 *Stylina* aff. *ablensis* ÉTALLON n.f. ? - ZUFFARDI-COMERCI, p. 56, Pl. 1, fig. 1.
1935 *Stylina lort-phillipsi* GREGORY - THOMAS, p. 28, Pl. 2, figs. 8-9.
1935 *Stylina macfadyeni* THOMAS, p. 28, Pl. 2, fig. 10 a, b, c.
p 1943 *Stylina macfadyeni* THOMAS - WELLS, p. 42, Pl. 6, fig. 3.
1943 *Stylina* sp. cf. *S. lort-phillipsi* GREGORY - WELLS, p. 43.
1954 *Convexastrea meriani suevica* GEYER - GEYER, p. 135, Pl. 9, fig. 9.
? 1956 *Stylina radicensis* ORBIGNY - LAFUSTE, p. 167.
1961 *Adelocoenia meriani* KOBY - BEAUVAIS, p. 2265.
? 1964 *Adelocoenia dendroidea* FROMENTEL - BEAUVAIS, p. 118.
1964 *Cryptocoenia nivernensis* BEAUVAIS, p. 125, Pl. 7, fig. 6.
1964 *Adelocoenia meriani* (KOBY) - BEAUVAIS, p. 120, Fig. 27; Pl. 4, figs. 3-5.
1965 *Convexastrea meriani* KOBY - GEYER, p. 231.
p 1966 *Pseudocoenia hexaphyllia* (ORBIGNY) - RONIEWICZ, p. 182, Pl. 2, fig. 1.
1966 *Pseudocoenia* cf. *radisensis* (ORBIGNY) - RONIEWICZ, p. 182.
? 1968a *Convexastraea dendroidea* FROMENTEL - GEYER, p. 16, Pl. 1, fig. 5.
? 1968b *Convexastraea dendroidea* FROMENTEL - GEYER, p. 76.
v 1972b *Cryptocoenia nivernensis* BEAUVAIS - BEAUVAIS, p. 95.
1972 *Pseudocoenia radisensis* (ORBIGNY) - TURNŠEK, p. 163, 226, Pl. 3, figs. 3-4.
1974 *Cryptocoenia nivernensis* BEAUVAIS - BONNEAU *et al.*, p. 75.
1976 *Solenocoenia meriani* (KOBY) - RONIEWICZ, p. 112.
? 1976 *Pseudocoenia dendroidea* FROMENTEL - RONIEWICZ, p. 113.
1976 *Pseudocoenia radisensis* (ORBIGNY) - RONIEWICZ, p. 49, Pl. 4, fig. 4ab.
1981 *Pseudocoenia beskidena* ELIÁŠOVÁ, p. 125, Pl. 5, fig. 2; Pl. 6, fig. 12.
1982 *Cryptocoenia radisensis* ORBIGNY - BENDUKIDZE, p. 11, Pl. 2, fig. 1a-b.
? 1984 *Pseudocoenia radisensis* (ORBIGNY) - BEAUVAIS, p. 24.
1985 *Convexastrea meriani* KOBY - ROSENDAHL, p. 37, Pl. 1, fig. 2.
1985 *Pseudocoenia radisensis* (ORBIGNY) - ROSENDAHL, p. 34, Pl. 3, fig. 1.
1988 *Pseudocoenia radisensis* ORBIGNY - FEZER, p. 87.
? 1989 *Pseudocoenia radiensis* (ORBIGNY) - BEAUVAIS, p. 266, Pl. 64, fig. 2.
1990 *Pseudocoenia beskidena* ELIÁŠOVÁ - ERRENST, p. 168, Pl. 3, fig. 2.



◀ **Figure 20:** Paleobiogeographical distribution of *A. radisensis* (ORBIGNY, 1850).

1990 *Pseudocoenia radiensis* (Orbigny) - Errenst, p. 169, Pl. 3, fig. 3a-b.
1991 *Cryptocoenia radisensis* Orbigny - Lebanidze, p. 11, Pl. 2, fig. 2 a-b.
1993 *Cryptocoenia nivernensis* Beauvais - Beauvais & Nouiouat, p. 311, Pl. 4, fig. 3; Pl. 5, fig. 1.
v 1997 *Pseudocoenia radisensis* (Orbigny) - Turnšek, p. 170.
2001 *Convexastrea meriani* Koby - Laternser, p. 161.
2001 *Pseudocoenia radiensis* (Orbigny) - Laternser, p. 162.
2008 *Pseudocoenia radisensis* Orbigny - Eliášová, p. 153.
2012 *Pseudocoenia radisensis* Orbigny - Morycowa, p. 9, Fig. 4A-D.
v 2018 *Adelocoenia radisensis* Orbigny - Baron-Szabo, p. 77, Pl. 11, fig. D.

Remarks: Study of the lectotype revealed the presence of auriculae. The occurrence of well-developed septa also suggests that the species belongs to *Adelocoenia* rather than *Cyathophora*. This species differs from *A. bachmanni* in having a higher number of costae.

Status: valid.

Synonymized nominal species:

- *Convexastraea*? *dendroidea*? Fromentel, 1861

Type material: syntype lost.

Type locality: Oxfordian-Kimmeridgian of Fedry (Haute-Saône, France).

- *Adelocoenia meriani* Koby, 1881

Type material: according to Greppin's list (1904), the syntypes have the inventory numbers NMB no. 539-542. Beauvais (1964) erroneously mentioned the existence of a holotype but because she did not indicate to which specimen her description referred, the specimen figured by Beauvais (1964, Pl. 4, figs. 3-5) cannot be accepted as a validly fixed lectotype (by inference).

Type locality: Fringeli, Saint-Ursanne, Combe Chavatte, Bourrignon (Terrain à chailles siliceux, Switzerland).

Remarks: The specimen figured by Beauvais (1964) shows neither the occurrence of canals nor the presence of a vesicular endotheca.

- *Cryptocoenia lortphillipsii* Gregory, 1896

Type material: lectotype designated by Thomas (1935, p. 28, inference of a holotype), NHMUK no. R5049.

Type locality: Limestone maritime mountains at Duba, 8 miles south of Berbera (Somaliland). Upper Jurassic, according to Thomas (1935).

Remarks: The species is assigned to *Adelocoenia* on the basis of the figure given by Thomas (1935), clearly indicating the absence of a columella.

- *Stylina macfadyeni* Thomas, 1935

Type material: holotype by original designation NHMUK no. R 30251.

Type locality: Divesian-Argovian of Somaliland, Daghani section (Φ217 of Thomas, 1935).

Wells (1943) described two specimens, one with columella and another one without columella, explaining that the absence or occurrence of a columella is a matter of intracolonial variation. Based on our observations, we disagree with this statement.

- *Cryptocoenia nivernensis* Beauvais, 1964

Type material: holotype by original designation MNHN.F.R10737 (coll. Moreau).

Type locality: Oxfordian le Chalumeau, Alligny-Cosne (Nièvre, France).

Remarks: The number of costae is not twice the number of septa as stated by Beauvais (1964, p. 125).

- *Pseudocoenia beskidena* Eliášová, 1981

Type material: holotype by original designation, ÚÚG no. HF 778, coll. UUG Prague.

Type locality: Tithonian of Stramberk, Czech Republic.

Paleobiogeography of *A. radisensis* (Fig. 20): Oxfordian of Poland, Georgia, Switzerland, Greece; Oxfordian-Kimmeridgian of France, Romania; Oxfordian-Kimmeridgian of Slovenia, Sumatra?, Portugal, Germany; Kimmeridgian of Spain, Germany, Crete, Colombia; Tithonian of Poland; Tithonian-Berriasian of the Czech Republic, "Divesian-Argovian" of Somaliland; Upper Jurassic of Somaliland; Jurassic of Ethiopia and Algeria; upper Berriasian of Switzerland; unknown age of Somaliland.

Adelocoenia hexaphyllia (Orbigny, 1850), nov. comb.

(Fig. 21)

Type specimen: lectotype MNHN.F.R09325.

Type locality: lower Kimmeridgian, La Rochelle (France).

Dimensions of the lectotype: D = 3.5-5 mm, septal formula = 6S1 + 6S2 (+ S3), Nc = 24.

v* 1850 *Cryptocoenia hexaphyllia* Orbigny, p. 33.
1851b *Stylina*? *hexaphyllia* (Orbigny) - Milne Edwards & Haime, p. 60.
1852 *Astrea cavernosa* Schlotheim - Quenstedt, p. 647, Pl. 57, fig. 22.
1857 *Stylina hexaphyllia* (Orbigny) - Milne Edwards, p. 241.
1861 *Stylina hexaphyllia* (Orbigny) - Fromentel, p. 188.
1865 *Stylina hexaphyllia* (Orbigny) - Fromentel, p. 20.
1889 *Convexastrea hexaphyllia* (Orbigny) - Koby, p. 471, Pl. 125, fig. 1.
1909 *Cryptocoenia cassettii* Prever, p. 996, Figs. 10-11.
1913 *Convexastrea* cf. *hexaphyllia* (Orbigny) - Speyer, p. 210.
1931 *Cryptocoenia hexaphyllia* Orbigny - Cottreau, p. 155, Pl. 61, fig. 2.
1956 *Cyathophora hexaphyllia* (Orbigny) - Lafuste, p. 167.
1957 *Cryptocaenia hexaphyllia* (Orbigny) - Lafuste, p. 137.
v 1964 *Cryptocoenia hexaphyllia* Orbigny - Beauvais, p. 126, Pl. 6, fig. 7.

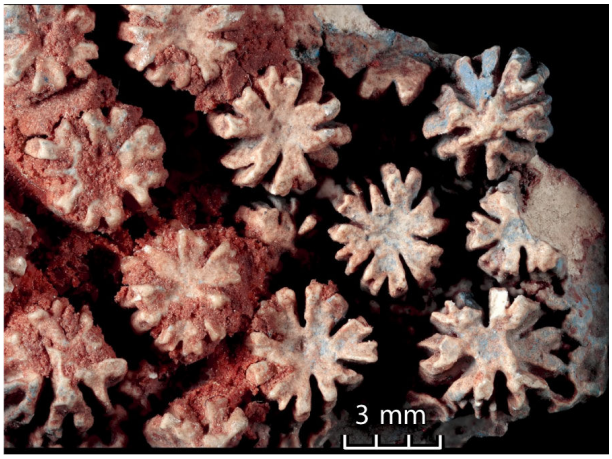


Figure 21: Lectotype of *A. hexaphyllia* (ORBIGNY, 1850), MNHN.F.R09325.

p 1966 *Pseudocoenia hexaphyllia* (ORBIGNY) - RONIEWICZ, p. 182, Pl. 2, fig. 2.
1972 *Pseudocoenia hexaphyllia* (ORBIGNY) - TURNŠEK, p. 162, 226, Pl. 3, figs. 1, 2, 5.
1973 *Pseudocoenia* cf. *hexaphyllia* (ORBIGNY) - TURNŠEK & MIHAJLOVIĆ, p. 96, Pl. 1, figs. 1-2.
1976 *Pseudocoenia hexaphyllia* (ORBIGNY) - RONIEWICZ, p. 50, Pl. 4, fig. 3.
1981 *Pseudocoenia hexaphyllia* (ORBIGNY) - TURNŠEK & MIHAJLOVIĆ, p. 15-16, Pl. 10, figs. 3-4.
1982 *Cryptocoenia hexaphyllia* ORBIGNY - LIAO, p. 158, Pl. 6, fig. 4.
1984 *Pseudocoenia hexaphyllia* (ORBIGNY) - BEAUVAIS, p. 24.
1985 *Pseudocoenia hexaphyllia* (ORBIGNY) - ROSENDAHL, p. 34, Pl. 4, fig. 5.
1985 *Pseudocoenia hexaphyllia* (ORBIGNY) - LIAO & XIA, p. 137, Pl. 4, fig. 4.
1989 *Pseudocoenia hexaphyllia* (ORBIGNY) - BEAUVAIS, p. 266.
1990 *Pseudocoenia hexaphyllia* (ORBIGNY) - ERRENST, p. 169, Pl. 3, fig. 4a-b.
1991 *Cryptocoenia hexaphyllia* (ORBIGNY) - LEBANIDZE, p. 10, Pl. 2, fig. 1.
1993 *Pseudocoenia hexaphyllia* (ORBIGNY)) - LIAO & XIA, p. 207, Fig. 2.11-12.
1994 *Pseudocoenia hexaphyllia* (ORBIGNY) - LIAO & XIA, p. 138-139, Pl. 36, figs. 1-2, 6-7.
v 1997 *Pseudocoenia hexaphyllia* (ORBIGNY) - TURNŠEK, p. 168.
p 2003 *Pseudocoenia hexaphyllia* (ORBIGNY) - PANDEY & FÜRSICH, p. 26, Pl. 3, fig. 2, non fig. 4.
2012 *Pseudocoenia hexaphyllia* (ORBIGNY) - MORYCOWA, p. 9-10, Fig. 4-E.
2015 *Pseudocoenia* cf. *hexaphyllia* (ORBIGNY) – KOŁODZIEJ, p. 182.
v 2018 *Pseudocoenia hexaphyllia* (ORBIGNY) - BARON-SZABO, p. 77, Pl. 11, fig. C.

Remarks: S3 are substantially reduced, their costal counterparts are not always visible.

Status: valid.

Synonymized nominal species:

- *Cryptocoenia cassettii* PREVER, 1909

Type material: syntype: MGPUT 19042 is a little rock sample (fig. 10 of the plate in PREVER) and the two thin sections (Fig. 11, no fig.) are 19042.1 and 19042.2.

Type locality: Upper Jurassic of Calascio (Italy).

Paleobiogeography of *A. hexaphyllia* (Fig. 22): Middle Jurassic - Kimmeridgian of Iran; Oxfordian of France, Poland, Georgia; Oxfordian-Kimmeridgian of Slovenia, Portugal, Tibet; Kimmeridgian of France, Germany, Romania, Spain; Kimmeridgian-Tithonian of Italy; Tithonian of Serbia, Poland; Upper Jurassic of Sumatra; upper Berriasian of Switzerland; Barremian of Serbia, redeposited in Stramberk type Barremian deposits of Poland.

Adelocoenia choffati (KOBY, 1905b), nov. comb.

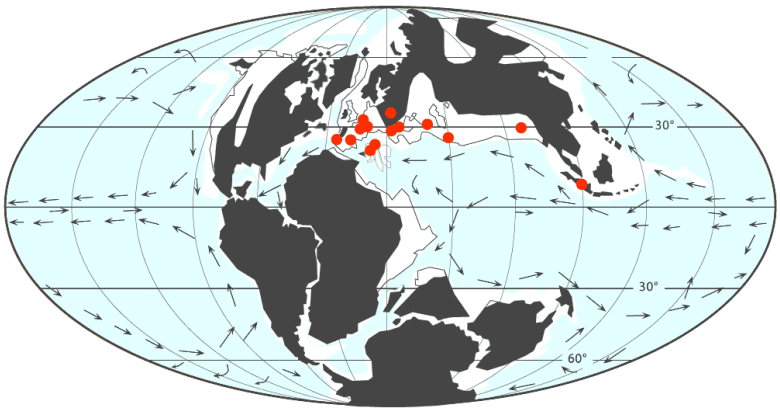
Type material: syntype, probably housed in MG Lisboa.

Type locality: Kimmeridgian of Outeiro Pragao, Barrio (Alcobaça), Portugal.

Dimensions of the original description: D = 5-6 mm (external diameter).

* 1905b *Cryptocoenia choffati* KOBY, p. 35, Pl. 9, figs. 9-10.
1905b *Cryptocoenia lusitanica* KOBY, p. 36, Pl. 7, figs. 8-10.
1955a *Stylina choffati* (KOBY) - GEYER, p. 341.
1964 *Cryptocoenia lusitanica* KOBY - BEAUVAIS, p. 126.
1980 *Cryptocoenia lusitanica* KOBY - LJULEVA & PERMYAKOV, p. 133, Pl. 59, figs. 2-3.

Status: valid.



◀ **Figure 22:** Paleobiogeographical distribution of *A. hexaphyllia* (ORBIGNY, 1850).

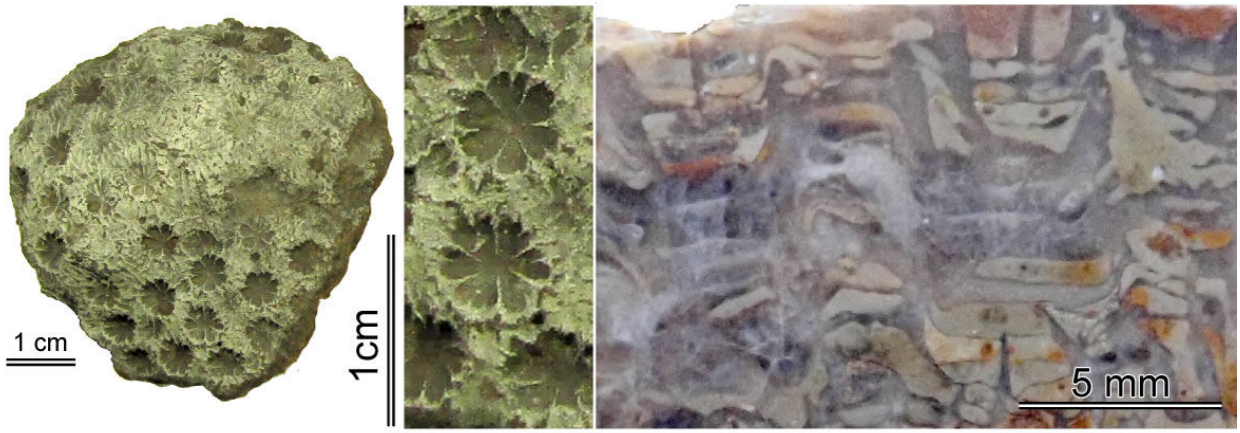


Figure 23: Holotype of *A. wegeneri* (PANDEY & FÜRSICH, 1993), RUC 1992I 248 with enlargement and topotype CPUN002008 in longitudinal section.

Synonymized nominal species:

- *Cryptocoenia lusitanica* KOBY, 1905b

Type material: syntypes MNHN.F.A32138.

Type locality: Kimmeridgian of Cesareda and Carrapateira (Algarve, Portugal).

Remarks: priority is given to *A. choffati* (KOBY, 1905b), based on the decision by GEYER (1955a, p. 341), who was the first revisor.

Paleobiogeography of *A. choffati*: Oxfordian-Kimmeridgian of Portugal, France; Kimmeridgian of Crimea? (occurrence doubtful because material illustrated in LYULEVA & PERMYAKOV [1980] is not from Crimea but represents a reproduction of KOBY's figures).

Adelocoenia wegeneri (PANDEY & FÜRSICH, 1993), nov. comb.

(Fig. 23)

p 1900 *Stylina kachensis* GREGORY - GREGORY, p. 58, Pl. 13, fig. 6 only.
* 1993 *Cryptocoenia wegeneri* PANDEY & FÜRSICH, p. 10, Fig. 8; Pl. 5, figs. 4, 6, 9.
2003 *Cryptocoenia wegeneri* PANDEY & FÜRSICH - PANDEY & FÜRSICH, p. 30, Pl. 3, fig. 7.

Type material: holotype by original designation. Housed at Jaipur. RUC1992 I 248. In addition to original figures used to make the determination, topotypes (CPUN 002007-002009) are available in Nancy for comparative analyses.

Type locality: Bathonian of Kachchh, Gujarat (India).

Dimensions of the holotype: D = 4.5-6 mm, c-c = 5-7 mm, Ns = 15-18, septal formula = 6S1 + nS2, Nc = 18-19.

Status: The number of both septa and costae is atypical for the genus *Adelocoenia* and justifies the validity of the species. It is atypical in the sense that the septa/costae sets are usually arranged in a multiple of 6, 8 or 10 within the genus. In *A. wegneri* the first septal size order is clearly hexameral, made of long distinct septa. The interseptal space created by S1 is filled irregularly by one or two short septa of comparable size orders, resulting in a septal pattern that shows affinities to the genus *Bilaterocoenia* MORYCOWA, 1974. We thought that the species could find its place within the genus *Bilaterocoenia* MORYCOWA, 1974. However, the distribution of S2 is developed much too irregularly and can, therefore, not be considered as a characteristic reliably indicating a bilateral symmetry. The stability of this symmetry remains still to be demonstrated within the genus *Bilaterocoenia* itself.

The variability of features such as columella/columellar space is also a significant feature with regard to Bathonian species of *Adelocoenia*.

Paleobiogeography of *A. wegeneri*: Bathonian of Kachchh (India); Middle Jurassic of Iran (Tabas block, Northern Tethys margin).

5.2. Octameral species of *Adelocoenia*

Adelocoenia lugdunensis (ORBIGNY, 1850), nov. comb.

(Fig. 24)

Type material: lectotype MNHN.F.B09537 designated by THÉVENIN in COTTREAU (1907).

https://science.mnhn.fr/institution/mnhn/collection/f/item/b09537?listIndex=1&listCount=7

Type locality: Sinemurian of Saint-Fortunat, Saint-Didier-au-Mont-d'Or near Lyon (France).

Dimensions of the lectotype: D = 4mm, septal formula = 8S1 + 8S2 + 16S3, Nc = 32.

v* 1850 *Octocœnia Lugdunensis* ORBIGNY, p. 222.
1851b *Stylina* ? *lugdunensis* (ORBIGNY) - MILNE EDWARDS & HAIME, p. 62.
1857 *Stylina* ? *lugdunensis* (ORBIGNY) - MILNE EDWARDS, p. 249.
1861 *Stylina* ? *lugdunensis* (ORBIGNY) - FROMENTEL, p. 192.
v 1907 *Octocœnia lugdunensis* (ORBIGNY) - THÉVENIN, p. 35, Pl. 10, figs. 23-24.

Status: valid.

Figure 24: Lectotype of *A. lugdunensis* (ORBIGNY, 1850), MNHN.F.B09537.

Remarks: Only one specimen is known.

Paleobiogeography of *A. lugdunensis*: Sinemurian of France.

Adelocoenia variseptata BEAUVAIS, 1978

Type material: holotype NHMUK no. R5276.

Type locality: Bathonian of Kachchh, Gujarat (India).

Dimensions of the holotype: D = 2-3 mm c-c = 2.5-3.5mm, septal formula = 8S1 + 8S2 (adults but 6 or 7 S1 and 7-8 S2 in young corallites).

* 1978 *Adelocoenia variseptata* BEAUVAIS, p. 48, Pl. 1, fig. 1.
1991 *Adelocoenia variseptata* BEAUVAIS - PRINZ, p. 176, Pl. 4, fig. 3.

Status: valid.

Paleobiogeography of *A. variseptata*: Bathonian of India; Aalenian of northern Chile.

Adelocoenia arcensis (FROMENTEL, 1861)

Type material: syntype, not found in the MNHN collections.

Type locality: Kimmeridgian (*fide* FROMENTEL) of Arc near Gray (Haute-Saône, France).

Dimensions of the original description: D = 1 mm, Ns = 16, Nc = 16.

* 1861 *Cryptocoenia arcensis* FROMENTEL, p. 199.
? 1995 *Adelocoenia* ? *arcensis* (FROMENTEL) - LÖSER & RAEDER, p. 42.

Status: valid.

Paleobiogeography of *A. arcensis*: Kimmeridgian of France; ?Aptian-Albian of Greece.

Adelocoenia baltovensis (RONIEWICZ, 1966), nov. comb.

Type material: holotype ZPAL no. H III/190.

Type locality: upper Oxfordian of Bałtów (Poland).

Dimensions of the type specimen: D = 3-3.5 mm, c-c = 5-7 mm, septal formula = 8S1 + 8S2, Nc = 32, endothecal density = 12-15/5 mm.

* 1966 *Pseudocoenia baltovensis* RONIEWICZ, p. 186, Pl. 4, fig. 3.
v 1972 *Pseudocoenia baltovensis* RONIEWICZ - TURNŠEK, p. 164, 227, Pl. 6, figs. 1-2.
1985 *Pseudocoenia baltovensis* RONIEWICZ - ROSENDAHL, p. 35, Pl. 3, fig. 5.
v 1997 *Pseudocoenia baltovensis* RONIEWICZ - TURNŠEK, p. 167.
2001 *Pseudocoenia* cf. *baltovensis* RONIEWICZ - REUTER *et al.*, p. 37.
2003 *Pseudocoenia* cf. *baltovensis* RONIEWICZ - HELM *et al.*, p. 83.

Status: Shows close affinities to *A. pistillum* (FROMENTEL, 1861), but is distinguished in having tabulae at a much higher density. These results are based on our observations made in a thin section of the lectotype of *A. pistillum*. The high density of tabulae in *A. baltovensis* justifies its taxonomic validity.

Remark. The species is well figured in RONIEWICZ (1966).

Paleobiogeography of *A. baltovensis* (Fig. 25): middle Oxfordian of Switzerland; upper Oxfordian of Poland, Germany; Oxfordian-Kimmeridgian of Slovenia, Portugal.

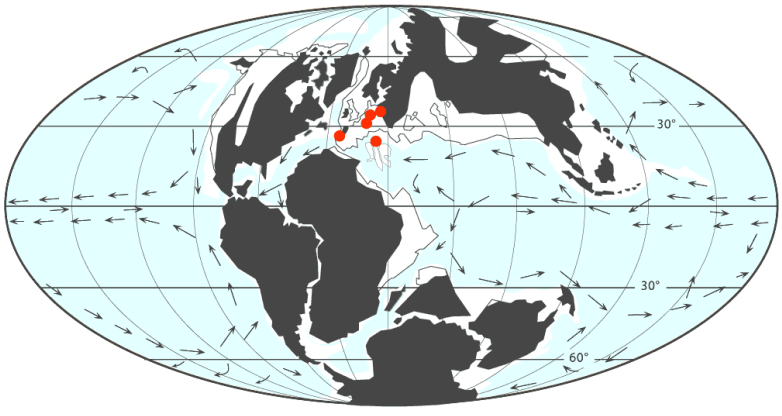
Adelocoenia breviseptata (RONIEWICZ, 1976), nov. comb.

Type material: holotype by original designation LPB 213.

Type locality: lower Kimmeridgian of Topalu (Romania).

Dimensions of the holotype: D = 1.1-1.5 mm, c-c = 2.5-3.5 mm, Ns = 14-16, septal formula = 8S1 + 8S2, but also hexameral and heptameral.

* 1976 *Pseudocoenia breviseptata* RONIEWICZ, p. 50, Pl. 5, figs. 1-3.
1983 *Pseudocoenia breviseptata* RONIEWICZ - BEAUVAIS, p. 43, Pl. 2, fig. 4.



◀ **Figure 25:** Paleobiogeographical distribution of *A. baltovensis* (RONIEWICZ, 1966).

2003 *Pseudocoenia* aff. *breviseptata* RONIEWICZ - PANDEY & FÜRSICH, p. 26, Pl. 4, fig. 5.

Status: valid.

Remark. The species is well figured in RONIEWICZ (1976).

Paleobiogeography of *A. breviseptata*: Bajocian-Bathonian of Iran (but identification *affinis*); Kimmeridgian of Romania; Upper Jurassic of Philippines.

Adelocoenia limbata (GOLDFUSS, 1826), nov. comb.

(Fig. 26)

Type material: holotype IPB, no. 82 coll. GOLDFUSS *Madrepora limbata*. Another specimen housed in Bonn labeled as *Astrea limbata* GOLDFUSS is a sample belonging to the GOLDFUSS collection, but lacks an inventory number. This specimen was published in GOLDFUSS (1829) and does not correspond to the original figure in GOLDFUSS (1826, Pl. 8, fig. 7). It is in slightly better preservation and was assigned to the species *Astrea limbata* (originally described as *Madrepora limbata*) by GOLDFUSS himself.

Type locality: Upper Jurassic of Heidenheim (Germany).

Remarks: GOLDFUSS (1826, p. 22) created the new taxon *Madrepora limbata*. Later in 1829 (p. 110), he revised this species based on additional material, transferring it to the genus *Astrea*, but, at the same time, erroneously referring to it as a new species ("*Astrea limbata* nobis"). That created confusion in that in subsequent works, authors have distinguished or mixed these two names in synonymies in such a confusing or complicated way that it is often difficult to understand to which GOLDFUSS reference they were referring. Here, despite the very problematic preservation of the original material (= holotype) described in 1826 (our Fig. 26), we assume that both samples belong to the same species. For a complete description of the species and a reliable identification of the species we refer to KOBY (1881, p. 94) and RONIEWICZ (1966, p. 183).

Dimensions of the holotype: D = 1.5-2 mm, c-c = 3-5 mm, Ns = 16, septal formula = 8S1 + 8S2, Nc = 32.

v* 1826 *Madrepora limbata* GOLDFUSS, p. 22, Pl. 8, fig. 7.
v 1829 *Astrea limbata* (GOLDFUSS) - GOLDFUSS, p. 110, Pl. 38, fig. 7.
1830 *Tubastrea limbata* (GOLDFUSS) - BLAINVILLE, p. 334.
1836 *Astrea limbata* GOLDFUSS - LAMARCK, p. 410.
1844 *Madrepora sublevis* MICHELIN, p. 111, Pl. 25, fig. 5.
v 1844 *Astrea limbata* GOLDFUSS - MICHELIN, p. 108, Pl. 24, fig. 10.
1846 *Madrepora limbata* GOLDFUSS - LEYMERIE, p. 252.
1848 *Oculina limbata* (GOLDFUSS) - BRONN, p. 835.
v 1850 *Pseudocoenia ramosa* ORBIGNY - ORBIGNY, p. 34.
v p 1850 *Pseudocoenia digitata* ORBIGNY - ORBIGNY, p. 34.
1850 *Lobocoenia sublaevis* (MICHELIN) - ORBIGNY, p. 40.
1850 *Cryptocoenia limbata* (GOLDFUSS) - ORBIGNY, p. 385.
1850 *Pseudocoenia octonis* ORBIGNY, p. 34.
1851b *Stylina* ? *octonis* (ORBIGNY) - MILNE EDWARDS & HAIME, p. 61.
1851b *Stylina sublaevis* (Michelin) - MILNE EDWARDS & HAIME, p. 60.
1851b *Stylina limbata* (GOLDFUSS) - MILNE EDWARDS & HAIME, p. 59.
1852 *Astrea limbata* GOLDFUSS - QUENSTEDT, p.647, Pl. 57, fig. 18.
1857 *Stylina* ? *octonaria* (ORBIGNY) - MILNE EDWARDS, p. 248.
1857 *Stylina* ? *sublevis* (MICHELIN) - MILNE EDWARDS, p. 246.
1859 *Stylina octonaria* (ORBIGNY) - ÉTALLON, p. 67/467.
1861 *Stylina* ? *sublevis* (Michelin) - FROMENTEL, p. 193.
1861 *Stylina limbata* (GOLDFUSS) - FROMENTEL, p. 188.
1861 *Stylina octonaria* (ORBIGNY) - FROMENTEL, p. 190.
1861 *Stylina ramosa* FROMENTEL - FROMENTEL, p. 190.
1864 *Stylina ramosa* FROMENTEL - ÉTALLON, p. 369, Pl. 32, fig. 1.
v ? 1864 *Stylina virgulina* ÉTALLON, p. 372, Pl. 52, fig. 6.
1865 *Stylina* ? *sublevis* (MICHELIN) - FROMENTEL, p. 21.
1865 *Stylina octonaria* (ORBIGNY) - FROMENTEL, p. 20.
1865 *Stylina limbata* (GOLDFUSS) - FROMENTEL, p. 20.
p 1866 *Stylina limbata* (GOLDFUSS) - BÖLSCHE, p. 451.
1867 *Astraea limbata* (GOLDFUSS) - QUENSTEDT, p. 777, Pl. 74, fig. 18.
1875 *Stylina limbata* (GOLDFUSS) - BECKER, p. 144.
1880 *Astraea limbata* (GOLDFUSS) - QUENSTEDT, p. 754, Pl. 172, figs. 33-41.
1881 *Cryptocoenia limbata* (GOLDFUSS) - KOBY, p. 94, Pl. 21, figs. 1-5; Pl. 22, figs. 1-2.
1888 *Cryptocoenia limbata* (GOLDFUSS) - SOLOMKO, p. 154.
1889 *Cryptocoenia limbata* (GOLDFUSS) - KOBY, Pl. 129, fig. 5.
1904 *Cryptocoenia limbata* (GOLDFUSS) - PAPP, p. 81.
1904 *Cryptocoenia octonaria* (ORBIGNY) - PAPP, p. 81.
1905b *Cryptocoenia crateriformis* KOBY, p. 38, Pl. 8, fig. 1.
1905b *Cryptocoenia delgadoi* KOBY, p. 39, Pl. 8, fig. 2.
1905b *Cryptocoenia ramea* KOBY, p. 40, Pl. 8, figs. 4-7.
1908 *Cryptocoenia octonaria* (ORBIGNY) - ZLATARSKI, p. 220.
p 1926 *Stylina limbata* (GOLDFUSS) - SPEYER, p. 241.
1931 *Pseudocoenia octonis* ORBIGNY - COTTREAU, p. 160/28.
1932 *Stylina limbata* (GOLDFUSS) - FRENTZEN & KARLSRUHE, p. 47.
1937 *Cryptocoenia cartieri* KOBY - MIRCHINK, p. 77.
1954 *Stylina limbata* (GOLDFUSS) - GEYER, p. 132.
1955a *Stylina limbata* (GOLDFUSS) - GEYER, p. 323.
1960 *Cryptocoenia limbata* (GOLDFUSS) - BENDUKIDZE, p. 20, Pl. 2, fig. 6.
non 1964 *Cryptocoenia limbata* (GOLDFUSS) - KOLOSVÁRY, p. 221, Pl. 3, fig. 19.
1963 *Cryptocoenia limbata* (GOLDFUSS) - BABAEV, p. 37.
1963 *Stylina limbata* (GOLDFUSS) - BABAEV & GASANOV, p. 4.
1963 *Cryptocoenia octonaria* (ORBIGNY) - BABAEV, p. 37.
1964 *Pseudocoenia subloevis* (MICHELIN) - BEAUVAIS, p. 122.
non 1964 *Stylina limbata* (GOLDFUSS) - BEAUVAIS, p. 133, Pl. 6, fig. 5; Pl. 8, fig. 3.
1964 *Pseudocoenia octonaria* ORBIGNY - BEAUVAIS, p. 122, Pl. 5, figs. 4-5.
v 1964 *Cryptocoenia michelini* BEAUVAIS, p. 126.
1965 *Pseudocoenia octonaria* (ORBIGNY) - ÉNAY, p. 26.

Figure 26: Holotype of *A. limbata* (GOLDFUSS, 1826), IPB 82. For scale see the graph paper in the background of the first image. Other images are close-ups of the same sample.

1966 *Pseudocoenia limbata* (GOLDFUSS) - RONIEWICZ, p. 183, Pl. 3, fig. 1a-d.
1967 *Cryptocoenia octonaria* (ORBIGNY) - BABAEV, p. 140.
? 1973 *Stylina limbata* (GOLDFUSS) - BEAUVAIS, p. 324.
1973 *Cryptocoenia limbata* (GOLDFUSS) - BABAEV, p. 79, Pl. 4, fig. 1.
1974 *Stylina limbata* (GOLDFUSS) - KLOPFER, p. 74.
1975 *Cryptocoenia limbata* (GOLDFUSS) - BENDUKIDZE & CHIKOVANI, p. 28-34.
1976 *Pseudocoenia limbata* (GOLDFUSS) - RONIEWICZ, p. 51, Pl. 6, figs. 1a-c, 2.
1980 *Cryptocoenia limbata* (GOLDFUSS) - LJULEVA & PERMYAKOV, p. 133, Pl. 59, figs. 4-5.
1980 *Cryptocoenia crateriformis* KOBY - LJULEVA & PERMYAKOV, p. 132, Pl. 61, figs. 1-2.
p 1980 *Cryptocoenia octonaria* (ORBIGNY) - LJULEVA & PERMYAKOV, p. 133, non Pl. 60, figs. 1-2; Pl. 64, fig. 2.
1981 *Cryptocoenia stelliserrata* BEAUVAIS & BERNIER, p. 180, Pl. 1, fig. 4; Pl. 2, fig. 4.
1982 *Cryptocoenia octonaria* (ORBIGNY) - BENDUKIDZE, p. 14.
non 1982 *Cryptocoenia limbata* (GOLDFUSS) - BENDUKIDZE, p. 12, Pl. 2, figs. 2-3a, b; Pl. 6, fig. 6.
non 1983 *Stylina limbata* (GOLDFUSS) - BEAUVAIS, p. 42, Pl. 2, fig. 3.
1983 *Pseudocoenia limbata* (GOLDFUSS) - KRASNOV, p. 79, Fig. 35.
1985 *Pseudocoenia limbata* (GOLDFUSS) - ROSENDAHL, p. 35.
1987 *Cryptocoenia* cf. *limbata* (GOLDFUSS) - KHUSANOV, p. 55, Pl. 2, fig. 3; Pl. 2a, fig. 2.
1988 *Stylina limbata* (GOLDFUSS) - REIFF, p. 359.
1990 *Pseudocoenia limbata* (GOLDFUSS) - ERRENST, p. 170, Pl. 3, fig. 6.
1993 *Pseudocoenia limbata* (GOLDFUSS) - DOZET & TURNŠEK, p. 69, Pl. 1, fig. 3.
1995 *Pseudocoenia limbata* (GOLDFUSS) - NOSE, p. 109.
1995 *Cryptocoenia ramea* KOBY - NOSE, p. 109.
v 1997 *Pseudocoenia limbata* (GOLDFUSS) - TURNŠEK, p. 169 cum fig.
2000 *Cryptocoenia michelini* BEAUVAIS - MEYER, p. 44.
2001 *Pseudocoenia limbata* (GOLDFUSS) - REUTER *et al.*, p. 37.
2001 *Pseudocoenia octonaria* (ORBIGNY) - LATERNSER, p. 162.
2003 *Pseudocoenia limbata* (GOLDFUSS) - HELM *et al.*, p. 82, Fig. 7B.
p 2003 *Pseudocoenia limbata* (GOLDFUSS) - PANDEY & FÜRSICH, p. 25, Fig. 4A ?, non 4B.
2005 *Pseudocoenia* cf. *limbata* (GOLDFUSS) - HELM, p. 100, Pl. 32, figs. 1-2.
v 2012 *Pseudocoenia limbata* (GOLDFUSS) - ZAMAN, p. 150, Pls. 30-31, tab. 31-33.
2015 *Pseudocoenia* cf. *limbata* (GOLDFUSS) - KOŁODZIEJ, p. 182.
v 2018 "*Pseudocoenia*" *limbata* (GOLDFUSS) - RICCI *et al.*, p. 462, Pl. 13, figs. 1abc, 3.

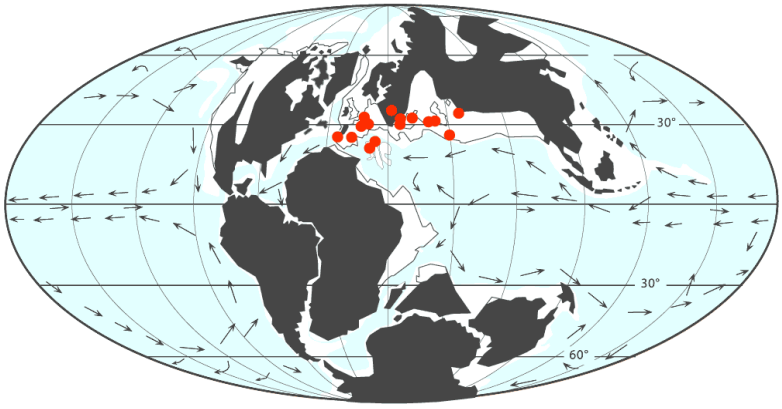
Status: valid

Synonymized nominal species:

- *Madrepora sublevis* MICHELIN, 1844

Type material: neotype MNHN MICHELIN coll. no. 567, designated by BEAUVAIS (1964, p. 123), not found.

Type locality: Kimmeridgian of Landeyron (France).



◀ **Figure 27:** Paleobiogeographical distribution of *A. limbata* (GOLDFUSS, 1826).

Figure 28: Lectotype of *A. splendens* (FROMENTEL, 1861), MNHN.F.M03933.

- *Pseudocoenia octonis* ORBIGNY, 1850

Type material: syntypes lost according to COTTREAU (1931, p. 160/28). BEAUVAIS (1964, p. 122) mentioned a holotype without a precise designation among the syntypes except she designated the type locality: La Rochelle. "Corallien" of La Rochelle. Other initial type localities were Vauligny near Tonnerre, Loix (Ile de Ré), Oyonnax, Châtel-Censoir (all in France).

- *Stylina virgulina* ÉTALLON, 1864

Type material: syntype MJSN S1192 (coll. THURMANN).

Type locality: Kimmeridgian of Waldeck (Switzerland).

Status: probably a junior synonym of *A. limbata*. The peritheca of the type specimen is too poorly preserved to verify the synonymy.

- *Cryptocoenia ramea* KOBY, 1905b

Type material: syntype not found.

Type locality: Upper Jurassic of Abbadia Valley (Couches d'Abbadia), Amaral, Panasqueira ("Coralligène d'Amaral"), Cesareda, Portugal.

Status: according to GEYER (1955a) and ROSENDAHL (1985), this species is a junior synonym of *A. limbata*. We follow their decision.

- *Cryptocoenia crateriformis* KOBY, 1905b

Type material: holotype by monotypy. Probably housed in MG Lisboa.

Type locality: Oxfordian/Kimmeridgian of Moulin de Tojeira (Portugal).

Remarks: KOBY (1905b, p. 40) distinguished "*Cryptocoenia*" *limbata* by the shape of colony and the distance between calices. According to GEYER (1955a) and ROSENDAHL (1985), this species is a junior synonym of *A. limbata*. We follow their decision.

- *Cryptocoenia delgadoi* KOBY, 1905b

Type material: holotype by monotypy. Probably housed in MG Lisboa.

Type locality: Moulin de Tojeira top of the "Couches de Montejunto", Bimammatum zone.

Status: Following GEYER (1955a, p. 323) and ROSENDAHL (1985, p. 35), we consider this species as a junior synonym of *A. limbata*.

- *Cryptocoenia michelini* BEAUVAIS, 1964

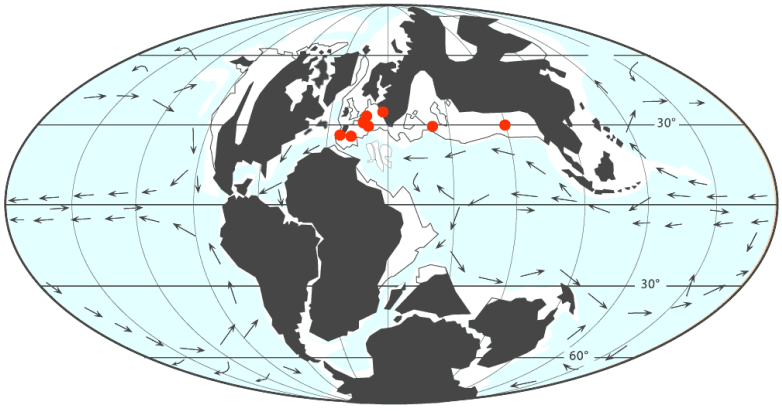
Type material: holotype by original designation using *Astrea limbata* GOLDFUSS *sensu* MICHELIN.

Type locality: Oxfordian of Saint-Mihiel (France).

Status: junior synonym of *A. limbata.*

- *Cryptocoenia stelliserrata* BEAUVAIS & BERNIER, 1981

Type material: holotype by original designation of *Cryptocoenia stelliserrata* BEAUVAIS & BERNIER, specimen FSL 133533.



◀ **Figure 29:** Paleobiogeographical distribution of *A. splendens* (FROMENTEL, 1861).

Type locality: upper Kimmeridgian (Calcaires de Valfin) of Valfin-lès-St-Claude (Jura, France).

Paleobiogeography of *A. limbata* (Fig. 27): ? Callovian-Oxfordian of Iran (Tabas block) (illustration inconclusive); Oxfordian of France, Switzerland, Germany, Poland, Crimea, Uzbekistan, Bulgaria, Portugal; Oxfordian-Kimmeridgian of Azerbaijan, Slovenia; Kimmeridgian of Germany, Switzerland, Portugal, Azerbaijan, France, Romania, Spain; Kimmeridgian-Tithonian of Romania, Italy; Tithonian of North Ossetia, Georgia, Azerbaijan, Crimea, Poland?; Upper Jurassic of Crimea, Georgia, Azerbaijan.

Adelocoenia splendens (Fromentel, 1861), nov. comb.

(Fig. 28)

Type material: lectotype MNHN.F.M03933 designated by Alloiteau (1956).

https://science.mnhn.fr/institution/mnhn/collection/f/item/m03933

Type locality: Oxfordian of Charcenne (Haute-Saône, France).

Dimensions of the lectotype specimen: D = 5-6 mm, septal formula = 8S1 + 8S2, Nc = 32.

v* 1861 *Stylina splendens* Fromentel, p. 189.
1865 *Stylina splendens* Fromentel - Fromentel, p. 21.
1956 *Stylina splendens* Fromentel - Alloiteau, no. 113.
nom. nud. 1961 *Cryptocoenia fromenteli* Beauvais – Beauvais, p. 2265.
1964 *Cryptocoenia splendens* (Fromentel) - Beauvais, p. 130, Pl. 7, fig. 1.
1964 *Cryptocoenia fromenteli* Beauvais - Beauvais, p. 130, Pl. 5, fig. 6.
1966 *Pseudocoenia fromenteli* (Beauvais) - Roniewicz, p. 186, Pl. 2, fig. 3.
1977 *Pseudocoenia fromenteli* (Beauvais) - Papoyan, p. 33, Pl. 3, figs. 2-3.
1982 *Pseudocoenia fromenteli* (Beauvais) - Liao, p. 158, Pl. 6, fig. 1.
1985 *Pseudocoenia fromenteli* (Beauvais) - Rosendahl, p. 35, Pl. 3, fig. 3.
1990 *Pseudocoenia fromenteli* (Beauvais) - Errenst, p. 172, Pl. 4, fig. 2ac.
1990 *Pseudocoenia splendens* Fromentel - Errenst, p. 172, Pl. 4, fig. 3a-c.
1994 *Pseudocoenia fromenteli* (Beauvais) - Liao & Xia, p. 138, Pl. 34, fig. 1.
2001 *Pseudocoenia splendens* (Fromentel) - Laternser, p. 162.
2001 *Pseudocoenia fromenteli* (Beauvais) - Reuter *et al.*, p. 37, Fig. 7.5.
2003 *Pseudocoenia fromenteli* (Beauvais) - Helm *et al.*, p. 83, Fig. 7C.

Status: valid.

Synonymized nominal species:

- *Adelocoenia fromenteli* (Beauvais, 1964)

Type material: holotype *Stylina castellum* Michelin in Fromentel, not found in the MNHN collections.

Type locality: Oxfordian of Charcenne (Haute-Saône, France).

Remarks: According to Beauvais, the species *fromenteli* possesses a tabularium. In contrast, based on the study of material from Poland, Roniewicz (1966, p. 186) described and illustrated both complete and incomplete tabulae.

Paleobiogeography of *A. splendens* (Fig. 29): Oxfordian of France, Germany, Switzerland, Poland, Portugal; Oxfordian-Kimmeridgian of Armenia; Kimmeridgian of Spain; Upper Jurassic of Tibet.

Adelocoenia tabulata (Errenst, 1990), nov. comb.

Type material: Holotype by original designation, Mk 14, Bochum (housed in the near future in CPUN).

Type locality: Kimmeridgian, mountain slope, about 1 km southwest of Moscardon (Montes Universales, province Teruel (Spain).

Dimensions of the type specimen: D = 1-1.6 mm, c-c = 2-3.5 mm, septal formula = (7+7) 8S1 + 8S2, Nc = ca 16, De = 13/5 mm.

1990 *Pseudocoenia tabulata* Errenst, p. 170, Pl. 3, fig. 5a-c.

Status: valid.

Remarks: well figured in Errenst (1990).

Paleobiogeography of *A. tabulata*: Kimmeridgian of Spain.

Adelocoenia pistillum (Fromentel, 1861), nov. comb.

(Figs. 30 - 31)

Type material: lectotype MNHN.F.R10818 (coll. Fromentel) by inference of a holotype in Beauvais (1964, p. 128).

Type locality: Oxfordian of Charcenne (Haute-Saône, France).

Dimensions of the lectotype: D = 2-3.5 mm, c-c = 4-5.5 mm, Ns = 32, septal formula = 8S1 + 8S2, Nc = 32, endothecal density = 2-3/2.5 mm.

v* 1861 *Stylina pistillum* Fromentel, p. 190.
v non 1861 *Stylina excentrica* Fromentel - Fromentel, p. 190.
v 1861 *Cryptocoenia brevis* Fromentel, p. 199.
1864 *Stylina castellum* (Michelin) - Étallon, p. 366, Pl. 51, fig. 7.
v 1864 *Stylina decipiens* Étallon, p. 367, Pl. 51, fig. 9.
v non 1864 *Stylina octosepta* Étallon - Étallon, p. 369, Pl. 51, fig. 12.
v 1865 *Cryptocoenia brevis* Fromentel - Fromentel, p. 22.
v 1865 *Stylina pistillum* Fromentel - Fromentel, p. 21.
v 1880 *Cryptocoenia subbrevis* Achiardi, p. 296, Pl. 20, fig. 2.
v 1881 *Cryptocoenia decipiens* (Étallon) - Koby, p. 90, Pl. 20, figs. ?1, 2-3.
v p 1881 *Cryptocoenia cartieri* (Koby) - Koby, p. 89, Pl. 22, figs. 3, 6, non 4, non 5.
? 1888 *Stylina octosepta* (?) Étallon - Solomko, p. 149.
1889 *Cryptocoenia bonanomii* Koby, p. 467, Pl. 125, fig. 7.

Figure 30: Lectotype of *A. pistillum* (FROMENTEL, 1861), MNHN.F.R10818.

v 1889 *Cryptocoenia decipiens* (ÉTALLON) - KOBY, Pl. 129, fig. 6.
1905b *Cryptocoenia decipiens* (ÉTALLON) - KOBY, p. 38, Pl. 8, fig. 3.
1913 *Cryptocoenia* aff. *decipiens* (ÉTALLON) - SPEYER, p. 212, Pl. 21, fig. 11-11a.
1954 *Stylina decipiens* ÉTALLON - GEYER, p. 133.
1955a *Stylina decipiens* ÉTALLON - GEYER, p. 323.
1961 *Cryptocoenia decipiens* (ÉTALLON) - BENDUKIDZE, p. 25.
1963 *Cryptocoenia decipiens* (ÉTALLON) - BABAEV, p. 36.
v 1964 *Cryptocoenia pistillum* (FROMENTEL) - BEAUVAIS, p. 128, Pl. 7, fig. 2.
v 1964 *Cryptocoenia globula* BEAUVAIS, p. 129, Pl. 3, fig. 6.
v 1964 *Cryptocoenia alligniensis* BEAUVAIS, p. 128, Pl. 10, fig. 1.
1965 *Stylina decipiens* ÉTALLON - GEYER, p. 231.
1967 *Cryptocoenia decipiens* ÉTALLON - BABAEV, p. 140.
1973 *Cryptocoenia decipiens* (ÉTALLON) - BABAEV, p. 76, Pl. 3, fig. 3.
1976 *Pseudocoenia decipiens* (ÉTALLON) - RONIEWICZ, p. 52, Pl. 6, fig. 3.
1979 *Cryptocoenia pistillum* (FROMENTEL) - NEGUS & BEAUVAIS, p. 225.
1982 *Cryptocoenia decipiens* (ÉTALLON) - BENDUKIDZE, p. 9, Pl. 2, fig. 1a-b.
1985 *Pseudocoenia decipiens* (ÉTALLON) - LIAO & XIA, p. 137, Pl. 5, fig. 3.
1988 *Stylina decipiens* ÉTALLON - FEZER, p. 87.
1990 *Pseudocoenia decipiens* (ÉTALLON) - ERRENST, p. 171, Pl. 4, fig. 1a-c.
v 1991 *Stylina* ? *decipiens* ÉTALLON - LAUXMANN, p. 122.
1994 *Pseudocoenia decipiens* (ÉTALLON) - LIAO & XIA, p. 137, Pl. 32, fig. 8.
1995 *Stylina decipiens* ÉTALLON - NOSE, p. 109.
v 1997 *Stylina decipiens* ÉTALLON - TURNŠEK, p. 191.
v 2018 "*Pseudocoenia*" *decipiens* (ÉTALLON) - RICCI *et al.*, p. 464, Pl. 13, fig. 2ab.

Status: valid.

Synonymized nominal species:

- *Stylina decipiens* ÉTALLON, 1864

Type material: syntype MJSN no. O 206, S 2199, S2219 (coll. THURMANN & ÉTALLON), Porrentruy.

Type locality: Oxfordian of Caquerelle, Pont d'Able (Switzerland).

- *Cryptocoenia brevis* FROMENTEL, 1861

Type material: syntype MNHN.F.A32886.

Type locality: Oxfordian of Charcenne (Haute-Saône, France).

- *Cryptocoenia subbrevis* ACHIARDI, 1880 (see Fig. 31)

Type material: holotype by monotypy, Museo geologico Universita di Pisa MSNUP (no. I 2519).

Type locality: Tithonian of Coltura di Sotto (commune di Polcenigo) nel Monte Cavallo (northeastern Italy).

- *Cryptocoenia bonanomii* KOBY, 1889

Type material: syntype, repository unknown, could possibly be in the collections of Porrentruy, Basel, Paris, Lausanne, or Geneva.

Type locality: Kimmeridgian ("Ptérocèrien") of Vorbourg near Delémont, Courroux quarry.

Remarks: KOBY proposed to separate *A. bonanomii* from *A. decipiens* on the basis of the colonial morphology, more salient calices, and slightly smaller corallites. Based on the current knowledge regarding variability in plocoid scleractinian corals, we apply a different taxonomic model. In addition, it should be noted that because this species has not been used as a valid taxon after 1899, it represents a *nomen oblitum*.

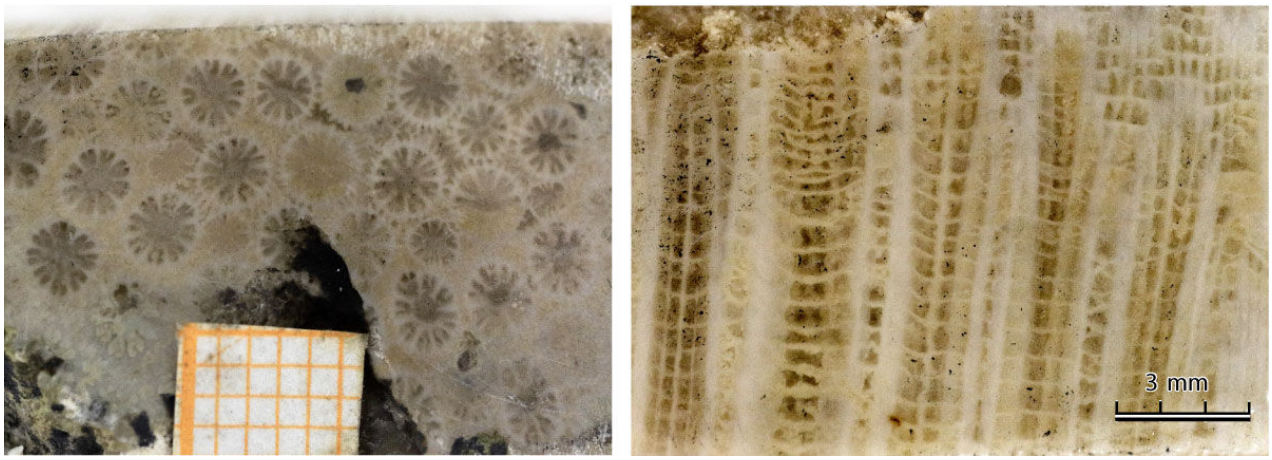


Figure 31: Holotype of "*Cryptocoenia*" *subbrevis* ACHIARDI, 1880, MSNUP no. I 2519, here synonymized with *A. pistillum* (FROMENTEL, 1861).

- *Cryptocoenia alligniensis* BEAUVAIS, 1964

Type material: holotype by original designation MNHN.F.R10738.

Type locality: Upper Jurassic ("Séquanien") of Alligny (Nièvre, France).

- "*Cryptocoenia*" *globula* BEAUVAIS, 1964

Type material: holotype by original designation, MNHN.F.R10816. In addition, three paratypes exist under the number A24812.

Type locality: Oxfordian of Champlitte (Haute-Saône, France).

Remarks: Because the holotype is poorly preserved due to silicification, some doubt remains regarding the generic identification as it could also belong to genera such as *Cyathophora* or *Adelocoenia*. However, structures seen in a paratype (presence of auriculae; septa show a significant inward development) support our hypothesis that this species belongs to *Adelocoenia*.

Paleobiogeography of *A. pistillum* (Fig. 32): Oxfordian of France, England, Switzerland, Azerbaijan, Crimea, Georgia; Oxfordian-Kimmeridgian of Slovenia; Kimmeridgian of Switzerland, Germany, Portugal, Spain, Romania; Kimmeridgian-Tithonian of Italy; Upper Jurassic of Italy, Tibet.

5.3. Nonameral species of *Adelocoenia*

Adelocoenia novemseptata (RONIEWICZ, 1966), nov. comb.

Type material: holotype ZPAL no. HIII/183.

Type locality: upper Oxfordian of Bukowa (Poland).

Dimensions of the holotype: D = (4) 4.5-5 mm, c-c = 4-7 mm, septal formula = 9S1 + 9S2, Nc = 36.

* 1966 *Pseudocoenia novemseptata* RONIEWICZ, p. 187, Pl. 5, fig. 1.

Status: valid. Given the rare occurrence of this nonameral species, the question of a possible intraspecific variation of *A. fromenteli* is raised. However, due to its easy practical recognition, we keep it separate as morphospecies.

Remarks: The species is well illustrated in RONIEWICZ (1966, p. 187, Pl. 5, fig. 1).

Paleobiogeography of *A. novemseptata*: known only from Oxfordian of Poland.

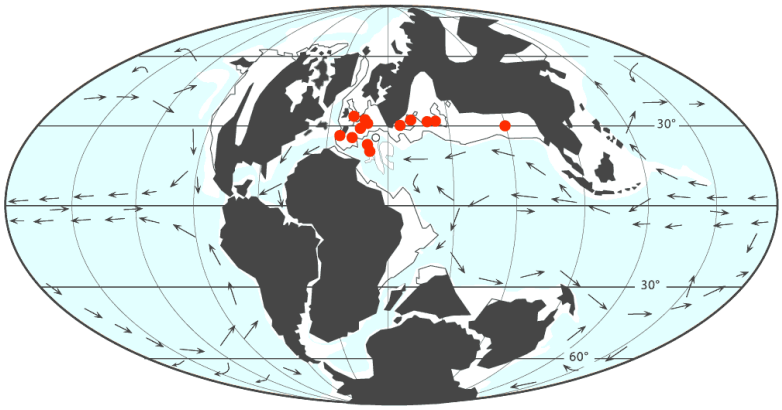
5.4. Decameral species of *Adelocoenia*

Adelocoenia maxima BEAUVAIS, 1964

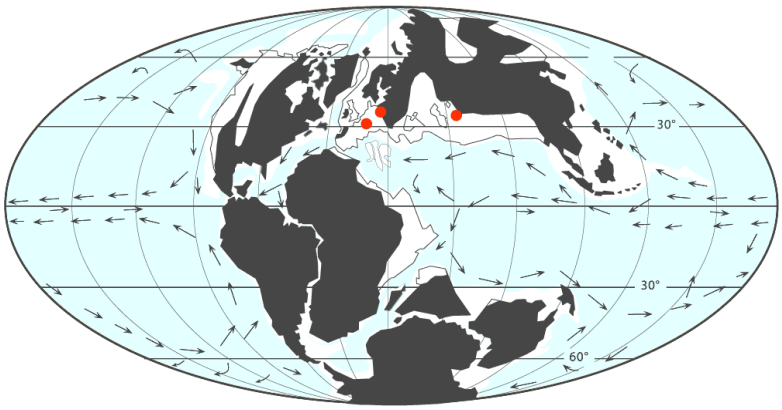
Type material: holotype, NMB D4335 (coll. BOHNY).

Type locality: Upper Jurassic ("Séquanien") of Hofbergli near Günsberg (Switzerland).

Dimensions of the holotype: D = 4-6 mm, c-c = 5-9 mm, Ns = 18-20, septal formula = 10S1 + 10S2, Nc = 40.



◀ **Figure 32:** Paleobiogeographical distribution of *A. pistillum* (FROMENTEL, 1861).



◀ **Figure 33:** Paleobiogeographical distribution of *A. maxima* BEAUVAIS, 1964.

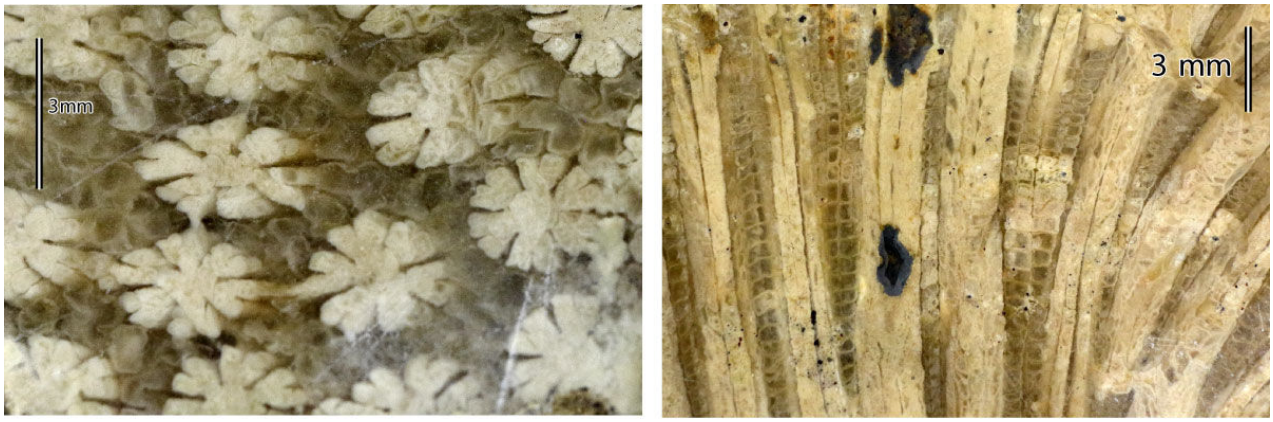


Figure 34: Syntype of "*Cryptocoenia*" ? *incerta* ACHIARDI, 1880 (Museum Pisa MSNUP I 2521).

v p 1881 *Cryptocoenia cartieri* KOBY - KOBY, p. 89, Pl. 22, fig. 5, non 3, non 4.
* 1964 *Adelocoenia maxima* BEAUVAIS, p. 119, Pl. 2, fig. 7; Pl. 4, fig. 1.
1966 *Pseudocoenia maxima* (BEAUVAIS) - RONIEWICZ, p. 188, Pl. 5, fig. 2.
non 1982 *Pseudocoenia* cf. *maxima* (BEAUVAIS) - LIAO, p. 158, Pl. 6, figs. 2-3.
1987 *Pseudocoenia maxima* (BEAUVAIS) - KHUSANOV, p. 53, Pl. 2, fig. 1.

Status: valid.

Paleobiogeography of *A. maxima* (Fig. 33): upper Oxfordian of Poland; upper Oxfordian-lower Kimmeridgian of Switzerland, Uzbekistan; lower Kimmeridgian of Poland.

5.5. Species of closely related genera transferred to genera other than *Adelocoenia*

Solenocoenia RONIEWICZ & GILL, 1976

- *Adelocoenia bernensis* BEAUVAIS, 1964, p. 118 (non *Stylina bernensis* THURMANN & ÉTALLON, 1864).
- *Convexastraea alveolata* KOBY, 1889, p. 470, Pl. 122, figs. 4-6.
- *Convexastraea weaveri* GERTH, 1928, p. 8, Pl. 2, fig. 5.
- *Convexastrea digitiformis* KOBY, 1905b, p. 42, Pl. 7, figs. 1-4.
- *Convexastrea kiliani* KOBY, 1905a, p. 854, Pl. 54, fig. 1.
- *Convexastrea portlandica* FROMENTEL, 1856, p. 859.
- *Convexastrea semiradiata* ÉTALLON, 1864, p. 374, Pl. 52, fig. 10 (type species of *Solenocoenia*).
- *Cryptocoenia*? *incerta* ACHIARDI, 1880, p. 298, Pl. 20, fig. 4 + p. 275 (Museum Pisa MSNUP I 2521). We provide here the first photograph of the syntype MSNUP I 2521 of this nominal species (see Fig. 34).
- *Cryptocoenia sublimbata* ORBIGNY, 1850, p. 33.
- *Cryptocoenia subregularis* ORBIGNY, 1850, p. 33.
- *Cryptocoenia thiessingi* KOBY, 1881, p. 86, Pl. 29, fig. 2.

Heliocoenia ÉTALLON, 1859

- *Adelocoenia corallina* ORBIGNY, 1850, p. 32.
- *Adelocoenia moreana* ORBIGNY, 1850, p. 33.

Stylina LAMARCK, 1816

The following species are transferred to the genus *Stylina* (with genus concept as recently proposed by ZAMAN & LATHUILIÈRE, 2018).

- *Adelocoenia tubulosa* ORBIGNY, 1850, p. 32.
- *Cryptocoenia arduennensis* ORBIGNY, 1850, p. 385.
- ? *Holocoenia cesaredensis* KOBY, 1905b, p. 31, Pl. 5, fig. 10.
- *Pseudocoenia bernardina* ORBIGNY, 1850, p. 34 - WELLS (1936, p. 128) chose the specimen MNHN no. 4472 (excluding no. 4472a and b) of the ORBIGNY coll. as the lectotype of the type species of the genus *Pseudocoenia* (= *Pseudocoenia bernardina*). Today, two specimens exist in the MNHN collections which have the inventory numbers MNHN.F.A53891 and MNHN.F.R09199, both of which were originally also referred to the same number (4472). Hence, it is impossible to verify whether Wells was referring to either one of the specimens. Therefore, following the ICZN [Art. 74.5], WELLS' lectotype designation is invalid. For this reason, we select the specimen MNHN.F.R09199 (hand specimen and thin section, Kimmeridgian of Landeyron, commune of Montréal-la-Cluse, Ain, France) as the lectotype of the species *Pseudocoenia bernardina* ORBIGNY, 1850. With regard to its characters, the specimen closely corresponds to the genus *Stylina sensu* ÉTALLON (1864). The paralectotype MNHN.F.A53891 (Kimmeridgian of Landeyron, Ain, France), belongs to *Adelocoenia* and is, therefore, here considered to be a junior synonym of *Adelocoenia limbata* (GOLDFUSS, 1829).
- *Pseudocoenia elegans* ORBIGNY, 1850, t. 2 – ORBIGNY, p. 34.

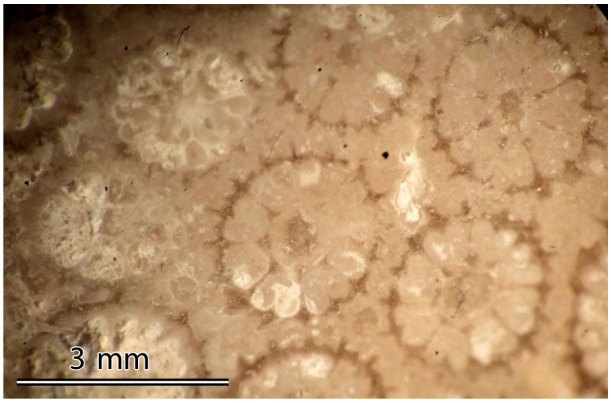


Figure 35: Lectotype of "*Cryptocoenia*" *tabulata* KOBY, 1881, MHNG 61498, here grouped with the genus *Stylina*.

- *Stylina bernensis* ÉTALLON, 1864, p. 366, Pl. 51, fig. 5.
- *Stylina communis* FROMENTEL, 1861, p. 189.
- *Stylina insignis* FROMENTEL, 1861, p. 189.
- *Stylina octosepta* ÉTALLON, 1864, p. 369, Pl. 51, fig. 12.
- *Cryptocoenia tabulata* KOBY, 1881, p. 93, Pl. 29, figs. 3-5 - Although KOBY figured several specimens and did not designate a holotype, BEAUVAIS (1964, p. 127) mentioned a "holotype" and figured one unnumbered specimen of the KOBY collection that is now housed in Geneva under MHNG 61498 (and corresponding to the syntype Pl. 29, fig. 3 of KOBY). As she did not explicitly designate the figured specimen and to avoid any ambiguity, here (Fig. 34) we designate this sample as the lectotype of the species *tabulata*. Based on a recently prepared polished surface of the specimen, it can be stated that a well-defined columella exists deeper in the corallites, surrounded by koutaliform auriculae. Therefore, we transfer this species to the genus *Stylina* (see Fig. 35). Type locality: Kimmeridgian of Valfin (France).

Pseudocoeniopsis RONIEWICZ, 1976

- *Pseudocoenia longiseptata* RONIEWICZ, 1966, p. 189, Pl. 6, fig. 1.

Bathycoenia TOMES, 1883

- *Prionastrea moneta* ORBIGNY, 1850, p. 322.

Cyathophora MICHELIN, 1843

- *Astrea alveolata* GOLDFUSS, 1826, p. 65, Pl. 22, fig. 3. Type species of the genus *Cryptocoenia*, which, in our view, represents a junior synonym of *Cyathophora*. Based on the assumed lack of septa that extend axially on the surface of the tabulae, some authors consider *Cryptocoenia* to be a separate genus. We disagree with this view.
- *Cryptocoenia cartieri* KOBY, 1881, p. 89, Pl. 22, fig. 4, non 3, non 5-6, NMB D 4334 (old number = 525). The correspondence of this specimen to both the original figure and the original description in KOBY (1881) is doubtful. Another syntype from Günsberg exists in the KOBY collection at Porrentruy under the number MJSN S1364, which is probably the specimen of fig. 5 on Pl. 22 in KOBY (1881). Because the syntypes appear to belong to different taxa, we select here both the sample from the KOBY collection in Basel NMB D 4334 as the lectotype and the specimen from the KOBY collection in Porrentruy S1364 as a paralectotype. The type locality of the newly designated lectotype D4334: Oxfordian (Rauracian) of Fringeli, Switzerland.
- *Cyathophora dolfussi* KOBY, 1907, p. 8, Pl. 4, fig. 24.
- *Cyathophora insignis* DUNCAN, 1872, p. 14, Pl. 1, figs. 9-11.

Bracthelia BEAUVAIS & BEAUVAIS, 1975

- *Pseudocoenia bangoinensis* LIAO & XIA, 1985, p. 137, Pl. 3, fig. 3.

Clausastrea ORBIGNY, 1849

- *Cryptocoenia decupla* ORBIGNY, 1850, p. 33.

5.6 Species of uncertain taxonomic position

- *Pseudocoenia ramosa* ORBIGNY, 1850, p. 34 syntypes MNHN.F.A09455, MNHN.F.A09456, MNHN.F.A09457. Because the type material is unrecognizably preserved, we consider it a *nomen dubium*.
- *Convexastrea abadiensis* GEYER, 1955a, p. 325, Pl. 1, fig. 6. Thin section studies of the type specimen will be necessary in order clarify whether is belongs to *Adelocoenia* or *Solenocoenia.*
- *Adelocoenia gissarensis* REIMAN, 1971, p. 100, Pl. 1, figs. 7-9. This species does not belong to *Adelocoenia*, because neither the budding mode nor both corallite shape and septal development are compatible with the genus *Adelocoenia*. The species needs to be revised.
- *Stylina* (*Convexastrea*) *hukawazaensis* EGUCHI, 1951, p. 74. This species was transferred to *Adelocoenia* by LÖSER & MORI, 2002. However, in young corallites of the holotype (see LÖSER & MORI, 2002, Fig 1.7), a major septum is present, a feature which is unknown in *Adelocoenia*. Therefore, further investigation will be necessary to clarify the taxonomic position of the material.
- *Adelocoenia lanceloti* ORBIGNY, 1850, p. 33. The lectotype MNHN.F.R09322 (designation in COTTREAU, 1931) is an artificial mold, which does not seem to correspond to the description by COTTREAU (1931, p. 154/22). According to COTTREAU, the material is poorly preserved. He indicated, however, the presence of a columella and suggested that the material belonged to a decameral species of *Stylina*. Because of both the discrepancy between the structures seen in the moldic material and the description, and the poor preservation of the material, the taxonomic position of this species remains unclear.

• *Convexastraea orientalis* NEUMAYR in NAUMANN & NEUMAYR, 1890, p. 30, Pl. 5, fig. 6. LÖSER and MORI (2002) suggested a possible synonymy with *Solenocoenia semiradiata* (ÉTALLON). However, a revision of the material is necessary in order to clarify its skeletal structures, especially those of the endotheca. At the present, the taxonomic status of this species remains uncertain.

• *Adelocoenia pseudosexradiata* ALLOITEAU & FARAG, 1964, p. 62, Pl. 4, fig. 3. This species is probably a *Solenocoenia*, but a revision of the type material, which is housed in Cairo (Egypt), is necessary in order to clarify its taxonomic position.

• *Cryptocoenia baugieri* ORBIGNY, 1850, p. 33. The species possibly belongs to *Adelocoenia* but because of the poor preservation of the material, its taxonomic position remains unclear.

• *Cryptocoenia haimei* TOMES, 1881, p. 161. The type specimen was neither figured nor ever revised after its original description. A revision is needed to clarify the taxonomic position of the species.

• *Madrepora obeliscus* MICHELIN, 1844, p. 112, Pl. 25, fig. 4. Because both the type material is lost and the description by MICHELIN is inconclusive, a taxonomic identification is impossible.

• *Cryptocoenia matskevici* KRASNOV & STAROSTINA, 1970, p. 79, Pl. 4, fig. 5. Based on the original description of the material, it seems that the species lacks costae, thus differing from the genus concept of *Adelocoenia*. A revision is necessary to identify its taxonomic position.

• *Cryptocoenia ornata* ORBIGNY, 1850, p. 385. The original description is most insufficient. In addition, the descriptions of the material by ORBIGNY (1850) and MILNE EDWARDS and HAIME (1857) contradict each other. Furthermore, the type material is lost. Therefore, the taxonomic position of the material cannot be determined.

• *Cryptocoenia plana* TOMES, 1884, p. 707. The type specimen was neither figured nor ever revised after the original description. A revision is needed to clarify the taxonomic position of the species.

• *Cryptocoenia rigauxi* TOMES, 1884, p. 707. The type specimen was neither figured nor ever revised after the original description. A revision is needed to clarify the taxonomic position of the species.

• *Convexastraea desori* KOBY, 1897, p. 30, Pl. 2, figs. 9-10. A revision is necessary to decide on the status of the species.

• *Adelocoenia minima* ALLOITEAU & FARAG, 1964, p. 60, Pl. 4, fig. 1. A revision of the type material, which is housed in Cairo (Egypt), is necessary in order to determine its taxonomic position.

• *Adelocoenia minima* BEAUVAIS, 1964, p. 121, Pl. 4, fig. 2; Pl. 5, fig. 1. Because the taxon represents a junior homonym, it is unavailable. It seems that the dimensions of KOBY's (1881) specimen used by BEAUVAIS to erect her new taxon fit with *A. parvistella* ALLOITEAU, 1961. For this reason we do not propose a replacement name.

• *Convexastrea edwardsi* KOBY, 1905b, p. 44, Pl. 8, fig. 11. A revision is necessary to decide on the status of the species. It should be noted that the figures of this species by LJULJEVA and PERMJAKOV (1980) are just reproductions of KOBY's figures that the authors attributed to a specimen from the Tithonian of Crimea.

• *Convexastrea etalloni* KOBY, 1905b, p. 43, Pl. 8, figs. 9-10. A revision is necessary to clarify the taxonomic position of the species.

• *Convexastrea fromenteli* KOBY, 1905b, p. 43, Pl. 9, fig. 11. Based on the original illustration by KOBY (1905b), this species most likely belongs to *Adelocoenia*, and should be, therefore, compared to the species *A. bacciformis* (MICHELIN) and *A. parvistella* ALLOITEAU, however, a close relationship with *Solenocoenia* cannot be excluded. A revision is necessary.

• *Stylina intricata* FROMENTEL, 1856, p. 857. The figure and description given in FROMENTEL (1863) clearly indicate the occurrence of a columella. However, the syntypes illustrated on the website of MNHN, which are casts, are rather ambiguous regarding the occurrence of columellar structures. Due to the poor preservation of the type material, its taxonomic position remains uncertain.

• *Convexastrea jaccardi* KOBY, 1894, p. 10, Pl. 3, fig. 2. The original description bears a theoretical contradiction regarding the dimensions of corallite diameter (4-4.5 mm) vs distance between corallites (1-2 mm). A revision of the material is needed.

6. Stratigraphy and evolution

The first occurrence of the genus is represented by a single specimen known from the Sinemurian of France (see Fig. 36). The genus has not been recorded from the two following stages (Pliensbachian and Toarcian). This is remarkable given that extensive work on Pliensbachian and Toarcian faunas has just recently been published (VASSEUR, 2018). From the Aalenian, *Adelocoenia* is known by a single occurrence from Chile. Even during the Bajocian, plocoid stylinids were still quite uncommon. The real evolutionary success of the genus began in the Bathonian (possibly during the late Bajocian, a substage which is presently poorly documented). In the Bathonian, *Adelocoenia* is represented predominantly by hexameral species. The pinnacle of its success followed in the Late Jurassic. During the Oxfordian-Kimmeridgian, *Adelocoenia* had its greatest morphological disparity and taxonomical diversity, and its geographical distribution was at its greatest. In addition, during these stages, species of *Adelocoenia* with all types of symmetry occurred and a significant radiation in octameral morphological types developed. The distributional pattern of *Adelocoenia* during the Cretaceous is

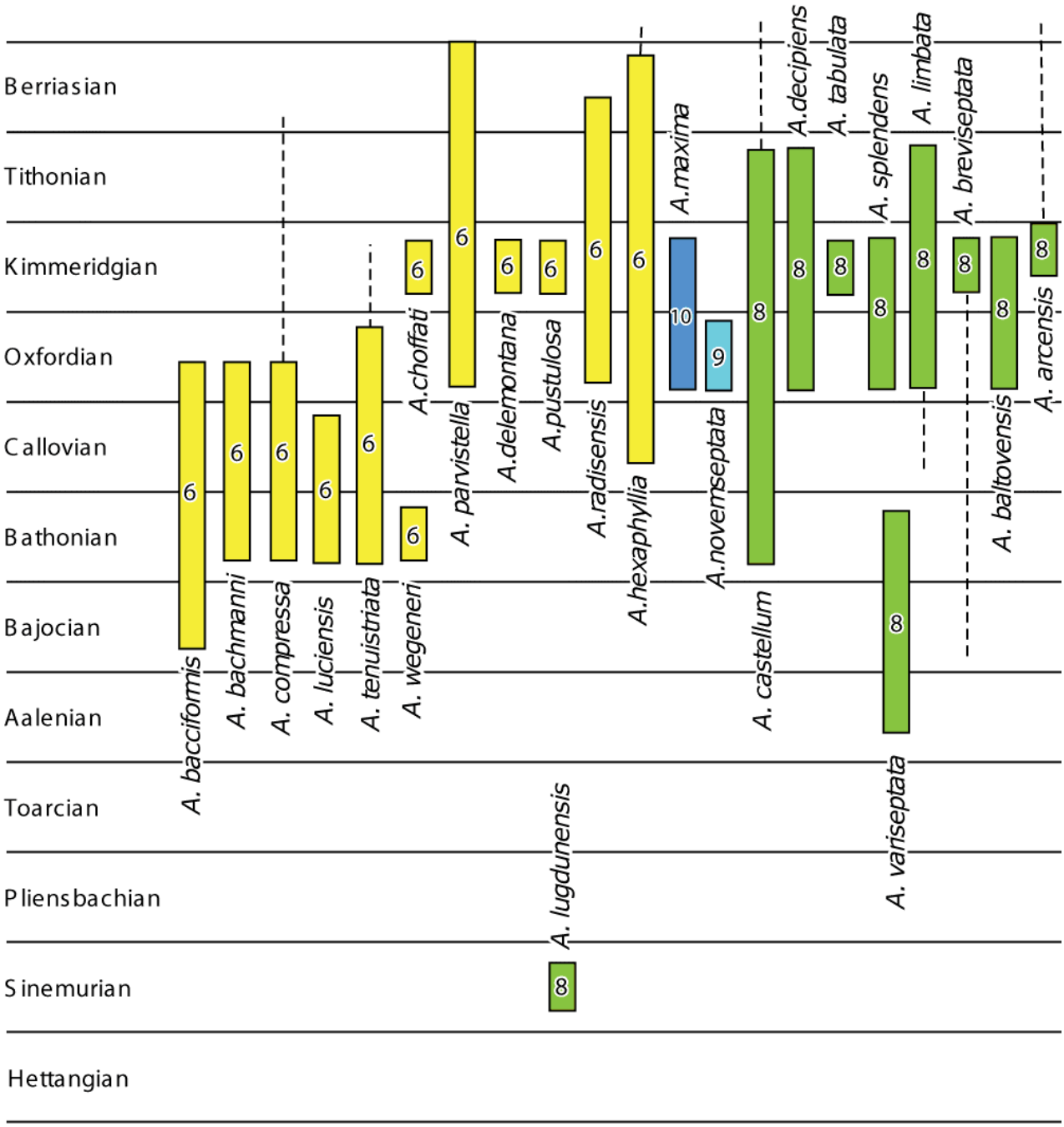


Figure 36: Stratigraphical distribution of Jurassic species of the genus *Adelocoenia*. Numbers indicate the septal symmetry.

probably underestimated. This issue will be the subject of a separate work. At least three Jurassic nominal species have been reported from the lowermost Cretaceous: *A. parvistella*, *A radisensis* and *A. hexaphyllia*.

Paleobiogeography

The paleobiogeographical patterns of the species are illustrated in the various maps presented above. As a general conclusion it can be stated that the distribution of *Adelocoenia* was marked by occurrences along the northern Tethys margin which, throughout the Jurassic, was characterized by ecological conditions favorable for reef development. The maps showing the paleobiogeographical patterns of *Adelocoenia* closely correspond to the paleomaps of reefal occurrences (*e.g.*, KIESSLING, 1999; LEINFELDER *et al.*, 2002; CECCA *et al.*, 2005; MARTIN GARIN *et al.*, 2012). It should be noted, however, that these paleobiogeographical patterns are potentially biased by the nature of the collections with many European countries overrepresented. More information is needed, especially on material from regions such as paleoequatorial latitudes and the southern hemisphere. However, the distributional patterns

shown on these maps lead to the following observations. First, the distribution is restricted to paleolatitudes of the shallow-water reef belt, suggesting a zooxanthellate nature for the genus, which would be consistent with its morphology. No *Adelocoenia* occurrence is known from areas in paleolatitudes higher than 40° (neither N nor S). More precisely, the occurrence of *Adelocoenia* in moderately high latitudes where eurytopic genera such as *Isastrea* MILNE EDWARDS and HAIME, 1851b, *Thamnasteria* LESAUVAGE, 1823, and *Thecosmilia* MILNE EDWARDS, 1848, are well represented can probably be explained by a eurytopic nature comparable to the latter genera (MARTIN GARIN *et al.*, 2012, consider the collective distribution of the nominal genera *Adelocoenia*, *Cryptocoenia* and *Pseudocoenia*). Compared with the typical eurytopic genera, the distribution of *Adelocoenia* is probably more restricted due to local ecological conditions; in particular, the quasi-exclusive preference of *Adelocoenia* for lagoonal environments (LATHUILIÈRE *et al.*, 2005, in which *Adelocoenia* is named erroneously *Cryptocoenia*). The genus is mainly Tethyan, often with a broad geographic distribution. Because only a few species of *Adelocoenia* are endemic, it is suggested that oceanic currents along the northern Tethys margin were very effective in species distribution. However, some rare occurrences have been recorded outside the Tethys, namely in Japan, Colombia and Chile. The occurrence of *Adelocoenia* with two species (*A. castellum* and *A. parvistella*) in the Upper Jurassic of Japan is also a significant fact in terms of geodynamic interpretation. The ecological requirements of *Adelocoenia* that are revealed by the paleomaps suggest that the Late Jurassic paleoposition of Japan was below the latitude of 35°. This hypothesis is in close accordance with the conclusions of CHABLAIS *et al.* (2010, 2011) who suggested a Triassic paleoposition of Japanese Sambosan units in a paleoequatorial latitude.

7. Conclusions

- Based on the designation of a well-preserved neotype, the definition of the genus *Adelocoenia* is established. From that it can be concluded that its characters closely correspond to the traditional taxonomic concepts of the genera *Cryptocoenia sensu* KOBY (1881, 1889) and *Pseudocoenia sensu* RONIEWICZ (1966) non *sensu* WELLS (1936).
- The placement of *Adelocoenia* within the family Stylinidae is confirmed.
- Many Jurassic species of the genus are revised resulting in a more detailed view of the history of the genus. Many other plocoid species are reclassified and grouped with other genera (*e.g.*, *Stylina*, *Heliocoenia*? *Solenocoenia*) for which their synonymies should be updated.
- Several plocoid species remain to be revised based on the newly established characterizations of type material of the genera dealt with in the current paper. Special attention should be given when evaluating species currently assigned to *Solenocoenia* for which longitudinal sections are often necessary in order to identify the two-zoned endotheca. The presence of canals in *Solenocoenia* connecting the corallites is not considered to be of taxonomic value.
- The genus *Adelocoenia* had its first occurrence in the Sinemurian. The pinnacle of its success, in terms of biomass production, species diversity and morphological disparity, was in the Late Jurassic. The last occurrence of *Adelocoenia* is in the Cretaceous for which a detailed revision of species is in preparation.
- Species of *Adelocoenia* mainly occurred in inner platform environments of low latitudes.
- The occurrence of *Adelocoenia* from the Upper Jurassic of Japan strongly supports the hypothesis that the paleoposition of Japan during the Late Jurassic was at latitudes not higher than 35° N.

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