

AUSTRIAN SCLERACTINIAN CORALS FROM THE K/T-BOUNDARY TO THE MIOCENE

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Summary

This is the first review and compilation of Austrian scleractinian corals from the K/T-boundary to the Miocene. The Austrian corals of the K/T-boundary (here defined as the period Middle Campanian-Upper Paleocene) show closest affinities to forms that are typical of the Upper Cretaceous, especially taxa of the Turonian-Lower Campanian strata of the Gosau Group. A first major transition in the faunal composition took place during the late Paleocene. When the 'typical Cretaceous forms' (e.g., *Heterocoenia*, *Paraplococoenia*, *Calamophylliopsis*) disappeared and the first species of modern genera (e.g., *Astreopora*, *Acropora*, *Goniastrea*, *Alveopora*) appeared all species of the latter vanished during the Eocene together with all genera which are characteristic of the Eocene-Oligocene period (*Stylocoenia* and *Pattalophyllia*) in other geographic areas. With the beginning of the Miocene another significant change of the Austrian coral fauna was observed due to the occurrence of both numerous solitary taxa (e.g., *Caryophyllia*, *Deltocyathus*, *Discotrochus*, and *Flabellum*) as well as colonial hermatypic genera (e.g., *Porites* and *Tarbellastraea*).

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Taxonomical and stratigraphical details of the Austrian scleractinian corals from the K/T-boundary to the Miocene

Note that stratigraphical ranges given for each species refer to the stratigraphical distribution in Austria.

MIDDLE CAMPANIAN-PALEOCENE (MIDDLE CAMPANIAN-THANETIAN)

Actinastrea hexaphylla (Quenstedt, 1881): Senonian (Gosau Group), see Beauvais (1982); *Columastrea striata* (Goldfuss, 1826): Turonian-Senonian (Gosau Group), see Baron-Szabo (2003); *Reussicoenia edwardsi* (Reuss, 1854): Senonian (Gosau Group), see Beauvais (1982); *Mesomorpha mammillata* (Reuss, 1854): Upper Turonian-Senonian, see Beauvais (1982) and Baron-Szabo (2002); *Actinacis remesi* Felix, 1903: Upper Turonian-Coniacian (Theresienstein reef), Santonian-Campanian (Gosau Group), and Maastrichtian (northern alpine flysch), see Baron-Szabo (2001 and 2003) and Veters (1925); *A. reussi* Oppenheim, 1930: Upper Coniacian-Santonian (Gosau Group) and Paleocene, see Beauvais (1982) and Tragelehn (1996, pl. 63, figs. 1-3); *Heterocoenia bacellaris* (Goldfuss, 1826): Santonian-Campanian (Gosau Group), Paleocene, see Quenstedt (1881) and Tragelehn (1996, pl. 61, fig. 6); *Multicolumnastraea cyathiformis* (Duncan, 1865): Santonian (Gosau Group), Paleocene, see Tragelehn (1996, pl. 62, fig. 5) and Baron-Szabo (2003); *Synastrea agaricites* (Goldfuss, 1829): Senonian (Gosau Group at Nußbach), see Baron-Szabo (2002); *Cunnolites polymorpha* (Goldfuss, 1826): Santonian-Maastrichtian, see Baron-Szabo (2003); *Stylocoenia montium* (Oppenheim, 1912): Paleocene, see Tragelehn (1996, pl. 62, fig. 2); *Acropora* sp.: Paleocene, see Tragelehn (1996, pl. 60, fig. 8) and Schlagintweit *et al.* (2003, pl. 1, fig. 3); *Astreopora auvertiaca* (Michelin, 1844): Paleocene, see Tragelehn (1996, pl. 61, figs. 3-4); *A. hexaphylla* Felix, 1906: Paleocene, see Tragelehn (1996, pl. 61, fig. 5); *Goniastrea tenera* Traub, 1938: Paleocene (Salzburg), see Kühn & Traub (1967); *Balanophyllia narindensis*

(Alloiteau, 1936): Paleocene (Salzburg), see Kühn & Traub (1967) (described as *B. schlosseri*); *B. traubi* Kühn, 1967: Paleocene (Salzburg), see Kühn & Traub (1967); *Paraplacocoenia orbignyana* (Reuss, 1854): Santonian-Campanian (Gosau Group) and Paleocene, see Beauvais (1982), Tragelehn (1996, pl. 61, figs. 1-2), and Baron-Szabo (2003); *Calamophylliopsis simonyi* (Reuss, 1854): Santonian (Gosau Group at Nefgraben) and Paleocene, see Beauvais (1982) and Tragelehn (1996, pl. 60, figs. 4 and 6); *Haimesastrea conferta* Vaughan, 1900, see Tragelehn (1996, pl. 62, figs. 8-9); *Oculina becki* (Nielsen, 1922): Paleocene, see Tragelehn (1996, pl. 59, figs. 6-10); *Faksephyllia* sp.: Paleocene, see Tragelehn (1996, pl. 60, fig. 9); *Alveopra* sp.: Paleocene, see Tragelehn (1996, pl. 62, fig. 1); *Pachygyra savii* d'Achiardi, 1866: Paleocene, see Tragelehn (1996, pl. 60, figs. 1-3); *Agathiphyllia* cf. *blaviensis* Chevalier, 1954: Paleocene, see Tragelehn (1996, pl. 62, fig. 7); *Cricocyathus grumi* (Catullo, 1852): Paleocene, see Tragelehn (1996, pl. 63, fig. 8); *Stephanoephyllia regularis* Traub, 1938, Paleocene (Salzburg), see Kühn & Traub (1967); *Trochocyathus haunsbergensis* Traub, 1938, Paleocene (Salzburg), see Kühn & Traub (1967); *T. kroisbachensis* Traub, 1938, Paleocene (Salzburg), see Kühn & Traub (1967); *Flabellum primitivum* Kühn, 1967, Paleocene (Salzburg), see Kühn & Traub (1967).

EOCENE
(YPRESIAN-BARTONIAN)

Stylocoenia bistellata Catullo, 1856: Ypresian (Waschberg), see Kühn (1966); *Actinacis* sp.: Ypresian (Waschberg), see Kühn (1966); *Favia costata* d' Achiardi, 1875: Ypresian (Waschberg), see Kühn (1966); *Meandrina angigyra* Reuss, 1848: Ypresian (Waschberg), see Kühn (1966); *M. reticulata* Reuss, 1848: Ypresian (Waschberg), see Kühn (1966); *Montastrea rudis* (Reuss, 1848): Ypresian (Waschberg), see Kühn (1966); *M. imperatoris* (Vaughan, 1919): Ypresian (Waschberg), see Kühn (1966) (= *M. bachmayeri*); *Pattalophyllia brevis* (Deshayes, 1834): Ypresian (Waschberg), see Kühn (1966) (= *Pattalophyllia cyclolitoides*); *Trochocyathus pyrenaicus* (Michelin, 1846): Bartonian (Reingruberhöhe), see Kühn (1966); *T. thorenti* d'Orbigny, 1850: Bartonian (Reingruberhöhe), see Kühn (1966); *Stephanocyathus* (*Odontocyathus*) *sieberi* Kühn, 1966: Bartonian (Reingruberhöhe), see Kühn (1966); *S. (O.) minor* Kühn, 1966: Bartonian (Reingruberhöhe), see Kühn (1966); *Flabellum appendiculatum* (Brongniart, 1823): Bartonian (Reingruberhöhe), see Kühn (1966).

MIOCENE
(BURDIGALIAN-TORTONIAN)

Tarbellastraea reussiana (Milne Edwards & Haime, 1850): Badenian, see Budd *et al.* (1996) and Riegl & Piller (2000); ?*T. distans* Chevalier, 1961: Langhian, see Budd *et al.* (1996); *T. eggenburgensis* (Kühn, 1925): Burdigalian, see Chevalier (1961); *T. abditaxis* Chevalier, 1961: Burdigalian; see Budd *et al.* (1996), *T. manipulata* (Reuss, 1847): Middle Miocene, see Chevalier (1961); *T. tenera* (Reuss, 1847): Lower Burdigalian, see Budd *et al.* (1996); *Discotrochus otnangensis* Prochazka, 1893: Helvetian, see Kühn (1965a); *D. hoelzli* Kühn, 1965: Helvetian, see Kühn (1965a and b); *Cladocora depauperata* Reuss, 1871: ?Tortonian, see Kühn (1965a); *C. conferta* (Reuss, 1871): Middle Miocene, see Chevalier (1961); *Trochocyathus angustibasis* Zuffardi-Comerci, 1932: Helvetian, see Kühn (1965a); *Flabellum* cf. *krejci* Kühn, 1963: Tortonian, see Kühn (1965a); *F. siciliensis* Milne Edwards & Haime, 1848: Helvetian, see Kühn (1965a); *F. austriacum* Prochazka, 1893: Helvetian; see Kühn (1965a), (= *F. siciliensis* M. Edw. of Reuss, 1871); *F. vaticani* Ponzi, 1876; *Stratigraphical Distribution in Austria*: Helvetian, see Kühn (1965a and b); *F. laevissimum* Kühn, 1965: Badenian, see Kühn (1965b); *F. roissyanum* Milne Edwards & Haime, 1848: Badenian, see

Chevalier (1961); *Balanophyllia italica* (Michelin, 1841): Helvetian; see Kühn (1965a); *B. pygmaea* Reuss, 1871: Helvetian, see Kühn (1965a); *B. cylindrica* (Michelotti, 1838): Helvetian, see Kühn (1965a); *B. bavarica* Kühn, 1965: Helvetian, see Kühn (1965b) (= *B. irregularis* Seguenza of Reuss, 1871); *B. concinna* Reuss, 1871: Lower Tortonian, see Chevalier (1961) and Kühn (1965b); *B. varians* Reuss, 1871: Langhian-Serravalian, see Chevalier (1961) and Kühn (1965b); *B. orthoclada* (Reuss, 1871): Langhian-Serravalian, see Kühn (1965b); *Dendrophyllia taurinensis* Milne Edwards & Haime, 1848: Helvetian, see Kühn (1965a); *Porites leptoclada* Reuss, 1871: Tortonian, see Kühn (1965b); *P. maigensis* Kühn, 1925: Burdigalian, see Chevalier (1961) and Kühn (1965b); *Enallopsammia poppelacki* (Reuss, 1848): Badenian, see Chevalier (1961) and Kühn (1965b); *Caryophyllia degenerans* Reuss, 1871: Middle Miocene, see Chevalier (1961); *C. leptaxis* Reuss, 1871: Middle Miocene, see Chevalier (1961); *Tethocyathus microphyllus* (Reuss, 1871): Tortonian, see Chevalier (1961); *Deltocyathus italicus* (Michelotti, 1838): Badenian, see Chevalier (1961); *Acanthocyathus verrucosus* (Milne Edwards & Haime, 1848): Badenian, see Chevalier (1961) (= *A. vindobonensis* Reuss, 1871); *Ceratotrochus multispinosus* (Michelotti, 1838): Middle Miocene, see Chevalier (1961); *C. multiserialis* (Michelotti, 1838): Middle Miocene, see Chevalier (1961); *C. duodecimcostatus* (Goldfuss, 1826): Badenian, see Chevalier (1961); *Siderastrea crenulata* (Goldfuss, 1826): Middle Miocene, see Chevalier (1961); *S. froehlichiana* (Reuss, 1847): Burdigalian, see Chevalier (1961) and Kühn (1965b); *Stephanophyllia elegans* (Bronn, 1837): Tortonian, see Chevalier (1961); *S. imperialis* Michelin, 1848): Tortonian, see Chevalier (1961); *Stylophora willoughbyi* Wells, 1945: Middle Miocene, see Chevalier (1961) (includes *Stylophora* sp of Reuss, 1871 and *S. reussiana* Montanaro-Gallitelli & Tacoli, 1951); *Acanthastrea horrida* (Reuss, 1871): Badenian, see Riegl & Piller (2000); *Platycoenia* sp.: Tortonian (= *Astrocoenia ornata* Michelotti of Reuss, 1871); *Heliastrea oligophylla* Reuss, 1871: Badenian, see Chevalier (1961); *H. tchihatcheffi* Chevalier, 1961: Badenian, (= *H. defrancei* M.E. & H. of Reuss, 1871), see Chevalier (1961); *Cyphastrea distans* (Reuss, 1871): Middle Miocene, see Chevalier (1961); *Plesiastraea desmoulinsi* (Milne Edwards & Haime, 1851): Middle Miocene, see Chevalier (1961); *P. romettensis* Seguenza, 1864: Middle Miocene, see Chevalier (1961); *Trochocyathus crassus* Milne Edwards & Haime, 1848): Middle Miocene, see Chevalier (1961); *Stylocora exilis* Reuss, 1871, Middle Miocene, see Piller & Kleemann (1991). The above list of Miocene species is still subject to modification pending a revision by this author dealing with approximately 20 additional species originally described by Reuss (1871).

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