



TREATISE ONLINE

Number 2

Part E, Revised, Volume 4, Chapter 5:
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Stromatoporoid-like Genera; and Excluded Taxa

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2010

**KU PALEONTOLOGICAL
INSTITUTE**

The University of Kansas

Lawrence, Kansas, USA

ISSN 2153-4012

paleo.ku.edu/treatiseonline

PART E, REVISED, VOLUME 4, CHAPTER 5: A LIST OF UPPER PALEOZOIC–MESOZOIC STROMATOPOROID-LIKE GENERA; AND EXCLUDED TAXA

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For over a century, certain upper Paleozoic to Mesozoic fossils of marine sessile benthic organisms with calcareous skeletons, many containing astrorhizae, were included with the Ordovician–Devonian Stromatoporoidea, and many of these were included in the same families as the earlier Paleozoic genera (e.g., KÜHN, 1939; LECOMPTE, 1956). The biological affinities of many of these upper Paleozoic and Mesozoic genera are still in doubt. Like the Stromatoporoidea, they have been assigned to a variety of invertebrate groups such as the hydrozoans, sponges, bryozoans, and foraminiferans. The hydrozoan affinity was strongly supported (e.g., LECOMPTE, 1956) by the similarities of some Jurassic–Cretaceous forms to Recent Hydrozoa (see chapter on Morphologic Affinities, *Treatise Online*, Part E, Revised, Volume 4, Chapter 9E). Only relatively recently have some genera among the Mesozoic forms been found to contain spicules or spicule pseudomorphs (e.g., G. TERMIER, TERMIER, & RAMALHO, 1985; WOOD, 1987) that demonstrate a relationship with the demosponges. Some of the nonspicular forms contain astrorhizae, diagnostic of the Porifera, that confirm they are sponges, but not all genera contain astrorhizae.

In the 19th century, before thin sections became a standard method of research, many genera of calcareous crusts were established with inadequate diagnoses and illustrations. Some of these have been determined to be inorganic tufas, stromatolites formed by cyanobacteria, poorly preserved corals and sponges, or calcareous algae. Most are impossible to identify consistently, cannot be traced through type specimens, and have been noted in the literature only in the original description. KÜHN (1939, p. 60–62)

gave an extensive list of these useless genera, which is not repeated here. A few of the genera that have received some comment in the literature are listed below; for others, the reader is referred to KÜHN's (1939) list and FINKS and RIGBY (2004).

Upper Paleozoic–Mesozoic stromatoporoid-like fossils are more difficult to study than their Ordovician–Devonian analogs. This difference is due to the limited number of paleontologists studying the late Paleozoic–Mesozoic forms. As STOCK (2001) noted, for the period 1926–2000, there were 734 publications on Ordovician–Devonian stromatoporoids, but only 230 on Carboniferous–Cretaceous forms. Whereas 6 paleontologists (R. G. S. Hudson; A. Schnorf-Steiner; G. Termier; H. Termier; D. Turnšek; R. Wood) produced more than 10 publications on Jurassic–Cretaceous stromatoporoid-like taxa from 1926 to 2000, 14 paleontologists did the same for the Ordovician–Devonian stromatoporoids (O. V. Bogoyavlenskaya; D.-Y. Dong; E. Flügel; S. Kershaw; V. G. Khromykh; A. I. Lessovaya; B. Mistiaen; H. Nestor; V. N. Riabinin; J. St. Jean; C. W. Stearn; C. W. Stock; B. D. Webby; V. I. Yavorsky). A large number of publications are representative of a major research commitment by the author to a particular taxon. Clearly, this relatively large number of specialists, in many cases interacting with each other on a regular basis, led to a more coherent understanding of the earlier stromatoporoids than was possible for later stromatoporoid-like forms.

The above-noted uncertainties with regard to the taxonomic position of many of the upper Paleozoic–Mesozoic, nonspicular, stromatoporoid-like taxa, the lack of a coherent, consistent classification system for this taxon, and the additional lack of anyone

currently specializing in the study of the nonspicular stromatoporoid-like forms has discouraged the authors from presenting here a systematic paleontology of the group. In this alphabetical list of stromatoporoid-like genera, the geologic systems from which type species were collected are indicated. Excluded taxa (either not stromatoporoid-like poriferans or not Porifera) are listed on p. 4 herein.

- Actinostromina** GERMOSK, 1954, p. 351 [*A. oppidana*; OD]. *Upper Jurassic*: Slovenia.
- Adriatella** MILAN, 1969, p. 180 [*A. poljaki* MILAN, 1969, p. 181; OD]. *Upper Jurassic*.
- Aksaeporella** BOIKO, 1979, p. 57 [*A. arta* BOIKO, 1979, p. 58; OD]. [BOIKO (1979) placed this genus in the parastromatoporids, but it also resembles chaetetids and hydrozoans.] *Upper Triassic*: Tadzhikistan (Pamirs).
- Aphralysia** GARWOOD, 1914, p. 268 [*A. carbonaria* GARWOOD, 1914, p. 269; OD]. [Several authors (e.g., PIA, 1937) have considered the genus to be a stromatoporoid, but GALLOWAY (1957) returned it to the algae.] *Lower Carboniferous*: England (Westmoreland).
- Astrolytopsis** GERMOSK, 1954, p. 361 [*A. slovenica*; OD] [= *Trupetostromaria* GERMOSK, 1954, p. 365 (type, *T. circoporea*, OD)]. *Upper Jurassic*: Slovenia.
- Atelostroma** DONG & WANG, 1983, p. 417 [*A. jurasicum* DONG & WANG, 1983, p. 418; OD]. *Upper Jurassic*: China (Xizang).
- Axiotubullina** DONG & WANG, 1983, p. 419 [*A. columna*; OD]. *Upper Jurassic*: China (Xizang).
- Baastadiostroma** BROOD, 1972, p. 404 [*B. typicum*; OD]. *Upper Cretaceous*: Sweden.
- Burgundostromaria** TURNŠEK, 1970, p. 199 [*B. zlatibornensis* TURNŠEK, 1970, p. 200; OD]. *Upper Cretaceous*: Serbia.
- Cassianostroma** FLÜGEL, 1960, p. 51 [*C. kupperi* FLÜGEL, 1960, p. 51–52; OD]. *Triassic*: Italy.
- Ceraostroma** KÜHN, 1926, p. 413 [*C. steinmanni*; OD]. *Jurassic*: Austria.
- Circopora** WAAGEN & WENTZEL, 1887, p. 957 [*C. foveolata* WAAGEN & WENTZEL, 1887, p. 958–960; OD]. *Permian*, ?*Triassic*: Pakistan, Austria, Russia, Indonesia.
- Coenostella** TURNŠEK, 1966, p. 355 [*C. thomasi* TURNŠEK, 1966, p. 356; OD]. *Upper Jurassic*: Slovenia.
- Convexitroma** BOIKO, 1984, p. 62 [*C. irregularis*; OD]. *Lower Jurassic*: Tadzhikistan (Pamirs).
- Crimestroma** YAVORSKY, 1947, p. 16 [*C. borissiaki*; OD]. *Upper Jurassic*: Ukraine (Crimea).
- Cylcopisis** LE MAITRE, 1935, p. 43 [*Stromatomorpha (Cylcopisis) atlantis* LE MAITRE, 1935, p. 43; OD]. *Lower Jurassic*: Morocco.
- Dehornaepporella** TERMIER IN G. TERMIER, H. TERMIER, & RAMALHO, 1985, p. 204 [*Stromatopora choffati* DEHORNE, 1917a, p. 118; OD]. [G. TERMIER, H. TERMIER, & RAMALHO (1985) noted the presence of monaxon spicules (styles) in the type species.] *Upper Jurassic*: Egypt (Sinai), Israel, Oman, Portugal, Slovenia.
- Dongqiastroma** DONG & WANG, 1983, p. 415 [*D. lamellatum*; OD]. *Upper Jurassic*: China (Xizang).
- Dongqiastromaria** DONG & WANG, 1983, p. 417 [*D. grossa*; OD]. *Upper Jurassic*: China (Xizang).
- Desmopora** YAVORSKY, 1947, p. 17 [*D. listrigonorum*; OD]. *Upper Jurassic*: Ukraine (Crimea).
- Disparistromaria** SCHNORF, 1960b, p. 439 [*D. tenuisima* SCHNORF, 1960b, p. 440; OD]. *Cretaceous*: Switzerland.
- Ellipsactinia** STEINMANN, 1878, p. 116 [*E. ellipsoidea* STEINMANN, 1878, p. 117; OD]. *Upper Jurassic*: Austria.
- Emscheria** SCHNORF-STEINER, 1958, p. 461 [*E. neth-erensis* SCHNORF-STEINER, 1958, p. 462; OD]. *Upper Cretaceous*: France.
- Gurumdistroma** BOIKO, 1984, p. 65 [*G. astrorhizoidea*; OD]. *Lower Jurassic*: Tadzhikistan (Pamirs).
- Hudsonella** TURNŠEK, 1966, p. 361 [*H. otlicensis* TURNŠEK, 1966, p. 362; OD]. *Upper Jurassic*: Slovenia.
- Incrustospongia** MOLINEUX, 1994, p. 980 [*I. meandrica* MOLINEUX, 1994, p. 980–981; OD]. [FINKS & RIGBY (2004) placed this laminated encrusting form in Demospongiae, order and family Uncertain.] *Upper Carboniferous*: USA (Texas).
- Jillua** KRUMBECK, 1913, p. 134 [*J. tubifera*; OD]. [Comments in FLÜGEL & SY (1959); YABE & SUGIYAMA (1935), KÜHN (1939); based on surface features only.] *Upper Triassic*: Indonesia.
- Komia** KORDE, 1951, p. 181 [*K. abundans*; OD] [= *Ungdarella* MASLOV, 1956, p. 73, *non* KORDE, 1951, *nec* TOOMEY & JOHNSON, 1968, p. 577 (type, *U. americana*, OD)]. [Although originally described as an alga and confirmed as such by STOCK & others (1992), WILSON, WAINES, & COOGAN (1963) placed these fossils in the Stromatoporoidea.] *Upper Carboniferous*: Japan, Russia (Urals), USA (south-western states).
- Lamellata** FLÜGEL & SY, 1959, p. 60 [*L. wahneri* FLÜGEL & SY, 1959, p. 61; OD]. [The genus was compared with *Ellipsactinia*, *Nigriporella*, and *Sphaeractinia* by FLÜGEL & SY (1959). KONISHI (1959) wrote that the genus is a synonym of *Tubiphytes* MASLOV.] *Upper Triassic*: Austria, Greece (Corfu).
- Lithopora** TORNQUIST, 1900, p. 128 [*L. koeneni*; OD]. *Triassic*: Italy.
- Milleporidium** STEINMANN, 1903, p. 2 [*H. remesi*; OD]. *Upper Jurassic*: Austria.
- Millesstroma** GREGORY, 1898, p. 340 [*M. nicholsoni* GREGORY, 1898, p. 341; OD]. [The genus is composed of bundles of fine tubes that suggest affinity to the bryozoans (DEHORNE, 1920); however, GREGORY (1898) placed it in the hydrozoans.] *Upper Cretaceous*: Egypt.
- Myriopora** KÜHN, 1939, p. 34 [*Myriopora verbeekii* VOLZ, 1904, p. 187; OD]. [HUDSON (1956) considered that *Myriopora* of REUSS (1846) was a *lapsus calami* for *Myriapora* BLAINVILLE (1830)]

and that *Myriopora* VOLZ, 1904, was a homonym of *Myriopora* REUSS and *Myriapora* BLAINVILLE and hence was not available, and to resolve the nomenclatural problem, he recognized KÜHN's genus *Myrioporina* as valid to replace the names that BLAINVILLE, REUSS, and VOLZ had used for this taxon.] *Jurassic*: Indonesia (Sumatra).

Palaeoaplysina KROTOW, 1888, p. 549 [*P. laminaeformis*; OD; neotype P209-3 (TCHUVASCHOV, 1973)] [=Mezenia STUCKENBERG, 1895, p. 130 (type, *M. rozeni*, OD); FLÜGEL, 1961; =Uralotimania RIABININ, 1915, p. 23 (type, *U. reticulata*, OD)]. [This is a common reef-forming fossil organism of the lower Permian and Carboniferous rocks of western and arctic North America and Russia. It has a unique cellular microstructure and a complex system of internal canals parallel to the base in the lower part, bending upward to the upper surface. The genus has generally been assigned to either the hydrozoans or sponges and suggestions that it is an alga are rejected by recent researchers. Recent papers on this common fossil include: DAVIES (1971); DAVIES & NASSICHUK (1973, 1986); WATKINS & WILSON (1989).] *upper Carboniferous–lower Permian*: Canada (arctic islands, Yukon), Russia (Urals, Russian platform), USA (California, Idaho).

Palaeomillepora GABILLY & LAFUSTE, 1957, p. 355 [*P. liassica*; OD]. *Lower Jurassic*: France.

Paradehornella BOIKO, 1989, p. 56 [*P. astriferum*; OD]. *Middle Jurassic*: Tadzhikistan (Pamirs).

Paramilleporella FENNINGER in FENNINGER & HÖTZL, 1965, p. 20 [*P. gracilis*; OD]. *Upper Jurassic*: Austria.

Paratubuliella DONG & WANG, 1983, p. 423 [*P. pertabulata*; OD]. *Upper Jurassic*: China (Xizang).

Parksia LECOMPTÉ, 1952, p. 24 [*Stromatopora douvillei* DEHORNE, 1918, p. 220; OD]. *Upper Jurassic*: Tunisia.

Paronaria TERMIER & TERMIER, 1984, p. 236 [*Parkeria provali* PARONA in PARONA, CREMA, & PREVER, 1909, p. 161; OD]. *Cretaceous*: Italy.

Periomipora H. TERMIER, G. TERMIER, & RAMALHO, 1985, p. 980 [*P. elegantissima*; OD]. [TERMIER, TERMIER, & RAMALHO (1985) noted the presence of monaxon spicules in the type species.] *Upper Jurassic*: Portugal.

Reticullina TURNŠEK, 1966, p. 364 [*R. rectangularis* TURNŠEK, 1966, p. 365; OD]. *Upper Jurassic*: Slovenia.

Rhizoporidium PARONA in PARONA, CREMA, & PREVER, 1909, p. 158 [*R. irregulare*; OD]. *Cretaceous*: Italy.

Sarawakia HASHIMOTO, 1973, p. 210 [*S. ellipsactinoides* HASHIMOTO, 1973, p. 211; OD]. *Upper Jurassic*: Malaysia (Sarawak).

Saresiastroma BOIKO, 1989, p. 57 [*S. conceptum* BOIKO, 1989, p. 58; OD]. *Middle Jurassic*: Tadzhikistan (Pamirs).

Sarmenofascis TERMIER, TERMIER, & VACHARD, 1977, p. 146 [*Cladocoropsis cretacea* TURNŠEK, 1968, p. 357; OD]. *Lower Cretaceous*: Montenegro.

Scaniostroma BROOD, 1972, p. 396 [*S. gracilis*; OD]. Resembles the spongiomorphs. *Upper Cretaceous*: Sweden.

Sedeikiastroma BOIKO, 1984, p. 60 [*S. liassica* BOIKO, 1984, p. 61; OD]. *Lower Jurassic*: Tadzhikistan (Pamirs).

Shamovella RAUSER-CHERNOUSOVA, 1950, p. 17 [*S. obscura* MASLOV, 1956, p. 82; SD RIDING, 1993; see discussions regarding the validity of *Shamovella* versus *Tubiphytes*: RIDING & GUO (1992); RIDING (1993); RIDING & BARKHAM (1999)] [= *Tubiphytes* MASLOV, 1956, p. 82 (type, *T. obscurus*; OD); = *Nigriporella* RIGBY, 1958, p. 584 (type, *N. magna*, OD, lost); Permian, Texas, USA]. [RIDING & GUO (1992) discussed the possible affinity of this widespread fossil as a cyanobacterium, hydrozoan, rhodophyte, poriferan, or foraminiferan and concluded that it is most likely a sponge.] *Carboniferous–Cretaceous (mainly Permian)*.

Siphostroma STEINER, 1932, p. 79 [*S. arzieri* STEINER, 1932, p. 99; OD]. [Discussed by YABE & SUGIYAMA (1935), KÜHN (1939), and LECOMPTÉ (1952).] *Cretaceous*: Switzerland.

Sphaeractinia STEINMANN, 1878, p. 115 [*S. diceratina*; OD]. *Upper Jurassic*: Austria.

Sporadoporidium GERMÖVŠEK, 1954, p. 370 [*S. rakovci*; OD]. *Upper Jurassic*: Slovenia.

Steinerella LECOMPTÉ, 1952, p. 26 [*Stromatopora mecosola* STEINER, 1932, p. 103; OD]. *Lower Cretaceous*: Switzerland.

Stromatoporellata BAKALOW, 1910, p. 5 [*S. mammillaris*; OD]. [Described on the basis of surface characteristics only. Holotype not available (see FLÜGEL & SY, 1959).] *Upper Triassic*: Bulgaria.

Stromatoporellina KÜHN, 1927, p. 550 [**Stromatoporella haugi* DEHORNE, 1917b, p. 70; OD] [= *Astrorhizopora* SCHNORF-STEINER, 1958, p. 454 (type, *Stromatoporella haugi* DEHORNE, 1917b, p. 70, OD)]. *Upper Cretaceous*: France.

Stromatoporina KÜHN, 1927, p. 550 [**Stromatopora tornquisti* DENINGER, 1906, p. 66; OD]. *Triassic*: Italy (Sardinia).

Stromatorhiza BAKALOW, 1906, p. 13 [**Thamnaraea? granulosa* KÖBY, 1888, p. unknown; OD]. [HUDSON (1955) gives the most complete discussion and suggests synonymy with *Cylcopsis* LE MAITRE, *Astrostyllopsis* GERMÖVŠEK, and *Trupetostromaria* GERMÖVŠEK.] *Jurassic*: Switzerland.

Stromatostroma BAKALOW, 1910, p. 4 [*S. triassicum*; OD]. *Triassic*: Bulgaria.

Tauripora YAVORSKY, 1947, p. 16 [**T. astroites* YAVORSKY, 1947, p. 16–17; OD]. *Permian*: Crimea.

Tosastroma YABE & SUGIYAMA, 1935, p. 158 [**T. tokunagai* YABE & SUGIYAMA, 1935, p. 185; OD]. *Upper Jurassic*: Japan.

Tubuliella TURNŠEK, 1966, p. 357 [**T. fluegeli*; OD]. *Upper Jurassic*: Slovenia.

Tubulopareites SCHNORF, 1960a, p. 430 [**T. constans* SCHNORF, 1960a, p. 432; OD]. *Upper Cretaceous*: France.

Xizangstromatopora DONG, 1981, p. 118 [**X. densata* DONG, 1981, p. 119; OD]. *Upper Jurassic*: China (Xizang).

Yezoactinia HASHIMOTO, 1960, p. 95 [**Y. shotomb-estuensis* HASHIMOTO, 1960, p. 96; OD]. *Upper Jurassic*: Japan.

EXCLUDED TAXA

- Aprutinopora** PARONA in PARONA, CREMA, & PREVER, 1909, p. 150 [*A. osmoi* PARONA in PARONA, CREMA, & PREVER, 1909, p. 151; OD]. [Questionably a bryozoan (KÜHN, 1939).] *Cretaceous*: Italy.
- Cerkesia** MOISEEV, 1944, p. 24 [*C. robinsoni* MOISEEV, 1944, p. 25; OD] [=Cerkesia FLÜGEL, 1961, p. 74, *lapsus calami*]. [MOISEEV (1944) suggested relationships with the actinostromatids, siphonostromids, and burgundiids, but his illustrations suggest this may be a bryozoan. Used by only MOISEEV.] *Upper Triassic*: Georgia and Russia (Caucasus).
- Cycloporidium** PARONA in PARONA, CREMA, & PREVER, 1909, p. 157 [*C. tuberiforme*; OD]. [“Description and illustration very unclear” (KÜHN, 1939, p. 58).] *Cretaceous*: Italy.
- Elephantaria** OPPENHEIM, 1930, p. 1 [*E. lindstroemi* OPPENHEIM, 1930, p. 2; OD]. [Possibly a scleractinian coral.] *Cretaceous*: Austria.
- Lichuanopora** FAN, RIGBY, & ZHANG, 1991, p. 66 [*L. bancaensis*; OD]. [Skeleton consists of open, longitudinal tubes with walls penetrated by pores. Possibly a hydrozoan.] *upper Permian*: China (Hubei).
- Likinia** IVANOVA & ILKHOVSKY in ILKHOVSKY, 1973, p. 11 [*L. nikitinii*; OD]. [May be a hydrozoan.] *Middle Carboniferous*: Russia (Oka River).
- Lophiostroma** NICHOLSON, 1891, p. 160 [*Labechia? schmidti* NICHOLSON, 1886, p. 16; OD]. [STUGIYAMA (1939) used this lower Paleozoic genus for calcareous crusts, identifying the species as *Labechia? schmidti* NICHOLSON, 1886, p. 16, =*Lophiostroma (Labechia?) schmidti* NICHOLSON (1891, p. 160). MORI (1980, p. 238–239) identified *Lophiostroma ozawai* YABE & SUGIYAMA, 1931, as a brachiopod shell.] *Carboniferous–Permian*: Japan.
- Megastroma** MONTANARO–GALLITELLI, 1954, p. 79 [*M. lecomptei*; OD]. [FLÜGEL & FLÜGEL-KAHLER (1968) suggested this may be an inorganic structure.] *Permian*: Italy (Sicily).
- Neostroma** TORNQUIST, 1901, p. 1117 [*N. sumatraense*; OD]. [FLÜGEL (1961) synonymized this genus with the scleractinian coral *Actinacis d'ORBIGNY*.] *Cretaceous*: Indonesia (Sumatra).
- Parkeria** CARPENTER in CARPENTER & BRADY, 1870, p. 724 [*P. sphaerica* CARTER, 1877, p. 61; OD] [=*Millarella* CARTER, 1888, p. 178 (type, *M. cantabrigiensis*, OD)]. [A hydrozoan cnidarian (TERMIER & TERMIER, 1984).] *Cretaceous*: England, India.
- Porosphaera** STEINMANN, 1878, p. 120 [*Millepora globularis* PHILLIPS, 1829, p. 155; OD]. [In Calcarea (FINKS & RIGBY, 2004, p. 756).] *Upper Cretaceous*: Czech Republic, England, France, Germany.
- Rhizostromella** PARONA in PARONA, CREMA, & PREVER, 1909, p. 160 [*R. apennina*; OD]. [“Description and illustration worthless” (KÜHN, 1939, p. 62).] *Cretaceous*: Italy.
- Sphaerostromella** YABE & SUGIYAMA, 1931, p. 123 [*S. shikokuensis*; OD]. [The skeleton is spherical with zooids like a bryozoan. It has been considered to be a bryozoan (KÜHN, 1939), hydrozoan (FLÜGEL, 1961), or not a stromatoporoid (FLÜGEL & FLÜGEL-KAHLER, 1968).] *Carboniferous*: Japan.
- Stromactinia** VINASSA DE REGNY, 1911, p. 19 [*S. triassica* VINASSA DE REGNY, 1911, p. 20; OD]. [STEINER (1932) related this genus to *Ellipsactinia*. FLÜGEL (1961, p. 71) placed it in the alga *Sphaerocodium*.] *Upper Triassic*: Hungary (Lake Balaton).
- Stromaporidium** VINASSA DE REGNY, 1915, p. 108 [*S. globosum*; OD]. [The genus has been placed in the Hydrozoa (VINASSA DE REGNY, 1915), algae (PARONA, 1928; SUGIYAMA, 1939), or *incerta sedis* (FLÜGEL & SY, 1959).] *Upper Triassic*: Indonesia.
- Thalaminia** STEINMANN, 1878, p. 112 [*Ceriopora crista* GOLDFUSS, 1826, p. 38; OD]. [According to FLÜGEL (1961, p. 71), this is a nonstromatoporoid sponge, but FINKS, REID, and RIGBY (in KAESLER, 2004) did not include it with the Porifera.] *Upper Jurassic–Lower Cretaceous*: France.

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