Proceedings of the Eighth International Workshop on Agglutinated Foraminifera

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The New and Reinstated Genera of Agglutinated Foraminifera published between 2005 and 2008

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ABSTRACT

During the four-year period since the publication of the previous *Proceedings of the International Workshops on Agglutinated Foraminifera*, some seven genera of agglutinated foraminifera have been described as new, one genus has been reinstated, one newly described genus has been suppressed, and 10 schlumbergerinid and 15 xenophyophorid genera have been transferred to the agglutinated foraminifera. This brings the total number of new, reinstated, and reassigned agglutinated foraminiferal genera to 185 since the publication of "Foraminiferal Genera and their Classification" by Loeblich & Tappan (1987).

INTRODUCTION

The purpose of this paper is to continue the compilation of validly described and reinstated genera of agglutinated foraminifera published after Loeblich & Tappan's (1987) book "Foraminiferal Genera and their Classification". In this paper, I provide a list of the newly described genera of agglutinated foraminifera published in the accessible literature, as well as those that have been newly reinstated, or transferred to the agglutinated foraminifera. The current work is a continuation of previous compilations containing 152 valid genera (Kaminski, 2000, 2004a, 2008), and encompasses the years 2005 to 2008, inclusive.

It is my intention to update these "appendices" to Loeblich & Tappan (1987) approximately every four years as a regularly occurring chapter in the IWAF proceedings volumes. The purpose of this work is to review recent changes and updates to the taxonomy with the goal of stabilising the generic nomenclature of the agglutinated foraminifera. The suprageneric systematics of the genera follows Kaminski (2004b), with the exception the latinised endings for the superfamilies have now been corrected to follow zoological rather than botanical nomenclature.

Genera reinstated or transferred into the Agglutinated Foraminifera since 2005

Subclass TEXTULARIIA Mikhalevich, 1980
Order ASTRORHIZIDA Lankester, 1885
Suborder ASTRORHIZINA Lankester, 1885
Superfamily XENOPHYOPHOROIDEA Tendal, 1972 [stat. nov. ex subclass Xenophyophoria Tendal, 1972].

The recent findings that at a molecular level, at least some species of xenophyophores are in fact foraminiferans closely related to *Rhizammina* (Pawłowski *et al*., 2003; A. Gooday, personal communication, 2008) means that their systematics must be accommodated within the subclass Textulariia in the classification of Kaminski (2004b). At best, this group can be assigned equal status among the two existing superfamilies Astrorhizoidea Brady, 1881, and Komokioidea Tendal & Hessler, 1977 within the suborder Astrorhizina Lankester, 1885. The following genera are members of the superfamily Xenophyophoroidea: *Aschemonella* Brady, 1879, *Cerelasma* Haeckel, 1889, *Cerelpemma* Laubenfels, 1936, *Galatheammina* Tendal, 1972, *Homogammina* Gooday & Tendal, 1988, *Maudammina* Tendal, 1972, *Occultammina* Tendal, Swinbanks & Shirayama, 1982, *Psammetta* Schultze, 1906, *Psammina* Haeckel, 1889, *Reticulammina* Tendal, 1972, *Semipsammina* Tendal, 1975, *Spiculammina* Kamenskaya, 2005, *Stannoma* Haeckel, 1889, *Stannophyllum* Haeckel, 1889, and *Syringammina* Brady, 1883. The genus *Pelosina* Brady, 1879 was regarded by Mikhalevich & Voronova (1999) to be a xenophyophore, but according to A. Gooday (personal communication, 2010), the genus does not possess any of the distinctive internal features (granellare strands or stercomare strings) that characterise the subfamily. *Pelosina* is therefore best placed in the superfamily Saccamminoidea.

SCHLUMBERGERINIDA Mikhalevich, 1980
(= order Rzehakinida Saidova, 1981 = suborder Rzehakinina Saidova, 1981 in the classification of Kaminski, 2004b)

In: Kaminski, M.A. & Filipescu, S., (eds), 2011. Proceedings of the Eighth International Workshop on Agglutinated Foraminifera. *Grzybowski FoundationSpecial Publication*, **16**, 53-59.

The taxonomic position and the composition of the order Schlumbergerinida Mikhalevich, 1980 has been reviewed by Mikhalevich & Kaminski (2008). The schlumbergerinids represent a well-defined foraminiferal group characterised by the predominance of planispiral or miliolid coiling modes not seen in other foraminiferal phyletic lines except within the class Miliolata. They differ from their isomorphic forms within the subclass Miliolana in the agglutinated character of their wall (mainly agglutinated on an organic base). Genera having a thick agglutinated layer underlain by a thin calcareous layer characteristic of the porcellaneous miliolids were also included in the order Schlumbergerinida by Mikhalevich & Kaminski (2008). In the classification of Kaminski (2004b), the Rzehakinina was regarded as a suborder of the Lituolida, with ten genera (*Psamminopelta* Tappan, 1957, *Rzehakina* Cushman, 1927, *Spiroloc-ammina* Earland, 1934, *Ammoflintina* Earland, 1934, *Birsteiniolla* Mayer, 1974, *Miliammina* Heron-Allen & Earland, 1930, *Silicomassilina* Serova, 1966, *Silicosigmoilina* Cushman & Church, 1929, *Spirosig-moilinella* Matsunaga, 1955, and *Trilocularena* Loeblich & Tappan, 1955). In addition to the above-listed genera Mikhalevich & Kaminski (2008) transferred the following genera into the order Schlumbergerinida**:**

Spiroglutina Mikhalevich, 1983 (type species: *Spiroloculina asperula* Karrer, 1868).

Agglutinella El-Nakhal, 1983 (type species: *Agglutinella soriformis* El-Nakhal, 1983).

Dentostomina Carman, 1933 (type species: *Dentostomina bermudiana* Carman, 1933).

Siphonaperta Vella, 1957 (type species: *Siphonaperta macbeati* Vella, 1957).

Falsagglutinella Loeblich & Tappan, 1994 (type species: *Falsagglutinella byrsa* Loeblich & Tappan, 1994).

Ammomassilina Cushman, 1933 (type species: *Massilina alveoliniformis* Millett, 1898).

Ammosigmoilinella Zheng, 1988 (type species: *Ammosigmoilinella eximia* Zheng, 1988).

Sigmoilopsis Finlay, 1947 (type species: *Sigmoilina schlumbergeri* Silvestri, 1904).

Schlumbergerina Munier-Chalmas, 1882 (type species: *Schlumbergerina arenifora* Munier-Chalmas, 1882).

Pseudoflintina Saidova, 1981 (type species: *Miliolina triquetra* Brady, 1879).

HORMOSININA Mikhalevich, 1980

ARTHRODENDRON Ulrich, 1904

Type species. *Arthrodendron diffusum* Ulrich, 1904, p. 138, OD. [Subjective junior synonym: *Aschemonella carpathica* Neagu, 1964, p. 582].

Arthrodendron Ulrich, 1904, p. 138, OD.

Halysium Świdziński, 1937, p. 146 [type species: *Halysium problematicum* Świdziński, 1934; non *Halysium* Corda, 1837].

Palaeoarthrodendron Dayal, 1964, p. 727 [nom. subst. pro *Arthrodendron* Ulrich, 1904].

Aschemocella Vialov, 1966, p. 31. [type species: *Aschemonella carpathica* Neagu, 1964].

Test free, with large (commonly 1–3 mm wide) irregularly ovoid, flask-shaped, or tubular chambers in a linear or dichotomously branching series, increasing very slowly in size. Chambers are compressed with a raised outer rim and may have irregular shape at the point of branching. Wall imperforate, simple, of agglutinated quartz, mica, and sponge spicules in abundant cement, probably with an inner organic lining. May have more than one rounded aperture, which may be produced on a neck, terminal, or may be at the side of the chamber, probably just before a new branch arises. U. Cretaceous (Campanian); Romania, Ukraine; Paleogene, Trinidad, Angola, North Sea.

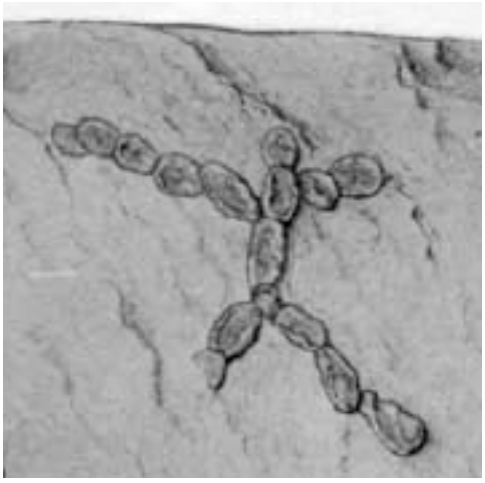

Figure 1. *Arthrodendron diffusum* Ulrich. Upper Cretaceous, Kodiak Island, Alaska, Paratype, natural size (from Ulrich, 1904).

Remarks. We regard the type species of the genus *Aschemocella* (*Aschemonella carpathica* Neagu, 1964) to be a junior synonym of *Arthrodendron diffusum* (Kaminski *et al*. 2008).

Kaminski, M.A., Uchman, A., Neagu, T. & Cetean, C.G. 2008. A larger agglutinated foraminifer originally described as a marine plant: The case of *Arthrodendron* Ulrich, 1904 (Foraminifera), its synonyms and homonyms. *Journal of Micropalaeontology*. **27** (2), 103-110.

Genera suppressed since 2005

ORBITOLININA Kaminski, 2004b

PRAEORBITOLINOIDES Matsumaru, 2005

Cherchi & Schroeder (2009) regarded the genus *Praeorbitolinoides* Matsumaru, 2005 to be a junior

synonym of *Praeorbitolina*, based upon their reinterpretation of the juvenile stage of the type species *Praeorbitolinoides japonica* Matsumaru, 2005. According to these authors, *Praeorbitolinoides japonica* represents a transitional form between the species *Praeorbitolina cormyi* and *Praeorbitolina wienandsi* Schroeder.

Matsumaru, K. 2005. *Praeorbitolinoides*, a new orbitolinid foraminiferal genus from the Lower Aptian (Cretaceous) of Hokkaido, Japan. *Micropaleontology,* **51** (1), 93-99.

Cherchi, A. & Schroeder, R. 2009. Revision of the orbitolinid foraminiferal genus *Praeorbitolinoides* Matsumaru, 2005 from the Aptian of Hokkaido, Japan. *Micropaleontology*, **55** (4), 421-424.

New Genera published since 2005

ALLOGROMIIDA Hartog in Harmer & Shipley, 1906.

CONICOTHEKA Gooday, Todo, Uematsu & Kitazato, 2008

Type species. *Conicotheca nigrans* Gooday, Todo, Uematsu & Kitazato, 2008, OD

Conicotheca Gooday, Todo, Uematsu & Kitazato, 2008, p. 416.

Description. Test tiny (usually <120 microns), elongate, more or less conical in shape, tapering towards the proximal end from widest point in the distal third to quarter. Proximal end often slightly bulbous; distal end truncated or bluntly pointed with single terminal aperture that is round to elongated in shape. There are no internal subdivisions. Test wall mainly organic, transparent and colourless. Some areas smooth on submicrometre scale; other areas with scale-like surface pattern, probably due to the presence of clay minerals. Test interior contains large, dark coloured stercomata. Holocene, NW Pacific, at 10,896 m.

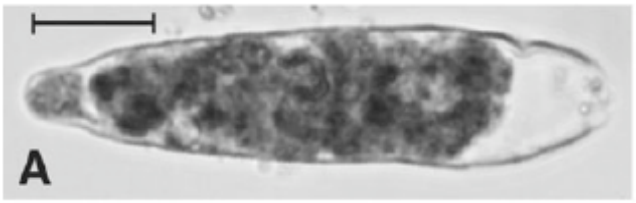

Figure 2. *Conicotheca nigrans* Gooday, Todo, Uematsu & Kitazato. Holocene, NW Pacific, CHALLENGER Deep, southwest part of the Izu–Bonin–Mariana Trench (11°20.093′N, 142°11.803′E, depth 10,896 m). Side view of holotype (MPC-02704), Transmission light micrograph of specimen on open slide in glycerol, scale = 25 μm (from Gooday *et al*. 2008).

Remarks. Differs from *Nodellum* in its much smaller test size, more compact, streamlined shape, and in the lack of a well defined proloculus. *Conicotheca* differs from *Resigella* in the absence of chamber-like subdivisions. The type specimens of *C. nigrans* are deposited in the Micropalaeontology Collection, National Museum of Nature and Science, Tokyo and in the Palaeontology Department, Natural History Museum London under reg. nos. MPC-02704 (holotype), MPC-02699-02703 (five paratypes) and BMNH ZF 5168 (six paratypes).

Gooday, A.J., Todo, Y., Uematsu, K. & Kitazato, H. 2008. New organic-walled Foraminifera (Protista) from the ocean's deepest point, the Challenger Deep (western Pacific Ocean). *Zoological Journal of the Linnean Society,* **153** (3), 399–423.

KOMOKIOIDEA Tendal & Hessler, 1977

BACULELLIDAE Tendal & Hessler, 1977

SKELETONIA Gooday, Kamenskaya & Cedhagen, 2007

Type species. *Skeletonia variabilis* Gooday, Kamenskaya & Cedhagen, 2007; OD(M).

Skeletonia Gooday, Kamenskaya & Cedhagen, 2007, p. 244.

Description. Test consisting of an initial cluster of globular, grape-like or more elongate chambers followed by a small number of relatively wide, stiff, crooked, tubular processes, typically 80–100 μm in diameter. These usually arise from either side of the longitudinal growth axis and increase in length from proximal to distal. The growth axis is sometimes compressed, obscure, or lacking. Tubular processes are sometimes interrupted by internal septa, and most of them branch dichotomously once or twice. The tips of the processes are flattened or rounded. Holocene; Southern Ocean, at 4,927–4,932 m.

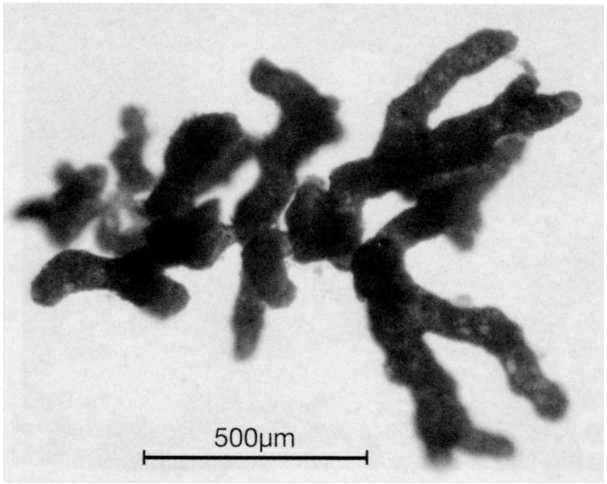

Figure 3. *Skeletonia variabilis* Gooday, Kamenskaya & Cedhagen. Holocene, Weddell Abyssal Plain, Southern Ocean, at 4,927–4,932 m. Side view of holotype (SMF XXVII 7533) in transmitted light, scale = 500 μm (from Gooday *et al*., 2007).

Remarks. The test of *Skeletonia* consists of a series of elongate elements termed "tubular processes" because they are wider than the tubules of typical

komokiaceans. The genus is reminiscent of *Baculella*, but differs in the lack of an axial tubule. Instead, the axis, where present, is formed by the bases of the lateral tubular processes and the short, stolon-like necks that connect them. The tubular processes are larger and more robust than the bead-like chambers of *Baculella*. Gooday *et al*. (2007) did not place the genus in the Baculellidae, but regarded it to be a komoki *incertae sedis*.

The type species displays considerable variability in that the arrangement of the tubular processes are not consistent. In some individuals there is an apparent axis of growth, but in others this axis is irregular and is compressed or not visible at all. The initial part, where visible, consists of a cluster of globular chambers but in some specimens these are replaced by small tubular structures. Type specimens of *Skeletonia variabilis* are housed in the Senckenberg Museum, Frankfurt (SMF XXVII 7533-7534).

Gooday, A.J., Kamenskaya, O.E. & Cedhagen, T. 2007. New and little-known Komokiacea (Foraminifera) from the bathyal and abyssal Weddell Sea and adjacent areas. *Zoological Journal of the Linnean Society,* **151**, 219-251.

XENOPHYOPHOROIDEA Tendal, 1972
PSAMMINIDAE Haeckel, 1889

SPICULAMMINA Kamenskaya, 2005
Type species. *Spiculammina delicata* Kamenskaya, 2005, OD(M).
Spiculammina Kamenskaya, 2005, p. 24.

Figure 4. *Spiculammina delicata* Kamenskaya, 2005. Holocene, Pacific Ocean, Clipperton Fracture Zone, R/V Antropov Sta. 5458, 5400m depth, lateral view of holotype (Zoological Museum, Moscow State University, nr. F-13), scale = 10 mm (from Kamenskaya, 2005).

Test large, up to 40 mm in height, treelike, probably attached, consisting of tubes of differing diameters. The central tube is 3 to 5 times thicker than peripheral tubes, and is branched and rarely anastomosing. Branching is dichotomous and trichotomous, occurring in clusters along the trunk of the tube. Xenophyae consist of sponge spicules oriented outwards chaotically, giving the test a shaggy appearance. Interior of tubes is filled with strings and masses of granellare and stercomare, with sparse xenophyae.

Remarks. As in other genera of the Psamminida, *Spiculammina* possesses external xenophyae arranged in a surface layer, while the chamber interior contains a loose mass of xenophyae with granellare and stercomare between them. The genus most closely resembles *Reticulammina*, differing in having a more treelike shape with large central trunk and sparse branching. The single intact specimen and numerous fragments were collected at a depth of 5400 m on the abyssal plain at the Clipperton Fracture Zone in the Pacific (11°52.1'N, 136°06.3'W).

Kamenskaya, O.E. 2005. *Spiculammina delicata* gen. et sp.n., a new xenophyophore from the eastern Pacific (Psamminidae). *Invertebrate Zoology*, **2** (1), 23-27.

VERNEUILINOIDEA Cushman, 1911
PROLIXOPLECTIDAE Loeblich & Tappan, 1985

EOBIGENERINA Cetean, Setoyama, Kaminski, Neagu, Bubík, Filipescu & Tyszka, 2008
Type species. *Bigenerina variabilis* Vašíček, 1947, OD.
Eobigenerina Cetean, Setoyama, Kaminski, Neagu, Bubík, Filipescu & Tyszka, 2008, p. 6.

Figure 5. *Eobigenerina variabilis* (Vašiček). Upper Cretaceous (Cenomanian), Hluk Formation, Hluk village, Czech Carpathians. Left: holotype. Remaining specimens are paratypes, side and top views, length of holotype = 0.45 mm (from Vašíček, 1947).

Description. Test with an early biserial stage comprising at least one-third the length of the adult test, followed by a loosely biserial stage, then a short lax uniserial portion, and finally by a terminal uniserial stage of low chambers that are round in cross-section. Wall solid, noncanaliculate, finely finished, of fine agglutinated particles in organic material, often well-silicified, insoluble in HCI. Aperture terminal, small and rounded, on a collar or

short neck. Australia; North Atlantic; Barents Sea; Alpine-Carpathian region: Romania, Poland, Czech Republic, Austria.

Remarks. Differs from *Bigenerina* in having a solid, noncanaliculate wall that is insoluble in acid, and from *Aaptotoichus* in having a well-developed biserial part, an apertural neck, and a finely agglutinated test wall. It differs from *Bimonilina* in having chambers that are truly uniserial, rather than lax-uniserial, and in having a round terminal aperture. Differs from *Rashnovammina* and *Bicazammina* in the addition of a truly uniserial terminal part with horizontal sutures between last chambers. Numerous Mesozoic species originally described as *Bigenerina* possess a solid noncalcareous wall and should be transferred to this genus (see Cetean *et al*., this volume).

Vašíček, M. 1947. Poznámky k mikrobiostratigrafii magurského flyše na Moravě. *Věstník Státního Geologického Ústavu Československé Republiky*, **22**, 235-256.

Cetean, C.G., Setoyama, E., Kaminski, M.A., Neagu, T., Bubík, M., Filipescu, S. & Tyszka, J. 2008. *Eobigenerina* n.gen., a cosmopolitan deep-water agglutinated foraminifer, and remarks on species formerly assigned to the genera *Pseodobolivina* and *Bigenerina*. *In:* Filipescu, S. & Kaminski, M.A. (eds), Eighth International Workshop on Agglutinated Foraminifera, Abstract volume. *Grzybowski Foundation Special Publication*, **14**, 6-7.

RECTOPROTOMARSSONELLA Kaminski, Bubík & Cetean, 2008

Type species. *Marssonella rugosa* Hanzlíková, in Homola & Hanzlíková 1953, OD(M).

Rectoprotomarssonella Kaminski, Bubík & Cetean, 2008, p. 517.

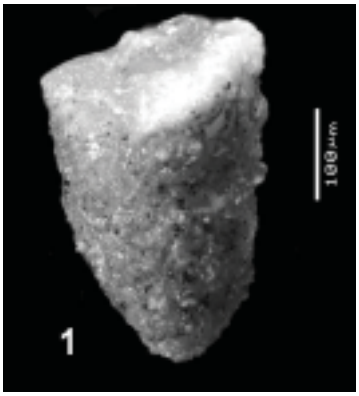

Figure 6. *Rectoprotomarssonella rugosa* (Hanzlíková). Upper Cretaceous (Campanian), Czech Republic. Side view of the so-called "False Holotype" from the Hanzliková Collection, Czech Geological Survey, Prague, scale = 100 μm (from Kaminski *et al*. 2007).

Description. Test large, elongate, up to 1 mm in length, tapering toward the base, and later nearly cylindrical in section, with a flattened terminal face. Early stage trochospirally coiled with four to five chambers per whorl, later reduced to triserial, biserial, and finally uniserial. Chamber interior not subdivided. Sutures mostly indistinct, slightly depressed. Wall coarsely agglutinated, noncanaliculate, with sparse calcareous cement, comprised of coarse particles held in a fine-grained groundmass. Aperture initially interiomarginal, a low slit situated in a re-entrant at the base of the last chamber, moving to terminal position in the uniserial part, rounded, without a tooth. Carpathians (Poland, Czech Republic, Romania); Spain.

Remarks. This genus differs from *Protomarssonella* Desai & Banner 1987 in possessing a uniserial part. It differs from the Cenozoic genus *Goesella* in having a solid wall and in lacking any trace of an apertural tooth. A single specimen of the type species, *Marssonella rugosa* is preserved in the Hanzlíková collection at the Czech Geological Survey. The specimen slide is labeled "holotype", but it is not from the type locality, and must have been added to the collection at a later date.

Acid treated specimens display holes in the wall where calcareous grains have been dissolved away, but no sign of a regular pattern of rounded pseudopores as in the genus *Marssonella* (see Desai & Banner 1987). The first chambers of the uniserial part still display some aspect of biseriality, and can be described as "lax-uniserial", while later chambers are truly uniserial, with horizontal sutures.

Kaminski, M.A., Bubík, M. & Cetean, C.G. 2008. *Rectoprotomarssonella* n.gen., a new agglutinated foraminiferal genus from the Upper Cretaceous of the Carpathian flysch. *Micropaleontology*, **53** (6), 517-521 [for 2007].

ORBITOLININA Kaminski, 2004b
PFENDERINOIDEA Smout & Sugden, 1962
HAURANIIDAE Septfontaine, 1988
AMIJELLINAE Septfontaine, 1988

ALZONORBITOPSELLA BouDagher-Fadel, 2008

Type species. *Alzonorbitopsella arabia* BouDagher-Fadel, 2008, OD(M).

Alzonorbitopsella BouDagher-Fadel, 2008. p. 175.

Figure 7. *Alzonorbitopsella arabia* BouDagher-Fadel. Middle Jurassic, Uweinat Formation of Saudi Arabia, equatorial section of presumed holotype, x20, (from BouDagher-Fadel, 2008).

Description. Test planispiral, annular and discoidal with no septulae. Septa simple, lacking a subepidermal reticulate mesh, thickened around the cribrate apertures, lacking true pillars linking septum to septum. A delicate reticulate hypodermis of beams and rafters is present, but this structure does not continue onto the septa. Chambers annular immediately following the large megalospheric proloculus. Apertures cribrate. Saudi Arabia.

Remarks. Differs from *Orbitopsella* in lacking true pillars linking the septa. BouDagher-Fadel (2008) described the type species from the Uweinat Formation of Saudi Arabia.

BouDagher-Fadel, M. 2008. Evolution and geological significance of larger benthic foraminifera. *Developments in Palaeontology & Stratigraphy,* **21**, 540 pp.

ORBITOLINOIDEA Martin, 1890
ORBITOLINIDAE Martin, 1980
DICTYOCONINAE Moullade, 1965

BARATTOLITES Vecchio & Hottinger, 2007

Type species. *Barattolites trentinarensis* Vecchio & Hottinger, 2007, OD(M).

Barattolites trentinarensis Vecchio & Hottinger, 2007, p. 520.

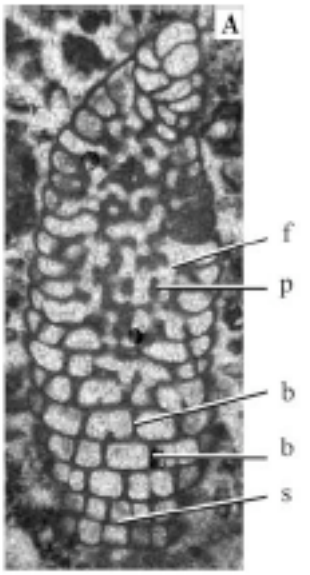

Figure 8. *Barattolites trentinarensis* Vecchio & Hottinger, 2007. Ypresian–Lower Lutetian, Trentinara Formation, Mount Panno Bianco (Pollino Massif, Calabria, southern Italy. Section parallel to cone axis; *p*-pillar, *s*-septum, *f*-foramen, *b*-beam. Holotype, megalospheric form, x30 (from Vecchio, & Hottinger, 2007).

Description. Test high conical. Chamber arrangement trochospiral in early stage, uniserial in later stages. Cone base almost flat in early stage, distinctly convex in adult chambers. Exoskeleton consisting of simple radial partitions (beams and intercalary beams) irregularly alternating or in line from one chamber to the next. The endoskeleton consists of columnar free-standing pillars positioned in the adaxial zone, delimited by a marginal trough and in line from one chamber to the next. The early growth stages in a megalospheric specimen consist of an excentric proloculus followed by a hemispherical deuteroconch and by a trochospiral nepiont that has a coiling axis, that may be considerably inclined, or even perpendicular with respect to the axis of the adult cone. In a microspheric specimen, the microsphere is found in an even more eccentric position followed by a tightly coiled nepiont exhibiting at least four whorls. During early ontogeny, the exoskeleton seems to appear first, the endoskeleton shortly afterwards. L-M. Eocene, Italy.

Remarks. *Barattolites* differs from *Dictyoconus* Blanckenhorn, 1900, in its simple exoskeleton, lacking horizontal partitions (rafters). It differs from the genus *Fallotella* Mangin, 1954, in its eccentrically positioned megalosphere, and its lack of horizontal partitions (rafters). It differs from the genus *Daviesiconus* Hottinger & Drobne, 1980, in having a long trochospiral early growth stage, in the absence of marginal apertures, and the constant occurrence of intercalary beams. *Coleiconus* Hottinger & Drobne, 1980, differs in exhibiting a pseudo-keriothecal texture in the thick outer chamber walls and in its lack of intercalar beams.

Vecchio, E. & Hottinger, L. 2007. Agglutinated conical foraminifera from the Lower-Middle Eocene of the Trentinara Formation (southern Italy). *Facies*, **53**, 509-533.

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Kaminski, M.A. 2004a. The new and revised genera of agglutinated foraminifera published between 1996 and 2000. *In:* Bubík, M. & Kaminski, M.A. (eds), *Proceedings of the Sixth International Workshop on*

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