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Thèse de Doctorat

Biodiversité et Ecosystèmes Fossiles et Actuels

par

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Foraminifères et algues calcaires du Mississippien supérieur (Viséen supérieur-Serpukhovien) : rôles biostratigraphique, paléoécologique et paléogéographique aux échelles locale, régionale et mondiale.

Appendix 1: Systematics of algae, "pseudo-algae", various microproblematica and foraminifers

Thèse dirigée par Daniel Vachard

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TABLE DES MATIERES

Introduction.

Je décris ici les taxons algaires et pseudo-algaires de Montagne Noire et d'Ardengost dans les Pyrénées centrales ; et ajoute quelques données sur ceux du Massif de Mouthoumet, des Pyrénées orientales (au sud de la France), du bassin franco-belge, de l'ouest de l'Allemagne et de la plate-forme de Derbyshire en Angleterre (voir leur localisation sur la Fig. 1 du livre 1). Ces dernières localités feront ultérieurement l'objet de publications thématiques. Les données et les illustrations (Annexe 2) résultent de l'étude de plusieurs collections de lames minces que l'on m'avait prêtées entre autres les collections de D. Vachard (annoté DV), de M. Aretz (annoté MA), de Marie-France Perret (MFP), de François Ballestra (annoté FB), de Raphaël Conil (annoté RC), de Marie Legrand-Blain , de mes lames personnelles taillées à Lille ou à Cologne (annoté LP), de compilation de littérature et surtout de la base de données de D. Vachard.

Cette partie est rédigée en anglais, à cause des nombreux taxons nouveaux qu'elle contient. Nous avons suivi les codes de nomenclature botanique et zoologique ; d'autre part des listes de synonymies, aussi complète que possible, ont été présentées afin d'obtenir des répartitions biostratigraphiques et paléogéographiques aussi exhaustives que possible.

1. Cyanobacteria

1.1. Skeletal cyanobacteria

Remarks. I follow the generic definitions of Mamet and Roux, 1975b (fig. 2), Bourque et al. (1981) and Mamet (1991), except for *Baccanella*; and the suprageneric classification of Chuvashov et al. (1987) and Bogush et al. (1990), except for Aphralysiaceae.

Order indeterminate
Family Renalcidaceae Riding and Brasier, 1975
nomen translat. Vachard in Vachard and Beckary, 1991 emend. Vachard, 1993
Genus *Renalcis* Vologdin, 1932 emend. Mamet and Roux, 1983.

Type species. *Renalcis granosus* Vologdin, 1932.
Synonyms. See Mamet and Roux (1983), Mamet (1991) and Vachard (1993).

Diagnosis. Colonies constituted of hollow, inflated, hemispherical to reniform "chambers". Variable shape of colonies from few chambers to botryoidal or uniseriate aggegates. "Wall" relatively thick, micritic, eventually with some deep internal clefts (slightly modified from Wray, 1967).

Remark. I accept the generic synonymies of Mamet and Roux (1983), although all the material of the Montagne Noire could be only assigned to "*Izhella*".

Occurrence. Cambrian-Bashkirian, cosmopolite (see Vachard, 1993). Rarely mentioned after the Bashkirian, but known up to the Early Permian (Vachard and Krainer, 2001b) and late Middle Permian (Vachard and Razgallah, 1988a). The very poorly illustrated *Renalcis* or cf.

Renalcis of South China (e.g., Lehrmann et al., 2001, 2007) seem to belong to another cyanobacterial bioconstructions.

Renalcis nubiformis (Antropov, 1955) Vachard, 1993
Pl. 1, fig. 1-17

1955 *Izhella nubiformis* n. gen. n. sp. Antropov, p. 47, pl. 1, figs. 4-6.
1973 *Nubecularites-Renalcis-Schuguria* (sic) - Maslov, pl. 7, figs. 7-8.
v. 1974b *Renalcis turbitus* Wray - Vachard, p. 194-195, pl. 28, figs. 12-13.
1976 *Izhella* sp. - Bless et al., pl. 12, fig. 23.
v. 1977a *Renalcis turbitus* Wray - Vachard, p. 374, tabl. 1.
v. 1977b *Renalcis turbitus* Wray - Vachard, p. 164, pl. 8, fig. 14.
1983 *Renalcis granosus* Vologdin - Mamet and Roux, p. 92-95, pl. 11, figs. 1-10, pl. 12, figs. 1-9, pl. 13, figs. 1-10 (with synonymy).
v. 1988a *Renalcis* - Vachard and Razgallah, p. 1137, fig. 1.
1993 *Renalcis nubiformis* (Antropov) emend. - Vachard, p. 76-78, pl. 1, fig. 2, pl. 3, fig. 8-12 (with 74 references in synonymy).
1995 *Renalcis* - Préat and Kassimi, pl. 8, figs. 3-4.
2002 "*Renalcis granosus*" Vologdin - Mamet, p. 493-494, pl. 1, fig. 6 (with synonymy).
Add (or rectify):
1992 *Renalcis granosus* - Mamet and Boulvain, pl. 1, figs. 14-17, pl. 2, figs. 1-2, 15-16.
1992 *Renalcis* sp. - Somerville et al., fig. 5U.
1993 *Renalcis* sp. - Perret, pl. F.XI, fig. 3.
2001b *Renalcis* sp. - Vachard and Krainer, pl. 3, figs. 5-6.
2002 *Renalcis* - Whalen et al., Fig. 5B-C.
2004 *Renalcis* - Shen and Webb, text-figs. 3, 4B, 9A-B, 10.
2004 *Izhella* - Shen and Webb, text-figs. 4C, 9B, 10.
2005 *Renalcis* - Shen and Webb, text-figs. 3-4, 6, 7A, 8B, 9C-D, 10A-D.
2007 *Renalcis* - Adachi and Ezaki, text-figs. 2A, 3E-F.

Description. Height of colonies = up to 2.040 mm; width of colonies = up to 3.000 mm; average diameter of a "chamber"= 0.200-0250 mm; "wall" thickness = 0.040-0.140 mm.

Occurrence. Late Silurian to late Middle Permian (Vachard, 1993). Latest Asbian-Brigantian of the Montagne Noire: Lenses of the road, near Roquessels (DV314D, DV.LR1); Castelsec (MA10.3, MA10.10, MA10.17, MA.11.8); Roquemaillère (DV134G); Vailhan-Roc de Castel (MA.RC3); Olistolithe à l'Ouest de Péret (MA.PE4); Roque Redonde (RR26, RR27, RR57, RR58, RR64, RR70, RR72, RR74, RR75, RR79); Vailhan-Château (DV247A, DV295C, DV313); Tourière (DV341B); Jeantels (DV690D); Les Pascales (MA.PA7, MA.PA8, DV601C); Roc de Murviel (DV253A, DV254A, DV254B). Apparently absent in the late Serpukhovian of Ardengost area. Bashkirian of Pyrenees.

Order Aphralysiales nomen translat. herein pro family

Diagnosis. Attached cyanobacteria with vesiculiform to elongate elements grouped in colonies. Wall micritic to microsparitic.
Composition. Only the eponym family, Aphralysiaceae, is described but *Bacinella* and *Archaeolithoporella* can belong to distinct families.
Occurrence. Ordovician to Cretaceous, cosmopolite.

Family Aphralysiaceae Vachard in Vachard et al., 2001
Genus *Aphralysia* Garwood, 1914

Type species. *Aphralysia carbonaria* Garwood, 1914.
Diagnosis. Encrusting colonies composed of irregular layers of small, hemispherical to semi-ellipsoidal vesicles with their convex surfaces facing away. Wall micritic.

Remarks. *Polymorphocodium* Derville, 1931 and *Stylocodium* Derville, 1931 are probably prioritary name because they appear constructed by columnar layers of *Aphralysia* (compare with Mamet, 1973, pl. 1, fig. 8).
Occurrence. Ordovician-Serpukhovian (Mamet and Roux, 1978b, Roux, 1985; Mamet, 1991). Europe, North Africa, Canada, Alaska, American Midcontinent, Australia (Mamet, 1991), up to the Moscovian in Southern France (Delvolvé et al., 1987; Vachard et al., 1989). Possible Lazarus effects occur with the Cretaceous *Bacinella*? *sterni* Radoicic, 1972 and *Pseudogirvanella cretacea* Dragastan, 1985 which correspond more probably to *Aphralysia*.

Aphralysia carbonaria Garwood, 1914
Pl. 2, figs. 1-2.

1914 *Aphralysia carbonaria* n. sp. Garwood, p. 268, pl. 21, figs. 3-4.
1961a *Aphralysia carbonaria* Garwood - Endo, pl. 12, fig. 6.
v. 1974b *Aphralysia* sp. - Vachard, p. 193, pl. 27, fig. 19.
v. 1977b *Aphralysia* sp. - Vachard, p. 165, pl. 8, fig. 20.
1978b *Aphralysia carbonaria* Garwood - Mamet and Roux, p. 76-77, pl. 3, fig. 14, pl. 4, fig. 1, pl. 7, fig. 14 (with synonymy).
1992 *Aphralysia carbonaria* Garwood - Mamet and Préat, pl. 1, fig. 7.
v. 1993b *Aphralysia carbonaria* Garwood - Vachard et al., pl. 3, fig. 20.
1996 *Aphralysia carbonaria* Garwood - Sebbar and Mamet, pl. 1, figs. 1, 6.
2000 *Aphralysia carbonaria* Garwood - Sebbar, pl. 4, fig. 10.

Description. The vesicles have the following dimensions: height = 0.025-0.035mm; width = 0.060-0.070 mm; wall thickness = 0.005-0.010 mm.
Occurrence. Ordovician-Mississippian, Palaeotethys and North America (Mamet and Roux, 1978b; Roux, 1985). Early Asbian of Libya. Bashkirian of Algeria (Sebbar, 2000). In the Montagne Noire, latest Brigantian (assemblage SF6): Les Batailles (DV611A, DV611C).

Aphralysia capriorae Mamet and Roux, 1975b
Pl. 2, figs. 3-9.

1975b *Aphralysia capriorae* n. sp. Mamet and Roux, p. 157, pl. 12, figs. 10-15, pl. 13, figs. 1-3.
v. 1977 *Polymorphocodium lapparenti* Derville - Perret and Vachard, p. 96 (no illustration).
v. 1977a *Aphralysia caprariae* (sic) Mamet and Roux - Vachard, p. 374, tabl. 1 (no illustration).
1984 *Aphralysia* sp. - Adams, text-fig. 4.
? 1992 *Aphralysia capriorae* Mamet and Roux - Mamet and Préat, p. 60, pl. 1, fig. 7.
non 1995 *Aphralysia capriorae* Mamet and Roux - Sánchez-Chico et al., p. 80, pl. 2, fig. 2 (= *Sparaphralysia*).
1999 *Aphralysia capriorae* Mamet and Roux - Sebbar and Mamet, pl. 2, fig. 11.
?1999 *Aphralysia capriorae* Mamet and Roux - Mamet, Préat and Lehmami, pl. 5, fig. 4 (maybe a crust of *Sphaeroporella* sp.).
2002 *Aphralysia capriorae* Mamet and Roux - Mamet, p. 157, pl. 12, figs. 10-15, pl. 13, fig. 1-3 (with synonymy).
2002 *Aphralysia capriorae* Mamet and Roux - Mamet, p. 499, pl. 2, fig. 10 (with synonymy).
2004 *Aphralysia capriorae* Mamet and Roux - Brenckle, pl. 6, fig. 7.
v. 2004 *Aphralysia capriorae* Mamet and Roux - Vachard and Aretz, p. 649, fig. 7. 1-2.
2005a *Aphralysia* sp. - Cózar and Somerville, fig. 14. 10.
? 2005d *Aphralysia ferreoli* Mamet and Roux - Cózar and Somerville, fig. 5. 4.

Description. Dimensions of the vesicles: height = 0.017-0.050 mm; width = 0.030-0.120mm; wall thickness = 0.004-0.010 mm.

Remarks. The spelling mistake *capriorae* for *caprariae* (from the Latine name, Capraria, of Cabrières the type locality) was modified by Vachard (1977a-b) but admitted by Vachard and Aretz (2004).

Occurrence. ?Devonian (Belgium, Morocco)-Early Tournaisian (Montagne Noire), Asbian-Pendleian (Montagne Noire, Spain, Belgium, Great Britain, Algeria, Morocco, Donbass,

Alaska, Tennessee, Tarim and Japan), late Serpukhovian of Pyrenees, early Bashkirian of Algeria and Pyrenees (compiled from the data of the literature, especially from Mamet, 2002). In the Montagne Noire, Asbian/Brigantian boundary to early Serpukhovian: Castelsec (MA11.9.1.Quer); Japhet (DV126D, DV856A, DV856C2); Serre de Péret (MA.SP18); Tourière (DV341B); Roc de Murviel (MA330.5); La Serre (MA.LS.II.U.2038, DV227A); Gare de Laurens (ML789). Rare in Ardengost: MFP.AH81.1.

Aphralysia ferreoli Mamet and Roux, 1975b
Pl. 2, figs. 10-12.

1975b *Aphralysia ferreoli* n. sp. Mamet and Roux, p. 157, pl. 13, figs. 4-9.
?1983 *Aphralysia ferreoli* Mamet and Roux - Mamet and Roux, p. 80-81, pl. 11, fig. 12 (with synonymy).
?1995 *Aphralysia ferreoli* Mamet and Roux - Sánchez-Chico et al., p. 80, pl. 2, fig. 3.
1996 *Aphralysia ferreoli* Mamet and Roux - Sebbar and Mamet, pl. 1, figs. 2-3.
2000 *Aphralysia ferreoli* Mamet and Roux - Sebbar, pl. 4, fig. 8.
?2004 *Aphralysia* spp. (mostly *A. ferreoli* Mamet and Roux) - Cózar, p. 373 (no illustration).
non 2005d *Aphralysia ferreoli* Mamet and Roux - Cózar and Somerville, fig. 5. 4 (other species, perhaps *A. capriorae*).

Description. The species is characterized by tubular trichomes, and looks like an aggregate of short girvanellids. Its elongate archs have the following dimensions: Heigth = 0.030-0.050 mm; width = 0.095-0.120 mm; wall thickness = 0.005 mm.

Occurrence. ?Asbian of Spain. "Namurien inférieur" in Mouthoumet Massif (col de Crouise = Ferreol auct.), "Namurian" of Arkansas, but is latest Viséan in Algeria (Sebbar and Mamet, 1996; Sebbar, 2000). The other references, Tournaisian of Australia and Late Silurian of Québec (e.g., Roux, 1985) seem to be microstructurally different. Boundary Asbian/Brigantian-early Serpukhovian of Montagne Noire: Roc du Cayla (MA12.22, MA12.3, DV82F); Roc de Murviel (MA53); La Serre (MA.Feldweg.31).

Genus *Sparaphralysia* Vachard in Vachard and Beckary, 1991

Type species. *Sparaphralysia tacania* Vachard in Vachard and Beckary, 1991.

Synonyms. *Osagia*? Twenhofel, 1919 (pars), "*Osagia*" (pars), *Aphralysia* (pars) (see Vachard et al., 2001), *Sphaeroporella* Antropov, 1967 (pars).

Diagnosis. Nodular colonies, hemispherical or elongate, composed of skeletal elements in archs. Wall whitish, finely microsparitic (according to Vachard et al., 2001, p. 382).

Composition. *Sparaphralysia tacania* Vachard in Vachard and Beckary, 1991 *Sparaphralysia* sp. 1 sensu Cózar, 2005a, fig.5. 7.

Remarks. Although not mentioned by Vachard (1974b, 1977a-b), this taxon is rather common in Montagne Noire. It was firstly identified in the Mississippian by Cózar et al. (2003a-b).

Occurrence. Late Viséan (late Asbian) to Middle Permian (late Midian): Southern France, Spain,?England, Japan, Tunisia, Oman (Vachard et al., 2001), Morocco (Saïd, 2005).

Sparaphralysia tacania Vachard in Vachard and Beckary, 1991
Pl. 2, figs. 13-17.

1981 *Sphaeroporella* sp. - Mamet and Martínez, pl. 2, fig. 4.
1991 *Sparaphralysia* tacania n. sp. Vachard in Vachard and Beckary, p. 322, pl. 1, figs. 3-5.
?1995 *Aphralysia capriorae* Mamet and Roux -Sánchez-Chico et al., p. 80, pl. 2, fig. 2 (or other species of *Sparaphralysia*).

2002 *Sphaeroporella* sp. - Mamet, p. 503, pl. 4, fig. 1 (with synonymy).
2003a *Sparaphralysia* tacania Vachard - Cózar et al., pl. 4, figs. 9, 11.
2003a *Sparaphralysia* - Cózar et al., pl. 4, fig. 12, pl. 5, figs. 1, 3-6, 8.
? 2004 *Sparaphralysia* spp. - Cózar, text-fig. 3 (no illustration).
? 2004 *Sparaphralysia* sp. - Cózar and Somerville, text-fig. 3 (no illustration).
v. 2005 *Sparaphralysia* sp. - Saïd, p. 176, p. 178, p. 181, p. 183, p. 185, p. 187, fig. X. 1. 20.
2005a *Sparaphralysia tacania* Vachard - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 5. 6-7.
2005d *Sparaphralysia tacania* Vachard - Cózar and Somerville, fig. 5. 1.

Description. Maximal length of colonies = 1.700-2.300 mm, height of vesicles = 0.050-0.120 mm; width of vesicles = 0.100-0.190 mm; wall thickness = 0.015-0.025 mm.
Occurrence. Late Asbian-early Brigantian of central Morocco. Brigantian-early Serpukhovian of Southwestern Spain. Viséan-Serpukhovian of Japan. Early Bashkirian of Northern Spain. Latest Asbian-Brigantian from the Montagne Noire: Lenses of the road, near Roquessels (DV293I, DV.FB3); Castelsec (MA10.2.3); Roque Redonde; Les Boutinelles (MA25.9B); Tiberet (ML.FSL.TIB); Roc de Murviel (MA7, MA24, MA82).

Genus *Bacinella* Radoicic, 1959

Type species. *Bacinella irregularis* Radoicic, 1959.

Diagnosis. Cyanobacterial biofilms surrounding irregular and relatively large open spaces, of different size and form. Wall micritic.

Remarks. This structure is relatively similar to *Aranea* Hance, 1983, and might be interpreted as a rhizoconcretion sensu Klappa (1980), i. e., pedogenetic accumulation of mineral matter around roots, accompanied by cementation, and probably produced by bacteria (see also Cózar and Vachard, 2005).

Occurrence. Early Permian (Kochansky-Devidé, 1970a; Wahlman, 1988, as "*Tubiphytes*-bryozoan (type B), fig. 10. A, C?, E, fig. 11. A?, B?, C)-Late Cretaceous (Radoicic, 1959). Discovered in the latest Viséan (assemblage SF2: Asbian/Brigantian boundary).

Bacinella (?) *sp.*
Pl. 3, fig. 1.

Description. A unique section, relatively doubtful, because it is unique, and because the genus is mentioned for the first time in the late Viséan, measures: maximal dimensions of cavities = 0.120 x 0.060 mm; "wall" thickness = 0.015 mm.

Occurrence. Assemblage SF2 (Asbian/Brigantian boundary) of Roc du Cayla (MA12.15).

Order Proauloporales Luchinina, 1975
Family Girvanellaceae Luchinina, 1975
Genus *Girvanella* Nicholson and Etheridge, 1878

Type species. *Girvanella problematica* Nicholson and Etheridge, 1878.

Diagnosis. Tubes thin, cylindrical, flexuous, undivided, non-branching. Wall micritic.

Remarks. See the details on the calcification of the trichomes of cyanobacteries in Pentecost and Riding (1986), Merz (1992), etc.

Occurrence. Cambrian-Early Cretaceous (Johnson and Konishi, 1956a). Late Cretaceous (Camoin, 1989), cosmopolite and eurytope. Recent equivalents probably exist (e. g., Riding, 1975).

Girvanella ducii Wethered, 1890

Pl. 3, figs. 2-12.

1890 *Girvanella ducii* n. sp. Wethered, p. 280, pl. 11, fig. 2a-c.
1956 *Girvanella ducii* Wethered - Konishi, p. 125, pl. 3, figs. 1, 3 (with synonymy).
1963 *Girvanella ducii* Wethered - Wood, p. 269-272, pl. 40, figs. 1-2.
non 1964 *Girvanella ducii* Wethered - Conil and Lys, p. 25, pl. 3, fig. 2.
1967 *Girvanella ducii* Wethered - Conil and Paproth, p. 55, 59, 65, pl. 4, fig. 2.
non 1972 *Girvanella ducii* Wethered - Petryk and Mamet, p. 771, 773, pl. 1, figs. 3 -5, 7 (= *G. densa*; but the synonymy list of 23 references is correct).
v. 1971 Girvanelles - Perret, pl. 1, figs. 1-3.
non 1972 *Girvanella ducii* Wethered - Mamet and Rudloff, p. 79-80, pl. 1, figs. 1-5 (= *G. densa*) (with 24 references in synonymy).
?1972 *Girvanella ducii* Wethered - Homann, p. 242-243, pl. 8, fig. 63 (probably another species) (with 17 references in synonymy).
? 1973 *Girvanella ducii* Wethered - Bozorgnia, p. 40-41, pl. 1, fig. 13.
1974b *Girvanella ducii* Wethered - Vachard, p. 173, pl. 7, fig. 2 (with 56 references in synonymy).
1975b *Girvanella problematica* Nicholson and Etheridge emend. Wood (= *G. ducii* Wethered, auct.) - Mamet and Roux, p. 141-142, pl. 2, figs. 6-13, pl. 3, figs. 1-12, pl. 4, figs. 1-9 (with 55 references in synonymy).
1977 *Girvanella problematica* Nicholson and Etheridge emend. Wood (= *G. ducii* Wethered, auct.) - Armstrong and Mamet, p. 108, pl. 2, figs. 6-13 (with 24 references in synonymy).
v. 1977a *Girvanella ducii* Wethered - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977 *Girvanella* ex gr. *problematica* Nicholson and Etheridge - Perret and Vachard, p. 93 (no illustration).
v. 1977 *Girvanella ducii* Wethered - Perret and Vachard, p. 93, pl. 1, fig. 2.
1977 *Girvanella ducii* Wethered - Paproth et al., p. 72 (no illustration).
1983 *Girvanella problematica* Nicholson and Etheridge emend. Wood (= *G. ducii* Wethered, auct.) - Mamet and Roux, p. 67, pl. 1, figs. 7-9, pl. 2, fig. 3 (with 11 synonymies added to Mamet and Roux, 1975b).
1986 *Girvanella problematica* (Nicholson and Etheridge) emend. Wood - Skompski, p. 257-258, pl. 39, fig. 2.
1989 *Girvanella* ex gr. *problematica-ducii* sensu Mamet and Roux - Vachard et al., p. 702, pl. 1, fig. 3.
1995 *Girvanella problematica* Nicholson et Etheridge emend. Wood - Sánchez-Chico et al., p. 71, pl. 1, figs. 1-2.
2002 *Girvanella problematica* Nicholson and Etheridge emend. Wood - Mamet, p. 493, pl. 1, fig. 1 (with synonymy).
2003a *Girvanella ducii* Wethered - Cózar et al., pl. 4, fig. 8.
?2004 *Girvanella problematica* Nicholson and Etheridge - Cózar and Somerville, text-fig. 9 p. 49 (no illustration).
2004 *Girvanella ducii* Wethered - Flügel, pl. 53, fig. 7.
v. 2005 *Girvanella ducii* (Wethered) (sic for the brackets) - Saïd, p. 181 (no illustration).
v. 2005 *Girvanella problematica* Nicholson and Etheridge - Saïd, p. 181 (no illustration).
v. 2005 *Girvanella* ex gr. *problematica* Nicholson and Etheridge emend. Wood - Saïd, p. 178, p. 189 (no illustration).
2005a *Girvanella ducii* Wethered - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 5. 1, 3-4.
2005 *Girvanella problematica* Nicholson and Etheridge - Mamet and Zhu, fig. 5E.
v. 2005 *Girvanella ducii* Wethered - Sanz-López et al., pl. 7, fig. 9.

Description. Tubes flexuous, often longitudinally grouped and aligned as a roof on the sea bottom. Thickness of trichome of the same dimension as the inner diameter (i. e. one third of the outer diameter). Wood (1963) indicated an outer diameter of 0.026-0.033 mm. Contrarily to the assertions of Mamet and diverse collaborators, *G. problematica* seems to differ, in its habitus and its dimensions, from *G. ducii*, as previously concluded by Wood (e.g., Vachard, 1974b, p. 172-173). The confusion of Mamet seems to have for origin a mistaken interpretation of *G. ducii* for tubes more similar to *G. densa* Conil and Lys, 1964 (see the ilustrations of Petryk and Mamet, 1972 and Mamet and Rudloff, 1972, or the assignment of *Girvanella densa* sensu Dil, 1977 to *G. ducii* by Mamet and Roux, 1983, p. 67). The specimens of Montagne Noire and Ardengost measure 0.020-0.030 mm in outer diameter; with a "wall" of 0.010-0.015 mm. The specimens of Ardengost are common in the packstones with *Calcifolium* and *Ardengostella* .

Occurrence. Ordovician-Pennsylvanian (according to Armstrong and Mamet, 1977 and Mamet, 2002), cosmopolite (with an acme during the Givetian-Serpukhovian in the Tethys). Latest Asbian-early Serpukhovian from the Montagne Noire: Lenses of the road, near Roquessels (DV 293C); Castelsec (MA11.3); Roc du Cayla (DV83B, DV84B); Roquemaillère (DV135B, ML.UM.ROQ); Roque Redonde (RR56); Les Batailles (DV608, DV609, DV609.2, DV611C, DV612A); Roc de Murviel (MA71); Gare de Laurens (ML789); La Serre (MA.Talweg 4). Rather common in the late Serpukhovian of Ardengost: RC 8563 (Perret and Vachard, 1977), MFP.AH.18A, AH18B, AH18E, AH18H, AH.18I, AH81.1 (this study).

Girvanella wetheredii Chapman, 1908

Pl. 3, figs. 13-14.

1890 *Girvanella incrustans* n. sp. Wethered, p. 280, pl. 11, fig. 1a-b. (preoccupied).
1908 *Girvanella wetheredii* nom. nov. Chapman, p. 383.
1963 *Girvanella wetheredii* Chapman - Wood, p. 265-267, pl. 38, fig. 1, pl. 39, fig. 1.
1964 *Girvanella wetheredi* (sic) Chapman - Conil and Lys, p. 25, pl. 3, fig. 1.
1967 *Girvanella wetheri* (sic) Chap. - Conil and Paproth, p. 55 (no illustration).
1972 *Girvanella wetheredii* Chapman - Petryk and Mamet, p. 71, pl. 1, figs. 1, 2, 6.
? 1973 *Girvanella wetheredi* (sic) Chapman- Bozorgnia, p. 41, pl. 3, fig. 16.
1974 *Girvanella wetheredii* Chapman - Rich, p. 363, pl. 1, figs. 6, 8, 15.
1975b *Girvanella wetheredii* Chapman (= *Girvanella incrustans* Wethered non Bornemann) - Mamet and Roux, p. 141, pl. 1, figs. 9-12, pl. 2, figs. 1-5 (with synonymy).
v. 1977 Nodule algaire à *Girvanella wetheredii* (petits tubes) et *Girvanella ducii* (tubes plus gros) - Dil et al., pl. 7, fig. 3.
v. 1977a *Girvanella* ex gr. *wetheredii* Chapman - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977 *Girvanella* ex gr. *wetheredi* (sic) Chapman - Perret and Vachard, p. 93 (no illustration).
? 1978 *Girvanella wetheredii* Chapman (= *Girvanella incrustans* Wethered non Bornemann) - Jansa et al., p. 1431, pl. 2, fig. 1.
v. 1981 *Girvanella* ex gr. *wetheredii* Chapman - Fontaine and Vachard, p. 15 (no illustration).
p. 1983 *Girvanella wetheredii* Chapman (= *Girvanella incrustans* Wethered non Bornemann) - Mamet and Roux, p. 66-67, pl. 2, figs. 1, 4, 5 (with synonymy).
1992 *Girvanella wetheredii* Chapman (= *Girvanella incrustans* Wethered non Bornemann) - Mamet et al., p. 214, 216, pl. 1, figs. 1-2 (with synonymy).
v. 1996 *Girvanella* ex gr. *wetheredii* Chapman - Vachard and Montenat, text-fig. 4 p. 469 (no illustration).
v. 1999 *Girvanella wetheredii* Chapman - Berkhli, p. 111 (no illustration).
?2004 *Girvanella wetheredii* Chapman - Cózar and Somerville, text-fig. 8 p. 48 (no illustration).
?2005a *Girvanella wetheredii* Chapman - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409 (no illustration).
2006 *Girvanella wetheredii* Chapman - Herbig, pl. 2, fig. 5.

Description. Wood (1963) indicated an outer diameter of 0.013 to 0.015 mm for this species, Petryk and Mamet (1972): 0.010 to 0.019, Rich (1974): 0.015-0.022, Mamet and Roux (1983) "un maximum de 12μm", Perret and Vachard (1977) an inner diameter of 0.006-0.009 mm, and Roux (1985) an inner diameter of 0.008-0.014 mm. A good comparison between *G. wetheredii* and *G. ducii* is given by the illustration of Dil et al. (1977), although this species is erronously excluded from the synonymy of *G. wetheredii* by Jansa et al. (1978) or Mamet and Roux (1983). The specimens of Montagne Noire measure 0.006 mm in inner diameter, those of Ardengost: 0.003-0.005 mm.

Occurrence. Ordovician-Permian (Mamet et al., 1992), cosmopolite. In the Brigantian of Roque Redonde (RR68, RR69, RR70) and the latest Brigantian of Montagne Noire (assemblage SF5 from Les Batailles, DV609), and the late Serpukhovian of Ardengost Formation (particularly, in Areng MFP.AH12: Perret and Vachard, 1977; and MFP.AH20C: this study).

Genus *Mitcheldeania* Wethered, 1886 non Wood, 1941
emend. Mamet and Roux, 1975b

Type species. *Mitcheldeania nicholsoni* Wethered, 1886.

Diagnosis. Colonies composed of relatively large tubes, with a variable diameter, and relatively distant from each other. Wall micritic.

Remarks. The analysis of Mamet and Roux (1975b) is remarkably complete.

Occurrence. Ordovician-Mississippian, cosmopolite (Roux, 1985; Mamet, 1991; Mamet et al., 1992); Pennsylvanian of Greenland and Japan (Mamet and Stemmerik, 2000; Mamet, 2002).

Mitcheldeania nicholsonii Wethered, 1886.
Pl. 3, figs. 15-18.

1886 *Mitcheldeania nicholsoni* n. gen. n. sp. Wethered, p. 535-536, pl. 14, fig. 6.
1964 *Girvanella nicholsoni* (Wethered) - Conil and Lys, p. 26, pl. 3, fig. 5-6.
1974 *Girvanella*? *nicholsoni* (Wethered) - Rich p. 363, pl. 1, figs. 1-3, 4?-5 (with synonymy).
v. 1974b *Mitcheldeania* cf. *distans* (Conil and Lys) - Vachard, p. 176, pl. 7, figs. 3-4.
v. 1977a *Mitcheldeania nicholsoni* Wethered - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977b *Mitcheldeania nicholsoni* Wethered - Vachard, p. 137 pl. 1, figs. 1, 4 (with 19 references in synonymy).
1978b *Mitcheldeania nicholsoni* Wethered - Mamet and Roux, p. 70-71, pl. 1, figs. 8-15 (with synonymy).
v. 1981 *Mitcheldeania nicholsoni* Wethered - Fontaine and Vachard, p. 15 (no illustration).
1982b *Mitcheldeania nicholsoni* Wethered - Brenckle et al., p. 59, pl. 5, figs. 14-15, pl. 6, figs. 1-5 (with synonymy).
1985 *Mitcheldeania nicholsoni* Wethered - Mamet and Pinard, pl. 1, fig. 2.
2005 *Mitcheldeania nicholsoni* Wethered - Sanz-López et al., pl. 6, fig. 1.

Description. Rare sections measuring: diameter of colonies to 1.500 mm; diameter of tubes = 0.070-0.095 mm; thickness of wall = 0.005-0.010 mm.

Occurrence. As for the genus. Brigantian of Montagne Noire: Japhet (DV 857.2), Roque Redonde (RR62, RR82), and Roc de Murviel (MA48).

Mitcheldeania distans (Conil and Lys, 1964)
Pl. 3, figs. 19-20.

1963 *Girvanella distans* Conil and Lys - Conil, pl. 1, fig. 8 (nomen nudum).
1964 *Girvanella distans* n. sp. Conil and Lys, p. 26, pl. 3, figs. 7-8.
v. non 1974b *Mitcheldeania* cf. *distans* (Conil and Lys) - Vachard, p. 176, pl. 7, figs. 3-4 (= *M. nicholsoni* fide Vachard, 1977b).
v. ? 1977a *Mitcheldeania distans* (Conil and Lys) - Vachard, p. 374, tabl. 1 (no illustration).
v. ? 1977 *Mitcheldeania distans* (Conil and Lys) - Perret and Vachard, p. 94-95, pl. 1, figs. 4-5 (with synonymy).
1995 *Mitcheldeania distans* (Conil and Lys) - Sánchez-Chico et al., p. 71, pl. 1, fig. 3.
p. 2002 *Mitcheldeania distans* (Conil and Lys) - Mamet, p. 495-496, pl. 2, figs. 8-9 (with a subjective synonymy).
?2004 *Mitcheldeania distans* (Conil and Lys) - Cózar, text-fig. 4 p. 372 (no illustration).

Description. Rare sections measuring: diameter of colonies to 1.275 mm; diameter of tubes = 0.075-0.100 mm; thickness of walls = 0.015mm. If it is misinterpreted, the specimen of Perret and Vachard (1977) might correspond to a network of sponges.

Occurrence. Viséan-Bashkirian of Eurasia (Mamet, 2002). Late Serpukhovian of Ardengost Formation (RC8558).

Family Garwoodiaceae Endo, 1961a nomen translat. Shuysky, 1973
(ex subfamily Garwoodineae)

Remarks. Although generally attributed to Johnson (1964) or Shuysky (1973) (see Emberger, 1976), the subfamily was firstly introduced by Endo (1961a, p. 24).

Genus *Garwoodia* Wood, 1941

Type species. *Mitcheldeania gregaria* Nicholson, 1888.

Diagnosis. Hemispherical colonies composed of numerous, radiating and ramified trichomes. The ramification is always rapidly subparallel to the initial branche. Wall micritic.

Occurrence. Ordovician-Mississippian, scarce in Serpukhovian-Bashkirian and Permian (Vachard et al., 1989); up to Early Cretaceous (Flügel, 2004, pl. 53, fig. 6); cosmopolite (Roux, 1985; Mamet et al., 1987; Mamet, 1991, 2002).

Garwoodia spp.
Pl. 4, figs. 1-7.

v. 1977 *Garwoodia* cf. *gregaria* (Nicholson) - Perret and Vachard, p. 95, pl. 1, fig. 6 (with synonymy).
v. 1977a *Garwoodia* cf. *gregaria* (Nicholson) - Vachard, p. 374, tabl. 1 (no illustration).

Description. Some specimens are similar to *G. gregaria* (Nicholson, 1888) emend. Wood, 1941 but differs in their wider filaments. In the Montagne Noire, they are sporadic from Asbian/Brigantian boundary to early Serpukhovian. The specimens of Ardengost are rather doubtful and looks like *Ortonellopsis*.

Occurrence. In Montagne Noire: Roc du Cayla (MA12.22); La Serre (MA.LS.IV.2010) and Roc de Murviel (MA58, MA83). In Ardengost: Areng (MFP.AH10B, AH.20 (= DV778C), AH81.1).

Genus *Ortonella* Garwood, 1914

Type species. *Ortonella furcata* Garwood, 1914

Diagnosis. Hemispherical colonies composed of numerous, radiating and ramified trichomes. The ramification is always with an acute angle. Wall micritic.

Remarks. The synonym with *Cayeuxia* advocated by Mamet and Roux, 1983 (p. 70) is doubtful (see Flügel, 2004, pl. 53, figs. 1-3), and according to Dragastan (1985), *Cayeuxia* and a part of *Ortonella* are synonyms of *Rivularia*, whereas other authors (e. g., Hudson, 1970, p. 23) preferred a comparison between *Ortonella* and recent *Scytonema*.

Occurrence. Cambrian-Permian, cosmopolite (Vachard, pers. comm.; see also Roux, 1985; Mamet, 1991). Recent equivalents seem to exist (e.g., Riding, 1975).

Ortonella spp.
Pl. 4, figs. 8-16, Pl. 5, figs. 1-2.

v. ? 1977 *Ortonella furcata* Garwood - Perret and Vachard, p. 93-94, pl. 1, fig. 3 (with synonymy).

Description. Several species too poorly represented to be determinated *Ortonella furcata* of Ardengost is doubtful because the tubes are relatively distant from each other.

Occurrence. Brigantian-early Serpukhovian of the Montagne Noire: Roc du Cayla (DV82F?); Roque Redonde (RR74?); Vailhan-Roc du Castel (MA.RC3?); Olistolithe à l'Ouest de Péret (MA.PE.1.2); Les Boutinelles (MA.BOU.25); Roc de Murviel (MA70,

MA55?, MA61, MA78, MA83, MA330.4, MA330.6); La Serre (MA.LSV.2007, MA.LSIV.2010, MA.LS.Feldweg.36). Late Serpukhovian of Ardengost area: Areng, Bois de Gertous (RC8543, DV777C, MFP.AH9B, G and H, RC 8566, MFP.GER7-8ba: Perret and Vachard, 1977); MFP.AH2, AH.B/81.10 (this study).

Genus *Ortonellopsis* n. gen.

Type species. *Ortonellopsis laxa* n. gen. n. sp.

Etymology. Comparable with *Ortonella*, because of the bifurcation of filaments, and ending opsis = almost.

Diagnosis. Colonies constituted of loosely packed filaments bifurcating with an acute angle.

Composition. *Ortonellopsis laxa* n. sp., *Ortonella mansellensis* Poncet, 1986a; *Ortonella myrae* Racz, 1964.

Comparison. *Ortonellopsis* differs from *Ortonella* in the loose filaments, whereas the angles of bifurcation are similar, from *Gaspesiella* Mamet and Roux in Bourque et al., 1981 in the type of bifurcation, from *Paramitcheldeania* Mamet, 2002 in the constant diameter of the tubes.

Remarks. *Bevocastria magna* Senowbari-Daryan and Link, 2004 can belong to this genus, but it differs in a probable pseudo-septation (fig. 3 D, F-H).

Occurrence. Silurian-Triassic, Canada, Southern France, Spain, Carnic Alps, Greece (respectively Poncet, 1986a; this work, Racz, 1964; Flügel and Flügel-Kahler, 1980; Schäfer and Senowbari-Daryan, 1983).

Ortonellopsis laxa n. gen. n. sp.

Pl. 5, figs. 3-10.

v. 1974b *Ortonella furcata* Garwood - Vachard, p. 175, pl. 6, fig. 5, pl. 7, fig. 5.
v. 1977a *Ortonella furcata* Garwood - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977a *Ortonella* aff. *furcata* Garwood - Vachard, p. 374, tabl. 1.
v. 1977b *Ortonella furcata* Garwood - Vachard, p. 136, pl. 1, fig. 2.

Etymology. Latine laxus, loose, because the filaments are loosely spaced.

Locus typicus. Roc de Murviel.

Stratum typicum. Late Brigantian.

Diagnosis. Elongated colonies formed of trichomes bifurcated as in *Ortonella*, but not joined together. Wall micritic. The spaces between the trichomes are cemented by a microsparitic calcite.

Description. Outer diameter = 0.032 mm; angle of bifurcation = 40°.

Holotype. MA83, Pl. 5, figs. 4-5

Type material. Twenty five colonies (a base of colony in DV227C).

Repository of the types. Collection of Palaeontology of Lille University.

Comparison. *Ortonellopsis laxa* is homeomorph of *Ortonella furcata*, but differs in the generic characters.

Remarks. It is difficult to explain the very rapid calcification between the trichomes theirselves differently calcified.

Occurrence. Late Brigantian-early Serpukhovian of Montagne Noire: Roque Redonde (RR81); Roc de Murviel (MA83) and La Serre (DV165A, DV165B, DV165E, DV227B, DV227C).

Gen. indet.
Pl. 5, figs. 11-13.

Remarks. Several genera were observed in Roque Redonde. They are unique in Montagne Noire, have no representatives in the literature, but are too rare to be described.

Occurrence. Roque Redonde (RR58; RR59; RR61; RR62; RR65; RR68; RR72; RR74; RR75; RR77; RR79).

1.2. Rhizoconcretions?

Family incertae sedis or "Microcodiaceae"Maslov, 1960
Genus *Baccanella* Pantic, 1971

Type species. *Baccanella floriformis* Pantic, 1971.

Synonyms. *Palaeomicrocodium* Mamet and Roux, 1983 (see Vachard and Massoubre, 1987, Cherchi and Schroeder, 1988); ?*Conglutinella* Shuysky and Shirshova, 1988.

Diagnosis. Diagenetic concretion composed of centered rosettes of hyaline calcite, with a botryoidal arrangment.

Remarks. *Baccanella* is supposed to be of bacterial origin or as diagenetic products caused by the recrystallization of micritic high-Mg calcite and aragonite (e. g., Flügel, 2004, pl. 50, fig. 4). The similarity with Microcodium results only in the diagenetic origin. In the frequent association of *Baccanella*/*Palaeomicrocodium* with *Renalcis*, the differences of origin (ontogenetic growth for *Renalcis*) and diagenetic development for Baccanella are easy to demonstrate.

Occurrence. Middle Devonian (Givetian) to Middle Jurassic. Very sporadic in the Palaezoic: Australia (Mamet and Roux, 1983; Shen and Webb, 2005), Belgium (Mamet and Préat, 1985a, 1992, 2005?; Mamet and Boulvain, 1992), Moravia (Zukalova, 1984), ?Germany (Herbig and Mamet, 2006), Morocco (Mamet et al., 1999); more common in the Triassic (Ladinian-Rhätian; Senowbari-Daryan, 1984). Up to the Middle Jurassic of Scotland (Hudson, 1970).

Baccanella floriformis Pantic, 1971
Pl. 5, figs. 14-16.

1970 Calcite spherulites - Hudson, fig. 9 C.
1971 *Baccanella floriformis* n. gen. n. sp. Pantic, p. 110-111, text-fig. 2, pl. 1, figs. 1-4, pl. 2, figs. 1-4, pl. 3, figs. 1-4.
1972a *Baccanella floriformis* n. gen. n. sp. Pantic, pl. 1, fig. 2, pl. 2, fig. 2, pl. 7, fig. 3, pl. 10, fig. 1.
1972b *Baccanella floriformis* Pantic - Pantic, pl. 4, fig. 1.
1975 *Baccanella floriformis* Pantic - Pantic-Prodanovic, pl. 48, figs. 1- 2.
v. 1977a *Baccanella floriformis* Pantic - Vachard, p. 374, tabl. 1 (no illustration).
1977 *Baccanella floriformis* Pantic - Gazdzicki and Smit, pl. 2, fig. 14.
1979 *Baccanella floriformis* Pantic - Senowbari-Daryan and Schäfer, pl. 1, fig. 4.
1981 *Baccanella floriformis* Pantic - Altiner and Zaninetti, pl. 88, fig. 12.
1983 *Palaeomicrocodium devonicum* n. sp. Mamet and Roux p. 96, pl. 8, figs. 18-19, pl. 9, figs. 1-10.
1984 *Baccanella floriformis* Pantic - Senowbari-Daryan, p. 26-27, pl. 11, fig. 7 (with synonymy).
1984 Mikroproblematika skupiny ?*Bobolites* Radionova - Zukalova, pl. 4, fig. 3.

1985a *Palaeomicrocodium devonicum* Mamet and Roux - Mamet and Préat, pl. 1, figs. 1-7.
1990 *Baccanella floriformis* Pantic - Ciarapica et al., fig. 7C.
1993 *Baccanella floriformis* Pantic - Senowbari-Daryan et al., p. 230, pl. 63, fig. 6.
1996 *Baccanella floriformis* Pantic - Bérczi-Makk, pl. 1, fig. 6.
2004 *Baccanella* - Flügel, pl. 50, fig. 4.
2004 *Baccanella floriformis* Pantic - Flügel, pl. 99, fig. 8.
2005 *Palaeomicrocodium* - Shen and Webb, text-fig. 9D.
? 2005 *Palaeomicrocodium devonicum* Mamet et Roux - Mamet and Préat, pl. 4, fig. 12.
?2006 *Palaeomicrocodium* sp. - Herbig and Mamet, pl. 6, fig. 2.

Description. These carbonate concretions are very rare. Only four specimens have been observed. Diameter of concretion = 2. 000-4.000 mm; diameter of each rosette = 0.150-0.300 mm.
Occurrence. As for the genus. Late Brigantian of Montagne Noire: Vailhan-Roque de Loup (DV313B), Jeantels (DV690B); Roc de Murviel (DV254D), Roque Redonde (RR86).

2 Chlorophyta

2.1. Chlorophycophyta Ulotrichales

Order ?Ulotrichales
Family Anatoliporaceae Vachard, Perret and Delvolvé, 1989 emend. Herein

Synonym. Salpingoporellinae Bassoullet et al., 1979 (pars; see Bassoullet et al., 1979; Roux, 1985; Chuvashov et al., 1987; and Mamet, 1991).

Emended Diagnosis. Attached colonies, composed of several thalli prostrate, domed, club-shaped to cylindrical. Central narrow cavity, or reduced to an enlargment at the base of the laterals. Branches numerous, aspondyl, phloiphore with strong oblique insertion, rectilinear or with slight curvature. Wall microsparitized.

Composition. *Anatolipora* Konishi, 1956; *Richella* Mamet and Roux in Mamet, Roux and Nassichuk, 1987; ?*Tegumentupecten* May, 1992; ?*Homannisiphon* Vachard and Krainer, 2001b.

Comparison. The Anatoliporaceae differ from the true Dasycladales in the small central cavity, the numerous, oblique, aspondyl laterals. Differ from the Seletonellaceae in the numerous thalli assembled in a colony. Differ from the Vermiporellaceae in the small size, the less triangular extremities, the colonial grouping, but the Vermiporellaceae are the most similar group. Consequently, if admitted the assignment of *Vermiporella* proposed by some authors (Kozlowski and Kazmierczak, 1968; Emberger, 1976), this family can belong to the Ulotrichales. The false, late Viséan *Vermiporella shartymensis* Kulik, 1973 is difficult to interpretate (? internally incomplete "*Issinella*", *Evlania* or *Luteotubulus*), whereas the false *Gymnocodium* of Mamet et al., 1994 are probably also some Ulotrichales, related with the Vermiporellaceae.

Remarks. The family Anatoliporaceae is emended herein in order to include *Anatolipora* and *Richella* which appear similar in the organization of laterals. *Tegumentupecten* is morphologically similar to *Richella*; and *Hommannisiphon*, without central cavity nor medullar zone, is hypothetically assigned here to the Anatoliporellaceae.

Occurrence. Questionable in the Devonian. Brigantian-late Serpukhovian. ?Pennsylvanian (with *Anatolipora cantabriensis* Mamet and Villa, 2004).

Genus *Anatolipora* Konishi, 1956 emend. herein

Type species. *Anatolipora carbonica* Konishi, 1956.

Synonym. *Anatolipora* (pars: Mamet and Rudloff, 1972, fig. 3 left, non Mamet and Roux, 1975a, pl. 11, fig. 12; nec Mamet, 1991, p. 375; 2002, p. 498).

Diagnosis. Colonies composed of several club-shaped to cylindrical thalli. Central cavity narrow. Branches numerous, aspondyl, phloiphore with strong oblique insertion and slight curvature. Wall microsparitized.

Composition. *Anatolipora carbonica* Konishi, 1956; *A. cantabriensis* Mamet and Villa, 2004; *A. macroporelloidea* n. gen. n. sp.

Remarks. Paradoxically, the type species *Anatolipora carbonica* possesses two holotypes (pl. 1, figs. 2 and 4). The first illustrated (pl. 1, fig. 2) might correspond to *Windsoporella* Mamet and Rudloff, 1972 emend. Vachard, 1980. The pl. 1, fig. 9 is a typical section of this "*Windsoporella*". The second one (fig. 4) corresponds to the specimens generally assigned to *Anatolipora* by Mamet and Rudloff, 1972; Vachard, 1977b; and Herbig and Mamet, 1985. Consequently, for the stability of the nomenclature, it seems to be more logical to consider *Anatolipora* as defined by the second holotype of Konishi (1956, pl. 1, fig. 4).

Comparison. *Richella* differs by the incrusting growth.

Occurrence. Latest Viséan (Brigantian) to late Serpukhovian (Arnsbergian). Japan, Montagne Noire, Pyrenees, Spain, Belgium, ?Algeria, Alaska, Alberta (Mamet, 1991).

Anatolipora carbonica Konishi, 1956

Pl. 6, figs. 1-12.

p. 1956 *Anatolipora carbonica* n. sp. Konishi, p. 121, 123, pl. 1, figs. 1-3, 5-6, 8-9; text-fig. 1 A-B (but the idealized euspondylity is misinterpreted); non pl. 1, figs. 4, 7 (= *Windsoporella*).
non 1961b *Anatolipora carbonica* Konishi - Endo, p. 131-132, pl. 7, fig. 3 (indetermined dasycladale).
v. p. 1974b *Anatolipora carbonica* Konishi - Vachard, p. 176-177, pl. 7, fig. 7 (non pl. 5, fig. 6 = *Cabrieropora pokornyi*).
p. 1976 *Anatolipora carbonica* Konishi - Emberger, p. 18 (no illustration).
v. 1977a *Anatolipora carbonica* Konishi - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977b *Anatolipora carbonica* Konishi - Vachard, p. 134, pl. 1, fig. 9.
v. 1989 *Anatolipora carbonica* Konishi - Vachard et al., p. 704, pl. 1, fig. 9 (with synonymy).
2002 *Anatolipora carbonica* Konishi - Mamet, p. 498, pl. 3, figs. 4-10 (with synonymy).
Add:
non 1978 *Anatolipora* aff. *carbonica* Konishi - Mamet et al., p. 363-364, pl. 5, fig. 15 (a true dasyclad).
1980 *Nanopora anglica* Wood - Buchroithner et al., p. 25, pl. 5, fig. 5.
1988 *Anatolipora carbonica* - Deloffre, pl. 9, fig. 18.
non 1989b *Anatolipora carbonica* - Nguyen Duc Tien, pl. 23, figs. 6-9 (aspondyl and metaspondyl dasyclads).
v. 1994 *Anatolipora carbonica* Konishi - Delvolvé et al., p. 190, 193 (no illustration).
? 1997 *Richella incrustata* Mamet and Roux in Mamet and others - Harris et al., fig. 9. 25.
v. 1998 *Anatolipora carbonica* Konishi - Delvolvé et al., p. 366 (no illustration).
non 1999 *Anatolipora carbonica* - Sebbar and Mamet, text-fig. 3. 84, pl. 2, fig. 14 (a dasyclad because of the large central cavity).
p. 2000 *Anatolipora carbonica* Konishi in Johnson and Konishi - Granier and Grgasovic, p. 9-10 (with synonymy) (no illustration).
2000 *Anatolipora* sp. - Sebbar, pl. 1, fig. 8.

Description. Maximal length = 4.000 mm, outer diameter = 0.300-0.610 mm, inner diameter = 0.060-0.130 mm, thickness of skeleton = 0.150-0.260 mm, proximal diameter of laterals = 0.015- 0.020 mm, distal diameter of laterals = 0.025-0.033 mm.

Remarks. This small species is rather common in the basal photic zone. Contrary to Vachard et al. (1989), the illustrations of Homann (1972) can be interpreted as follows: fig. 24 = a small *Mizzia*, fig. 45 = a cribrate aperture of *Climacammina* sp., fig. 54 = a polyaxone sponge spicule (Vachard, pers. comm.).

Occurrence. As for the genus. Brigantian in the Montagne Noire (assemblages SF 2-5): Castelsec (MA11.9.1.Quer, MA11.9.1. Längs, MA11.9.3, MA11.10); Roc du Cayla (MA12.18, MA12.22, DV84A, DV465B); Roque Redonde (RR51, RR52, RR53, RR54, RR55, RR59, RR62, RR63, RR73, RR76?, RR84?); Les Boutinelles (MA.BOU25.9, MA.BOU25.9B); Tiberet (ML.FSL.TIB); Vailhan-Château (DV232A); Roc de Murviel (MA21, MA.70, MA73.2, MA82, MA83, MA330.4, MA330.5, MA330.11, DV251B); Les Batailles (DV612A, DV611B). Late Serpukhovian in Pyrenees: Ardengost (MFP.AH81.1).

Anatolipora macroporelloidea n. sp.
Pl. 6, figs. 13-18.

Etymology. Comparable to the Seletonellaceae *Macroporella*.

Locus typicus. Northern slope of Les Batailles hill, near Cabrières (Hérault, France).

Stratum typicum. Latest Brigantian.

Holotype. DV612A (Les Batailles) (Pl. 6, fig. 17).

Type material. Six specimens (in three thin sections).

Diagnosis. *Anatolipora* characterized by wide laterals.

Description. Maximal length = 2.220 mm, outer diameter = 0.315-0.500 mm, inner diameter = 0.075-0.130 mm, thickness of skeleton = 0.120-0.175 mm, proximal and distal diameters of laterals = 0.055-0.075 mm.

Repository of the types. Collection of Palaeontology of the Lille University.

Comparison. It differs from *A. carbonica* Konishi by the larger size of the colonies and the broader laterals.

Remarks. The laterals are more or less similar to the laterals of *Macroporella*, a genus of Seletonellaceae. This form might be characteristic of the latest Brigantian because of the assemblage of Les Batailles, and the dating of the basal flysch levels of Mounio thanks to *Neoprincipia petschoriaeformis*.

Occurrence. Latest Brigantian of Montagne Noire (SF4 and SF5): Roque Redonde (RR52); Les Batailles (DV612A) and Mounio (DV605B).

Genus *Richella* Mamet and Roux in Mamet et al. 1987

Type species. *Richella incrustata* Mamet and Roux in Mamet et al., 1987.

Diagnosis. Attached Secundoporellaceae composed of narrow and elongate thalli with large basal cavity and numerous, more or less radiate, aspondyl laterals.

Remarks. See Vachard and Aretz (2004).

Occurrence. Serpukhovian-Kasimovian. North America, Southern France and Uzbekistan (see Vachard and Aretz, 2004).

Richella incrustata Mamet and Roux in Mamet et al., 1987
Pl. 6, figs. 19-20.

p. 1974 *Zaporella*? sp. - Rich, p. 364, pl. 11, fig. 14 (non fig. 11 = *Paraepimastopora*).
1987 *Richella incrustata* n. sp. Mamet and Roux in Mamet, Roux and Nassichuk, p. 58, pl. 30, figs. 9-13.
1991 *Richella incrustata* Mamet and Roux - Mamet, pl. 1k.
? 1997 *Richella incrustata* Mamet and Roux in Mamet and others - Harris et al., fig. 9. 25 (probably *Anatolipora carbonica*).
2003 *Richella incrustata* Mamet and Roux - Khodjanyazova and Mamet, pl. 5, figs. 11-12.
v. 2004 *Richella incrustata* Mamet and Roux -Vachard and Aretz, p. 651, fig. 8. 1 (with synonymy).

Description. Dimensions are similar to those indicated for this species: Length of thallus = up to 5.000 mm, wall thickness= 0.100-0.200 mm, diameter of pores = 0.020-0.050 mm.

Occurrence. Early Serpukhovian from USA and from Serre de Péret (MA.SP18) and La Serre (MA.LSI.2039, MA.LSI.2040, MA.LSI.2046, MA.LSI.2047, MA.LS.Feldrand. 51).

2.2. Chlorophycophyta Caulerpales

Order Caulerpales
Family indeterminate
Genus *Poncetellina* Mamet and Roux, 1984

Type species. *Solenopora erecta* Poncet, 1971.

Synonyms. *Solenopora* Dybowski, 1877 (pars), *Poncetella* Mamet and Roux, 1983 (preoccupied).

Diagnosis. Large, erected, subcylindrical thallus. Medullar zone generally not preserved. Cortical zone constituted of curvated, ramified laterals.

Occurrence. Devonian-Mississippian. France, Australia, Belgium, Southern Spain (see Vachard and Aretz, 2004).

Poncetellina? sp.

? 1995 *Poncetellina* sp. - Sánchez-Chico et al., p. 73-74, pl. 2, figs. 9-10.
v. 2004 *Poncetellina*? sp. - Vachard and Aretz, p. 651-652, fig. 8. 6.

Description. Length of thallus = 7.600 mm, diameter = 0.310 mm, diameter of medullary zone = 0.230 mm, diameter of pores = 0.060-0.080 mm.
Occurrence. ?Late Viséan of Southern Spain. In the Montagne Noire, early Serpukhovian: La Serre (GIK 1837: Vachard and Aretz, 2004).

Genus *Orthriosiphon* Johnson and Konishi, 1956b

Type species. *Orthriosphon saskatchewanensis* Johnson and Konishi, 1956b.

Diagnosis. Thallus club-shaped. Medullar zone not calcified. Cortical zone relatively wide perforated by trifurcate laterals, tapering gradually and terminated by small funnels. Ovoid and subcortical conceptacles.

Remarks. The correct spelling (neutral) is *O. saskatchewanense.*

Occurrence. Tournaisian-Viséan. ?Serpukhovian, northwestern Paleotethyan and Northamerican. ?Early Permian of the Carnic Alps. The *Orthriosiphon* of Morocco (Vachard and Tahiri, 1991, pl. 2, figs. 15-16) and Sumatra (Vachard, 1989b, pl. 1, fig. 17) are more probably *Pseudokulikia* Mamet, 1997. They do not belong to *Paraepimastopora* contrary to Cózar and Somerville (2005b, p. 80).

Orthriosiphon? spp.
Pl. 7, figs. 1-7.

v. 1977a *Orthriosiphon* cf. *saskatchewanense* Johnson - Vachard, p. 374, tabl. 1 (pars) (no illustration).
v. 1977 *Orthriosiphon saskatchewanense pyrenaicum* n. subsp. Vachard in Perret and Vachard, p. 13-14, pl. 2, figs. 1-2, 4, 7.

Description. Length of thallus = 9.000 mm; diameter of pores = 0.060-0.075 mm.

Remarks. These incomplete specimens might correspond to other large, finely perforated Caulerpale, such as *Orthriosiphon* Johnson and Konishi, 1956b or *Orthriosiphonoides* Petryk in Petryk and Mamet, 1972 (which is not a dasycladale as indicated by these authors, but evidently a codiacean alga).

Occurrence. Latest Asbian-late Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293A); Vailhan-Roque de Loup (DV313B?); Les Pascales (DV601B); Roquemaillère (DV139C); Roque Redonde (RR64, RR73); Les Batailles (DV611C); Tourière (DV341B). Late Serpukhovian of Ardengost area: Bois de Gertous, Serre de Castets, Areng, etc. (MFP.GER10-11b, RC8556, DV771A, DV774C, RC8547, MFP.AH2C, MFP.Jez 1A, MFP.Jez1B, MFP.AH2E, RC8549, RC8554).

Genus *Saccamminopsis* Sollas, 1921 emend. Vachard and Cózar, 2003

Type species. *Nodosaria fusulinaformis* McCoy, 1849 (= *Saccammina carteri* Brady, 1871).

Diagnosis. Ovoid, pear-shaped, bottle-shaped or amphora shaped segments of thalli, with a wide rounded cavity and a neck perforated by a narrow pore. Rarely, the segments are associated in a cateniform thallus of two, three or rarely more segments. Wall thin, whitish, microsparitic, with very poorly preserved perforations.

Remarks. The thallus is interpreted as a possible gametophyte of Caulerpales by Vachard and Cózar (2003); it seems to be adapted to the disphotic zone (Martínez-Rodríguez et al., 2003; Vachard and Cózar, 2003; Cózar and Somerville, 2005b).

Occurrence. Probable LAD in the early Asbian of Ireland (Cózar and Somerville, 2005b: text-fig. 3). Occasionally very common in the late Asbian and Brigantian of England, Ireland, Spain, France, Belgium, Germany, Poland, Morocco, Algeria, Greece, Austria, Donbass (C1vf1), Kazakhstan, Japan, Nova Scotia (e. g., Vachard and Cózar, 2003; Cózar and Somerville, 2004, 2005b). Serpukhovian of Kazakhstan (Brenckle and Milkina, 2003).

Saccamminopsis fusulinaeformis (McCoy, 1849)
Pl. 7, figs. 8-20.

1849 *Nodosaria fusulinaformis* n. sp. McCoy, p. 131 (fide Brady, 1876; non vidi).
1871 *Saccammina Carteri* n. sp. Brady, p. 183-184, pl. 12, figs. 1-6.
1876 *Saccammina Carteri* Brady - Brady, p. 57-61, pl. 1, figs. 1-7, pl. 12, fig. 6 (with synonymy).
non 1888 *Saccamina* (sic) *carteri* (Brady) - Meunier, p. 234, pl. 7, figs. 1-2 (some ostracods).
1921 *Saccammina (Saccamminopsis) carteri* (Brady) n. gen. (sic) - Sollas, p. 193-212, pl. 7, figs. 8-14.
non 1932 *Saccammina carteri* (Brady) - Liebus, p. 161, pl. 9, fig. 28 (some pachyspherins).
1952 *Saccamminopsis fusulinaformis* (McCoy) n. comb. - Cummings, text-fig. A p. 224, n° 3, 5, 8).
1956 *Saccamminopsis carteri* (Brady) subsp. *ukrainica* n. subsp. Brazhnikova in Brazhnikova et al., p. 18, pl. 7, figs. 3, 5.
1961 *Saccamminopsis carteri* (Brady) - Hanzawa, pl. 16, fig. 1.
1964 *Saccamminopsis fusulinaformis* (McCoy) - Loeblich and Tappan, p. C319, fig. 232. 1-2.
1966 *Saccamminopsis fusulinaformis* (McCoy) - Okimura, pl. 1, figs. 1-6.
1966 *Saccamminopsis fusulinaeformis* (McCoy) orth. mut. - Mamet et al., p. 16, 17, 18 (no illustration).
1967 *Saccamminopsis carteri* (Brady) *ukrainica* Brazhnikova forma typica - Brazhnikova et al., pl. 15, fig. 1.

1967 *Saccamminopsis carteri* (Brady) *ukrainica* Brazhnikova forma minima - Brazhnikova et al., p. 180-181, pl. 56, figs. 1-5.
1970 *Saccamminopsis fusulinaformis* (McCoy) - Hallett, pl. 3, fig. 9.
1972 *Saccamminopsis "carteri"* (Brady) - Mamet, p. 3 (no illustration).
non 1973 *Saccamminopsis carteri* (Brady) *ukrainica* Brazhnikova - Grozdilova, p. 91, pl. 6, fig. 7 (corresponds to *Baculella*, Famennian issinellacean).
1973 *Saccamminopsis carteri ukrainica* Brazhnikova forma minima - Ivanova, pl. 5, fig. 1.
v. 1974b *Saccamminopsis fusulinaeformis* (McCoy) - Vachard, p. 377-378, pl. 6, fig. 6, pl. 28, fig. 1 (with synonymy).
v. 1977a *Saccamminopsis carteri* Brady - Vachard, p. 374, tabl. 1 (no illustration).
1977 *Saccamminopsis carteri* Brady - Paproth et al., p. 61 (no illustration).
1977b *Saccamminopsis fusulinaeformis* (McCoy) - Vachard, p. 165, pl. 8, fig. 19.
1984 *Saccamminopsis fusulinaformis* (McCoy) - Herbig, pl. 6, figs. 1, 3.
1985 *Saccaminopsis* (sic) *carteri ukrainica* Brazhnikova - Lys, pl. 1, fig. 2.
1986 *Saccaminopsis* (sic) sp. - Skompski, p. 272-273, pl. 17, figs. 4-6, pl. 18, figs. 1-2.
1987 *Saccamminopsis fusulinaformis* (McCoy) - Loeblich and Tappan, pl. 221, figs. 7-9.
1988 *Saccaminopsis* (sic) *fusulinaeformis* (McCoy) - Flügel and Herbig, pl. 43, fig. 7, pl. 44, figs. 3, 6-7.
1989 *Saccamminopsis fusulinaformis* (McCoy) - Fewtrell et al., p. 62, pl. 3.11, fig. 6.
1989a *Saccamminopsis* sp. - Poncet, p. 425-429, figs. 1A-I, 2-3.
1990 *Saccamminopsis* - Gutteridge, p. 222 (no illustration).
1992 *Saccamminopsis fusulinaeformis* (McCoy) - Vachard and Berkhli, pl. 2, figs. 3, 11.
1993 *Saccamminopsis* sp. - Skompski, p. 147-152, figs. 1A-C, 2A-B, 3A-D, 4A-B, 5A-C.
1993 *Saccamminopsis fusulinaeformis* (McCoy) - Berkhli et al., fig. 6. 8.
1993 *Saccamminopsis fusulinaformis* (McCoy) - Vdovenko et al., p. 45, fig. 6z, zh, e.
non 1995 *Saccaminopsis* (sic) *carteri* (Brady) - Pajic and Filipovic, pl. 25, fig. 10 (an ostracod).
1996 *Saccamminopsis* microfacies - Madi et al., pl. 22, fig. 4.
1996 *Saccamminopsis* sp. - Skompski, p. 217, pl. 20, fig. 1.
1997 *Saccamminopsis fusulinaeformis* (McCoy) - Gallagher and Somerville, text-fig. 4 p. 318, fig. 9t.
v. 1999 *Saccamminopsis fusulinaeformis* (McCoy) - Berkhli, p. 104 (no illustration).
1999a *Saccamminopsis fusulinaeformis* (McCoy) - Cózar and Rodríguez, fig. 3D.
1999b *Saccamminopsis fusulinaeformis* (McCoy) - Cózar and Rodríguez, pl. 1, fig. 8.
2000a *Saccamminopsis fusulinaeformis* (McCoy) - Cózar and Rodríguez, p. 113-114, figs. 4P-Q.
v. 2002a *Saccamminopsis fusulinaeformis* (McCoy) - Berkhli, et al., p. 193 (no illustration).
v. 2002b *Saccamminopsis fusulinaeformis* (McCoy) - Berkhli, et al., p. 139 (no illustration).
2003 *Saccaminopsis* (sic) sp. - Brenckle and Milkina, pl. 16, fig. 16.
2003a *Saccamminopsis fusulinaeformis* (McCoy) - Cózar, fig. 4Q.
2003b *Saccamminopsis fusulinaeformis* (McCoy) - Cózar et al., fig. 7G.
2003 *Saccamminopsis fusulinaeformis* (McCoy) - Martínez-Rodríguez et al., figs. 3B-D.
2003 *Saccamminopsis* ex gr. *fusulinaeformis* (McCoy) - Vachard and Cózar, p. 433, fig. 1. 1-15, fig. 5. 1-7, fig. 7. 1-7, fig. 8. 1-7.
2004 *Saccamminopsis fusulinaeformis* (McCoy) - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 6 p. 47, text-fig. 8 p. 48, text-fig. 9 p. 49, fig. 14. 33.
2004 *Saccamminopsis* ex gr. *fusulinaeformis* (McCoy) - Cózar, p. 372, 373, text-fig. 3, pl. 1, fig. 6.
2004 *Saccaminopsis* (sic) - Flügel, pl. 108, fig. 2.
2005a *Saccamminopsis fusulinaeformis* (McCoy) - Cózar and Somerville, text-fig. 16 p. 25 (no illustration).
v. 2005 *Saccamminopsis fusulinaeformis* (McCoy) emend. Vachard and Cózar - Saïd, p. 178, p. 181, p. 187, p. 190, fig. X. 1. 13.
2005b *Saccamminopsis fusulinaeformis* (McCoy) emend. Vachard and Cózar - Cózar and Somerville, pl. 2, fig. 4.

Description. The specimens of Montagne Noire are disarticulated (only several specimen show two or three articles in connection (Pl. 7, figs. 10, 19). Dimensions: Height = to 3.200 mm, width = 1.150-2.500 mm, wall thickness = 0.050-0.075 mm.

Occurrence. Apparently limited to the Brigantian. Palaeotethyan. Early to late Brigantian of Montagne Noire: Castelsec (MA10-?, MA10.3, MA10.23); Roquemaillère (ML.UM.ROQ, DV138C); Roc du Cayla (MA12.18, MA12.23, MA12.26, DV83B, DV84B); Roque Redonde (RR48, RR50, RR53, RR54? RR64, RR81); Vailhan-Château (DV247A, DV247C); Vailhan-Roque de Loup (MA.RL1, DV248E, DV313, DV313B, DV314A, DV325A); Mentaresses

(SF5); Les Pascales (MA.PA5, MA.PA6, DV601A, DV601C, DV601E, DV601F); Mounio (DV431D); Roc de Murviel (MA33, MA34, DV251E).

2.3. Chlorophycophyta Dasycladales

Order Dasycladales
Family Seletonellaceae (Kordé, 1950) Bassoullet et al., 1979
Tribe ?Macroporelleae Pia, 1920
Genus *Arengaepora* n. gen.

Type species. *Arengaepora pyrenaica* n. gen. n. sp.

Etymology. From the Areng Mountain, and ending pora often used among the dasycladales.

Diagnosis. Cylindrical thallus, rarely bifurcated. Hyperphloiophore laterals, i. e, with a short cylindrical proximal part and a wide conical distal part. The arrangement of laterals is mesospondyl (i. e., more or less spirally organized). Wall whitish to yellowish, microsparitic.

Composition. Monospecific.

Comparison. No alga is directly comparable, excepted for *Macroporella* Pia, 1912 with the mesospondyl but the shape of laterals is different, and for the Mesozoic *Salpingoporella* Pia, 1918, with the shape of the laterals, but they are euspondyl in this genus, and for the early Palaeozoic *Vermiporella* Stolley, 1893 but they are aspondyl and the shape of laterals is different.

Remarks. Because of the mesospondyly and the hyperphloiphory of the laterals, this new taxa is only questionably related to the Macroporelleae.

Occurrence. Late Serpukhovian of Ardengost Formation.

Arengaepora pyrenaica n. gen. n. sp.
Pl. 8, figs. 1-14.

Etymology. From the Pyrenees.

Locus typicus. Montagne d'Areng, near Ardengost village (France).

Stratum typicum. Late Serpukhovian.

Holotype. Sample AH.A/81(Pl. 8, fig. 14).

Type material. 85 specimens (see below).

Repository of the types. Köln and Lille Universities.

Diagnosis. As for the genus.

Description. Thallus cylindrical with relative wide central cavity. Laterals perpedicular to the central cavity more or less arranged in spirally oriented rows. Maximal length = 6.670 mm, outer diameter = 0.250-0.945 mm, inner diameter = 0.200-0.670 mm; thickness of skeleton = 0.025- 0.140 mm; proximal diameter of laterals = 0.001-0.002 mm ; distal diameter of laterals = 0.006-0.010 mm.

Comparison. No equivalents are known.

Remarks. Except for the distal calcification of the laterals (i. e., the cortex), the shape of the thallus is probably very similar to the reconstruction of the Jurassic *Macroporella lazuriensis* Bucur, 1988 (text-fig. 3).

Occurrence. Late Serpukhovian of Ardengost area: MFP.AH81.3 (16 specimens), AH.A/81 (16 specimens), AH.A/81.3 (12 specimens), AH.A/81.4 (7 specimens), AH.B/81 (2 specimens), AH.B/81.5 (15 specimens), AH. B/81.6 (3 specimens), AH.B/81.7 (12 specimens), AH.B/81.10 (2 specimens).

Tribe Epimastoporelleae Cózar and Vachard, 2004a
nomen translat. herein for subtribe Epimastoporellinae

Diagnosis. See the diagnosis of the Epimastoporellinae in Cózar and Vachard (2004a).

Remarks. In my opinion, the group of the Epimastoporelleae, homogenous and sufficiently distinct of the Gyroporelleae by the shapes of laterals and thalli, constitute a tribe.

Occurrence. Late Viséan to late Permian, cosmopolite in the late Pennsylvanian-early Permian; Palaeotethyan in the other periods (Vachard, pers. comm.).

Genus *Palaepimastoporella* Cózar and Vachard, 2004a

Type species. *Palaepimastoporella espielensis* Cózar and Vachard, 2004a.

Diagnosis. Thallus cylindrical, with rather large central cavity and rather thin skeleton. Laterals aspondyl, ellipsoidal to quadratic, arranged as those of *Epimastoporella* Roux, 1979.

Remarks. This genus is very rare in our material.

Occurrence. Latest Asbian to early Serpukhovian, Ireland, Northern England, Southwestern Spain, Montagne Noire.

Palaepimastoporella espielensis Cózar and Vachard, 2004a
Pl. 9, figs. 1-2.

v. 2002a Dasycladale indet. - Aretz, fig. 7. 9.
v. 2004a *Palaepimastoporella espielensis* n. sp. Cózar and Vachard, p. 178, 180, fig. 4. 1-10.
v. 2004 *Palepimastoporella* (sic) *espielensis* Cózar and Vachard - Cózar, p. 370, text-fig. 4 p. 372 (pars), pl. 1, fig. 8.
2005b *Palaepimastoporella* sp. - Cózar and Somerville, pl. 1, fig. 13.
2005d *Palepimastoporella* (sic) *espielensis* Cózar and Vachard - Cózar and Somerville, fig. 4. 12.

Description. Four sections correspond to the description of Cózar and Vachard (2004a). They measure: maximal length of thallus = 3.000 mm; wall thickness = 0.230 mm; diameter of pores = 0.150-0.200 mm; interpore space = 0.020 mm.

Occurrence. As for the genus. In the Montagne Noire: Brigantian of Castelsec (Aretz, 2002a), Roque Redonde (RR86?); boundary Viséan/Serpukhovian of La Serre (MA.LS-Feldweg.36).

Genus *Paraepimastopora* Roux, 1979

Type species. *Epimastopora kansasensis* Johnson, 1946.

Diagnosis. Thallus cylindrical, with rather large central cavity and rather thin skeleton. Laterals aspondyl, simple, cylindrical and thin. Intusannulations generally well developed.

Composition. (see Mamet et al., 1987, p. 35, and Mamet, 1991) *P. kansasensis* (Johnson, 1946); *P. irregularis* (Johnson, 1946) n. comb.; *P. jewetti* (Johnson, 1946); *P. kanumai* (Endo in Endo and Kanuma, 1954); *P. noetschensis* Krainer and Vachard, 2002; *P. urtazymensis* (Chuvashov and Anfimov, 1988); and *P. cozarii* n. sp.

Remarks. This genus is very rare in our material.

Occurrence. The genus seems to appear in the MFZ12 = Cf5 of Morocco (= late Livian = late Holkerian = "V3a", in the thin section MB.AA4, Berkhli and Vachard, unpublished data, 2005). Early Brigantian of central Morocco (Vachard, comm. pers., October, 2007). Early Asbian-early Serpukhovian of Spain (Sánchez-Chico et al., 1995; Cózar and Somerville, 2005b, p. 80). Brigantian of Ireland (Cózar and Somerville, 2005b, text-fig. 3). It remains rare in the late Viséan-Serpukhovian and is more common in the Pennsylvanian-Permian. Northwestern Palaeotethyan during the Late Mississippian and after, it is cosmopolite (see Mamet, 1991).

Paraepimastopora cozarii n. sp.
Pl. 9, figs. 3-5.

? 1973 *Orthriosiphon*? - Maslov, pl. 2, fig. 6 (or other species of the genus).
? p. 1974 *Zaporella*? sp. - Rich, pl. 1, fig. 11 (non fig. 14 = *Richella*).
? 1995 *Parapimastopora* sp. - Sánchez-Chico et al., p. 73, pl. 3, fig. 12.
? 1996 *Paraepimastopora* sp. - Sebbar and Mamet, pl. 2, fig. 4.
? 1999 *Paraepimastopora* sp. - Sebbar and Mamet, pl. 1, fig. 8.
? 2003 *Paraepimastopora* sp. - Mamet and Misik, fig. 3. 1-3.
v. 2004 *Paraepimastopora* sp. - Vachard and Aretz, p. 652, fig. 8. 5.
? 2004 *Paraepimastopora* sp. - Cózar, text-fig. 3 p. 371, text-fig. 4 p. 372 (no illustration).
v. 2004a *Paraepimastopora* sp. - Cózar and Vachard, fig. 4. 11.
? 2004 *Paraepimastopora* ? sp. - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 6 p. 47, text-fig. 8 p. 48, text-fig. 9 p. 49, fig. 13. 4, 7, fig. 14. 28.
v. ? 2005 *Paraepimastopora* sp. - Karim et al., fig. 3H.
? 2005a *Paraepimastopora* ? sp. - Cózar and Somerville, text-fig. 16 p. 25.
? 2005b "*Paraepimastopora*" sp. - Cózar and Somerville, pl. 1, fig. 15.
2005a *Paraepimastopora* (?) sp. - Cózar, text-fig. 4 p. 409, fig. 7. 19.
2005d *Paraepimastopora* sp. - Cózar and Somerville, fig. 4. 9.

Etymology. Dedicated to P. Cózar, our friend, for his past and future work.

Locus typicus. Les Boutinelles (Hérault, France).

Stratum typicum. Late Brigantian (assemblage SF5).

Holotype. Sample MA.BOU25.8 (photo 9.6/93); Pl. 9, figs. 3-4.

Diagnosis. Small species, with small diameter and intusannulation not hollow.

Description. Maximal length of thallus = 5.000-6.000 mm, wall thickness = 0.600 mm, diameter of pores = 0.050 mm, interpore space = 0.150 mm.

Type material. Seventeen specimens.

Repository of the types. Collection of Palaeontology; Köln University.

Comparison. The new species differs from *P. noetschensis* in the dimensions and the not hollow intusannulations.

Occurrence. Questionable in the late Asbian-Brigantian of Ireland, late Asbian-early Serpukhovian of Spain, Serpukhovian of Bechar Basin (Algeria), Asbian/Brigantian of central Morocco, early Brigantian of Northern England and Brigantian of Slovak Republic. Late Brigantian (assemblage SF5) of Les Boutinelles (MA.BOU25.8) and Les Batailles (DV607D). Early Serpukhovian (assemblage SF6) of La Serre (MA.LS.Feldweg10) (see also Vachard and Aretz, 2004: GIK1814).

?Tribe Epimastoporelleae Cózar and Vachard, 2004a

Genus *Borisovella* Ivanova, 1988a

Type species. *Borisovella turbinata* Ivanova, 1988a.

Synonyms. ?*Columbiapora* Mamet, 1974c (pars), "*Epimastopora*" (Pia, 1922) Kochansky and Herak, 1960 (pars), *Koninckopora* Lee, 1912 (pars).

Diagnosis. Thallus cylindrical to club-shaped. Axial cell generally preserved. Aspondyl laterals, oblique, numerous, and piriferous (i. e., pedonculated and proximally inflated).

Occurrence. Late Serpukhovian of Southern Urals. Late Serpukhovian of Ardengost area.

Borisovella mametii (Perret and Vachard, 1977) n. comb., emend herein

Pl. 9, figs. 6-7.

v. 1977 *Columbiapora mameti* n. sp. Perret and Vachard, p. 106-107, pl. 2, figs. 3, 5-6, pl. 3, fig. 6.
v. 1977 *Epimastopora macropora* (Maslov) - Perret and Vachard, p. 100-102, pl. 3, figs. 1-3, 5-6.
v. 1994 *Epimastopora macropora* (Maslov) - Delvolvé et al., p. 193 (no illustration).

Description. See Perret and Vachard (1977: figs. 5-6, tabl. 3). Length = 3.500-5.500 mm; D = 0.610-0.735 (1.425-3.080) mm, d = 0.245-0.290 (0.385-1.030) mm; s = 0.180-0.320 (0.230-0.625) mm; n = 10; p = 0.060-0.160 (0.065-0.230) mm.

Remarks. *Borisovella* differs from *Epimastopora* auctorum (now *Epimastoporella* Roux, 1979) in the cylindrical shape of the test, not sphaerical and broken in small remains. Because of this shape *Borisovella* is not a typical representative of Epimastoporelleae. *Columbiapora* sensu Perret and Vachard (1977) is evidently different of *Columbiapora* Mamet, 1974c revised by Mamet and Roux, 1981b (although the two taxa have apparently very few in common). *C. mameti* is valid. It exhibits clearly the shape of the laterals of "*Epimastopora macropora*" sensu Perret and Vachard (1977). It is a "petite forme" (small form in the sense of Vachard, 1993), i. e., most probably a section in apical extremity of a thallus. *Borisovella mametii* n. comb. differs from *B. turbinata* in the dimensions (compare with Ivanova, 1988a, p. 15, pl. 4, figs. 7-10, and Bogush et al., 1990, p. 115-116, pl. 14, fig. 8).

Occurrence. As for the genus. Ardengost area: MFP.AH2A, MFP.AH2E, MFP. AH2H, MFP.AH3B, MFP.AH3D, MFP.AH10, DV771A, DV 774C, RC8541, RC8548, RC8562, MFP.CAS25 (Perret and Vachard, 1977); MFP.AH81, AH.B/81.6, ?MFP.CAS23 (this study).

Family Dasycladaceae (Kützing) Stizenberger, 1860

Tribe Salpingoporelleae Bassoullet et al., 1979

Subtribe Nanoporinae n. subtrib.

Diagnosis. Small, cylindrical, euspondyl dasyclads. Cylindrical laterals. Wall whitish microsparitized.

Remarks. In Bassoullet et al. (1979) all the cylindrical, euspondyl dasycladales constitute the tribe Salpingoporelleae Bassoullet et al., 1979. The subtribe Nanoporinae n. subtrib. is established because of the relative homogeneity of this group and the following difference with the Salpingoporellinae: the Nanoporinae exhibit cylindrical and not phloiophore pores. For the differences with the issinellaceans (for instance, *Pseudonanopora* Mamet and Roux, 1975a), see Vachard and Aretz, 2004, p. 652.

Composition. *Nanopora* Wood, 1964, *Dutroella* Mamet and Roux, 1978b.

Occurrence. Viséan-Serpukhovian. Palaeotethyan, ?Siberian (Ivanova and Bogush, 1988) and North American.

Genus *Nanopora* Wood, 1964

Type species. *Nanopora anglica* Wood, 1964.

Diagnosis. Thallus small, cylindrical. Laterals cylindrical, eupondyl and with alternating pores. Wall whitish microsparitized.

Remarks. As indicated by Vachard and Aretz (2004), this true dasyclad must not be confused with issinellean algae like *Pseudonanopora* Mamet and Roux, 1975a.

Occurrence. Very rare in the early Viséan (Belgium). Middle Viséan (Morocco, Urals, Afghanistan, Iran) to late Serpukhovian, Palaeotethyan (including New Scotland in Canada), from England to South China (see Mamet, 1991, but a part of the locations concerns issinellaceans as indicated by Krainer and Vachard, 2002; and Vachard and Aretz, 2004).

Nanopora anglica Wood, 1964

Pl. 9, figs. 8-16

1964 *Nanopora anglica* n. sp. Wood, p. 181-185, pl. 31, figs. 1-3, pl. 32, figs. 1-4.
1974b *Nanopora anglica* Wood - Vachard, p. 181, pl. 7, figs. 12-15 (with synonymy).
1975a *Nanopora anglica* Wood - Mamet and Roux, p. 251, pl. 1, figs. 33-48 (with synonymy).
1976 *Nanopora anglica* Wood - Emberger, p. 62 (with 5 references in synonymy, no illustration).
v. 1977 *Nanopora anglica* Wood - Perret and Vachard, p. 108-109, pl. 4, figs. 6-7 (with synonymy).
v. 1977a *Nanopora anglica* Wood - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977b *Nanopora anglica* Wood - Vachard, p. 134, pl. 1, figs. 5-8.
1980 *Nanopora anglica* Wood - Vachard, pl. 11, figs. 1-2.
1980 *Nanopora anglica* Wood - Conil et al., pl. 26, figs. 2-7.
non 1980 *Nanopora anglica* Wood - Buchroithner et al., p. 25, pl. 5, fig. 5 (= *Anatolipora carbonica*).
1986 *Nanopora anglica* Wood - Skompski, p. 267, pl. 3, fig. 3, pl. 18, figs. 3-4.
non 1988a *Nanopora anglica* Wood - Ivanova, p. 6, pl. 2, figs. 12-14 (an issinellean).
non 1988 *Nanopora anglica* Wood - Ivanova and Bogush, p. 46, pl. 15, fig. 4 (an issinellean).
non 1988 *Nanopora* cf. *anglica* Wood - Ivanova and Bogush, p. 46, pl. 20, fig. 7 (an issinellean).
non 1988 *Nanopora anglica* Wood - Shuysky and Shirshova, p. 34, pl. 12, figs. 5-7 (an issinellean).
1988 *Nanopora* sp. - Hance, pl. 1, fig. 4.
1989 *Nanopora anglica* Wood - Skompski et al., pl. 3, fig. 4.
non 1990 *Nanopora anglica* Wood - Bogush et al., tabl. 1, p. 10, pl. 13, fig. 3 (an issinellean).
v. 1991c *Nanopora anglica* Wood - Vachard et al., p. 677, pl. 1, figs. 5, 18, 24.
1992 *Nanopora anglica* Wood - Vachard and Berkhli, pl. 2, fig. 12.
1996 *Nanopora anglica* Wood - Sebbar and Mamet, text-fig. 5. 29, pl. 2, fig. 5.
1996 *Nanopora anglica* (Wood) (sic) - Skompski, pl. 20, figs. 2-3.
1996 *Nanopora anglica* Wood) - Vachard and Montenat, text-fig. 4 p. 469.
2000 *Nanopora anglica* Wood - Sebbar, pl. 4, fig. 16.
v. p. 2002 *Nanopora pseudofragilissima* n. sp.Vachard in Krainer and Vachard, p. 13-14, pl. 2, figs. 6-7, 12-13 (with synonymy).
? 2004 *Nanopora* spp. - Cózar, text-fig. 3 (pars) (no illustration).
? 2004 *Nanopora anglica* Wood - Cózar and Somerville, text-fig. 3, text-fig. 6, text-fig. 8, text-fig. 9 (no illustration).
2005a *Nanopora* sp. - Cózar and Somerville, fig. 14. 6.
v. 2005 *Nanopora anglica* Wood - Saïd, p. 177, fig. X. 1. 25.
2005b *Nanopora anglica* Wood - Cózar and Somerville, pl. 1.1.
2005a *Nanopora anglica* Wood - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 7. 13.
?2005 *Nanopora fragilissima* (Maslov) - Mamet and Zhu, fig. 5A.
2006b *Nanopora anglica* Wood - Herbig, pl. 1, figs. 5-6.

Description. The species is easy to determinate, due to its measurements (compare with Perret and Vachard, 1977, tabl. 6). L = 0.810-2.200 mm, D = 0.120-0.190 mm, d = 0.055-0.110 mm, skeleton thickness = 0.025-0.040 mm, lateral diameter (“pore”) = (0.003) 0.008-0.012 mm.

Remarks. In Southern France, the species is very sporadically known (assemblages SF3, SF5 and SF6). No explanation can be given about its apparent absence in the assemblages SF1-2. Some *N. fragilissima* of the literature are difficult to distinguish from *N. anglica*, especially the illustration of Mamet and Zhu (2005).

Occurrence. As for the genus. Brigantian of Montagne Noire: Castelsec (MA10.II); Japhet (DV126B, DV126G, DV127A, DV127B, DV127C, ?DV856C.2); Vailhan-Château (DV246D); Roc de Murviel (MA5); Les Batailles (DV608, DV609.3). Late Serpukhovian of Ardengost area: MFP.AH2C, MFP.AH18E, MFP.BAR1B.

Family Diploporaceae Pia, 1920
nomen translat. Shuysky (1987)
non Deloffre (1987) nec Deloffre (1988) (ex tribe Diploporeae)

Remarks. The family Diploporaceae contains three tribes: Velebitelleae Vachard, 1977b; Albertaporelleae Güvenç, 1979 nomen translat. Deloffre, 1988 and Diploporeae Pia, 1920 nomen translat. Güvenç, 1979. The tribes might be much more numerous, due to the complete absence of representatives of Diploporaceae in the Late Devonian and Early Tournaisian, epochs even well studied in Belgium, Russia, Ukraine and some other countries. In this case, the diploporacean, clypeinacean and maybe selletonellacean dasycladales can be homeomorphs of Mississippian, Pennsylvanian and Permian genera. The possible homeomorphs are: (a) the Devonian *Diplopora* of Poncet (1965, 1967) homeomorphs of Triassic species of Pia (1920); (b) *Ivdelipora* Shuysky and Shirshova in Chuvashov et al., 1987; *Ligeripora* Vachard, 1993 homeomorphs of *Albertaporella* Johnson, 1966 and *Japhetellopsis* n. gen.; (c) *Lulipora* Shuysky, 1986 homeomorph of *Likanella* Milanovic, 1966; (d) the Luliporeae Shuysky in Chuvashov et al., 1987b emend. Vachard et al., 2001 (p. 187) in general; (e) *Lopsiella* Shuysky, 1987b; *Coticula* Shuysky and Shirshova in Chuvashov et al., 1987; *Gissarella* Saltovskaya, 1979; *Salopekiellopsis* Kabanov and Vachard (nomen nudum; submitted): four genera more or less homeomorphs of *Salopekiella* Milanovic, 1965 (see the illustrations of these taxa in Chuvashov et al., 1987); (f) *Sertulella* Shuysky and Shirshova, 1988 and *Resteignella* Mamet and Préat, 1983 looking like *Borladella* Cózar et al. (nomen nudum in press), *Murvielipora* n. gen., and *Cabrieroporellopsis* n. gen.; as well as (g) the Seletonellaceae *Couviniella* Mamet and Préat, 1992, and *Anthracoporella* Pia, 1920.

Tribe Velebitelleae Vachard, 1977b

The tribe Velebitelleae contains all the metaspondyl, vestibuled, articulated Diploporaceae, occurring from Early Devonian to Late Permian. It is subdivided into 4 subtribes: (1) Velebitellinae with *Diplopora* Schafhäutl, 1863 (pars): *D. constantini* Poncet, 1965 (n. gen.?); *Windsoporella* Mamet and Rudloff, 1972 emend. Vachard, 1980; *Eovelebitella* Vachard, 1974a; *Velebitella* Kochansky-Devidé, 1964; *Diplopora* (pars): *D. pusilla* Kochanky-Devidé and Herak, 1960 (n. gen.?); (2) Cabrieroporinae n. subtribe with *Cabrieropora* Mamet and Roux, 1975a and *Guadiatella* Cózar, Somerville, Rodriguez and Medina-Varea, in press-b; (3) Kulikiinae n. subtrib. with vesiculifer laterals (*Sphinctoporella* Mamet and Rudloff, 1972, *Kulikia* Golubsov, 1961 and *Frostereyella* Elliott, 1988). (4) Borladellinae n. subtribe with *Borladella* Cózar, Somerville, Rodriguez and Medina-Varea, in press-b, *Murvielipora* n. gen., and *Cabrieroporellopsis* n. gen., ?*Sertulella* Shuysky and Shirshova, 1988) with prominent verticils gining a pustulose superficie to the thalli.

Subtribe Velebitellinae Vachard, 1977a
nomen translat. Bassoullet et al., 1979 (ex tribe)
Genus *Windsoporella* Mamet and Rudloff, 1972 emend. Vachard, 1980

Type species. *Windsoporella radiata* Mamet and Rudloff, 1972.

Synonyms. *Anatolipora* Konishi, 1956 (pars); *Diplopora* Schafhäutl, 1863 (pars); *Albertaporella* Johnson, 1966 (pars): *Eovelebitella* Vachard, 1974a (pars); "*Velebitella*" Mamet and Roux 1975a (pars); *Pseudovelebitella* Mamet and Roux, 1978b (pars); ?*Queenslandella* Mamet and Roux, 1983.

Diagnosis. Thallus small to medium sized, metaspondyl, vestibuled, slightly articulated. Central cavity cylindrical. Grooves not developed. Articles rectangular to spherical, generally rounded at the external periphery, occasionally prominent, with one tuft by article. Laterals strongly phloiophore, and occasionaly regrouped as the petals of a flower ("petaliform" aspect of some tangential sections; see Vachard, 1980). Vestibules relatively large. Tufts often protruding in the periphery of the articles. The extremities of the laterals of the tufts ("pores") do not cover completely the surface of the segment. Pores limited to 1/3 of the height of the article, occupying the central part, with a ratio Hv = 0.50-0.75 (difference with *Eovelebitella* and *Velebitella*, see Vachard, 1980, and synonymy with *Pseudovelebitella*).

Remarks. The ratio Hv (Cózar et al., in press-a) is a dasyclad parameter which corresponds to the ratio Ha/Hbb of De Castro (1997, p. 181); i.e., the ratio of the height of the pore-bearing part to the total height of an article. The petaliform aspect of some sections (e.g., Mamet and Rudloff, 1972, pl. 3, fig. 20, 22 (bottom), pl. 12, fig. 2; Lys et al., 1978, pl. 2, fig. 3-5; Mamet and Roux, 1975a, pl. 13, fig. 4 (bottom, left); Skompski, 1986, pl. 3, fig. 1 (top); Ouarache et al. 1991, pl. 2, fig. 8; Cózar and Rodríguez 2004, fig. 9-10; Cózar and Somerville 2004, fig. 14. 32) is due to the ellipsoidal sections of the strongly inclined laterals, centred around the round section of the vestibule.

Discussion. The Velebitelleae (i.e., the Diploporaceae with a vestibule) are still poorly known and poorly characterized in the literature. Many Permian species look like *Eovelebitella* (Vachard, 1980; Granier and Grgasovic, 2000), but are distinct, since *Eovelebitella* disappears in the early Serpukhovian. The similarity is particulary great with the small form of the late Middle Permian designated as "*Velebitella* n. sp." by Kochansky and Gusic (1971) and Vachard in Montenat et al. (1977) (see also the "*Mizzia*" of Berger and Kaever, 1992, fig. 2. 22b). The synonyms of *Windsoporella* were previously discussed in Vachard (1980, 1990). Tentatively, the following Viséan-Serpukhovian are supposed synonyms: *Windsoporella* (Mamet and Rudloff, 1972, p. 83; Vachard, 1980, p. 78-79; Chuvashov et al., 1987, p. 69, fig. III.25; Deloffre, 1988, pl. 6, figs. 14-15; Mamet, 1991, p. 435); *Diplopora* (Chanton-Güvenç, 1972, p. 14-16); "*Velebitella*" (Mamet and Roux, 1975a, p. 263); *Eovelebitella* (Lys et al., 1978, pl. 2, figs. 1-5); *Albertaporella* (Güvenç, 1979, p. 632-633, pars; Skompski, 1986, p. 260, pars); *Pseudovelebitella* (Mamet and Roux, 1983, p. 78, pars; Deloffre, 1988, pl. 6, figs. 10-11, pars; Mamet, 1991, p. 426, pars); ?*Queenslandella* (Mamet and Roux, 1983, p. 79-80). *Queenslandella* is questionable, perhaps partially synonym of *Windsoporella*, partially a distinct taxon (identified as "*Windsoporella* n. sp." by Fontaine and Vachard, 1981, p. 15, pl. 1, fig. 3 in Central Sumatra; Fontaine et al., 1982, p. 48, in northeast Thailand). A part of *Queenslandella* looks like *Windsoporella* (Mamet and Roux, 1983, pl. 7, figs. 2-4), whereas the other part, including the holotype, is more similar to *Eovelebitella* or corresponds really to a different genus. True *Albertaporella*, and other Albertaporellinae Deloffre (1988) differ in having two or three orders of ramifications, whereas the laterals of the tufts are always simple

in the Velebitellinae. At least one *Anatolipora carbonica* Konishi, 1956 (pl. 1, fig. 9) is in fact a *Windsoporella*.

Composition. *Windsoporella radiata* Mamet and Rudloff, 1972; *W. clogrenensis* Cózar et al. n. sp. (nomen nudum); *W. adamuzensis* Cózar et al. n. sp. (nomen nudum); *W.*? *buttevantensis* Cózar et al. n. sp. (nomen nudum); *W. solida* Pille and Vachard n. sp. = Dasycladacée indéterminée (no. 2) Mamet and Roux, 1975a; *W. longirostris* Pille and Vachard n. sp. ; *W. rara* Pille and Vachard n. sp.; *W. indeterminata* Pille and Vachard n. sp. = Dasycladacée indéterminée (no. 1) Mamet and Roux, 1975a; *Diplopora tulayae* Chanton-Güvenç 1972; *Eovelebitella* sp. sensu Lys et al. (1978); *Eovelebitella* sp. sensu Cózar, 2004 (pl. 1, fig. 1) and Cózar and Somerville, 2005a (fig. 14. 8); "*Velebitella*" *pareyni* Mamet and Roux 1975a; *"Velebitella*" sp. sensu Cózar and Somerville, 2005a (fig. 14. 9); and ?*Queenslandella jenkinsi* Mamet and Roux, 1983 (pars?).

Comparison. Among the Carboniferous-Permian metaspondyl dasycladales, *Windsoporella* corresponds to forms where the surface of whorls is occupied up to one third by the pores, i. e., less than *Eovelebitella* and more than *Velebitella* (Cózar et al., in press-a). *Albertaporella* sensu Mamet (1991, p. 374; non Johnson, 1966) is synonym of *Windsoporella*, but for me (as for Shuysky, 1987a) it corresponds more to a representative of the Triploporellaceae, with three orders of ramifications of the laterals. *Windsoporella* is probably the ancestor of *Eovelebitella* (see also Cózar et al., in press-a). "*Windsoporella*", "*Velebitella*" and *Eovelebitella* sensu Cózar and Somerville (2004, text-fig. 12; 2005b, text-fig. 3) can be identified with *Anatolipora* emended here. *Queenslandella* is questionable, perhaps partially synonym of *Windsoporella*, partially a distinct taxon (identified as "*Windsoporella* n. sp." by Fontaine and Vachard, 1981, p. 15, pl. 1, fig. 3 in Central Sumatra; Fontaine et al., 1982, p. 48, in northeast Thailand). Pores limited to 1/3 of the height of the article, occupying the central part, with a ratio Hv = 0.50-0.75 (difference with *Eovelebitella* and *Velebitella*, see Vachard, 1980, and synonymy with *Pseudovelebitella*).

Occurrence. Middle Viséan (foraminiferal biozone MFZ11= Cf4δ = V2a) of Afghanistan, Turkey and Sumatra; late Viséan of Southern France, Spain, Morocco, England, Ireland, Poland, Russia, Turkey, Algeria, Iran, Sumatra, Thailand and Australia; latest Viséan -early Serpukhovian of Canada (Nova Scotia, SW Alberta), Iran (Alborz), and Spain.

Windsoporella solida n. sp.
Pl. 10, figs. 1-8.

?1972 *Anatolipora* aff. *A. carbonica* Konishi - Petryk and Mamet, p. 776-777, pl. 3, fig. 7.
1975a Dasycladacée indéterminée (no. 2) - Mamet and Roux, pl. 13, figs. 4-7.
p. 1978 *Eovelebitella* sp. - Lys et al., pl. 2, fig. 1-5 (non pl. 1, fig. 9 = another genus).
?1978 *Anatolipora* aff. *carbonica* Konishi - Mamet et al., p. 363-364, pl. 5, fig. 15.
1985 *Japhetella boehmi* Mamet and Roux - Herbig and Mamet, pl. 1, fig. 1.
v. p. 1992 *Windsoporella tulayae* (Chanton-Güvenç) - Vachard and Berkhli, pl. 4, fig. 10 (non pl. 2, figs 6-10 = *A. longirostris*).
?1996 *Pseudovelebitella pareyni* (Mamet and Roux) - Sebbar and Mamet, pl. 2, fig. 1.
2000 *Pseudovelebitella pareyni* (Mamet and Roux) - Sebbar, pl. 3, fig. 9.
?2004 *Eovelebitella* sp. - Cózar and Somerville, fig. 14. 32.
? 2004 *Windsoporella*? sp. - Cózar and Rodríguez, fig. 9.9.
? 2004 *Pseudovelebitella pareyni* (Mamet and Roux) - Cózar and Rodríguez, fig. 9. 10.
? 2005a "*Windsoporella*" sp. - Cózar and Somerville, fig. 14. 3.
? 2005a "*Velebitella*" sp. - Cózar and Somerville, fig. 14. 9.
2005b "*Velebitella*" *pareyni* Mamet and Roux - Cózar and Somerville, pl. 1. 5.
?2005b *Anatolipora* sp. - Cózar and Somerville, pl.1. 8 (or another species of *Windsoporella*).
?2005b "*Windsoporella*" sp. - Cózar and Somerville, pl.1. 12 (or another species of *Windsoporella*).

2005d "*Windsoporella*" sp. - Cózar and Somerville, fig. 4. 6.

Etymology. Latin solidus, solid.

Locus typicus. Japhet (Cabrières, Hérault).

Stratum typicum. Earliest Brigantian.

Diagnosis. A species of *Windsoporella characterized* by trapezoidal articles poorly individualized, an elongate pyramidal central cavity and thicker wall.

Description. L = 0.400-1.500 mm, D = 0.220-0.530 mm, d = 0.120-0.300 mm, skeleton thickness = 0.050-0.160 mm, lateral diameter ("pore") = 0.010-0.050 mm, height of segments = 0.300 mm.

Holotype. Sample DV856C; Pl. 10, fig. 7.

Type material. 55 specimens.

Repository of the types. Collection of Palaeontology of Lille.

Comparison. *Windsoporella solida* differs from *W. radiata*, *W. adamuzensis* (in press) and *W. clogerensis* (in press) in trapezoidal articles (not spherical), from *W. tulayae* in an elongate pyramidal central cavity no cylindrical and thicker wall, from *W. pareyni* in thicker wall and articles less individualized and from *W. rara* (submitted) in the absence of truncated central cavity.

Occurrence. Brigantian-early Serpukhovian (Assemblages SF2-6): Castelsec (MA10-?, MA10.1, MA.10.2.2, MA.10.3, MA.10.3.2, MA10.6.2, MA10.8.2, MA10.9, MA10.12, MA10.14, MA10.15, MA10.17, MA.10.50, MA10.71, MA10.I, MA10.I.2, MA.11.9.1.Quer, MA.11.6); Roquemaillère (DV137A, DV137C, DV137G, DV137I, ML.UM. ROQ); Roc du Cayla (MA.12.2); Japhet (DV126D, ?DV126C, ?DV164A, ?DV164B, DV164C, DV856 (oolitized), DV856.2, DV856.3, DV856A.2, DV856C, DV856C.2, DV857, DV857.2, DV857.3); Vailhan-Château (DV246H); Les Mentaresses (DV328'A, DV328'C, DV328'D, SF5); Les Pascales (DV601A); Roc de Murviel (MA33.0, MA 59, MA60, MA330.1, MA330.5, MA330.8, MA330.10, DV251B); Serre de Péret (MA.SP6, MA.SP.9); and La Serre (MA.LS.Feldweg13).

Windsoporella tulayae (Chanton-Güvenç, 1972) emend.
Pl. 10, figs. 9-13.

p. 1972 *Diplopora tulayae* n. sp. Chanton-Güvenç, p. 16-20, figs. 1-3 (non fig. 4 = *A. longirostris*).
v. 1977a *Windsoporella*? *tulayae* (Chanton-Güvenç) - Vachard, p. 374, tabl. 1 (no illustration).
v. non 1991 *Windsoporella tulayae* (Chanton-Güvenç) - Vachard and Tahiri, p. 23, pl. 2, figs. 9-10 = *A. longirostris*).
v. non 1991 *Windsoporella tulayae* (Chanton-Güvenç) - Ouarache et al., p. 50, 51, pl. 2, figs. 4, 8.
v. non 1992 *Windsoporella tulayae* (Chanton-Güvenç) - Vachard and Berkhli, pl. 2, figs 6-10, pl. 4, fig. 10?
v. non 1999 *Windsoporella tulayae* (Chanton-Güvenç) - Berkhli, p. 111, pl. 3, fig. 6 (= *W. longirostris*).
v. non 2000 *Windsoporella tulayae* (Chanton-Güvenç) - Berkhli et al., pl. 1, fig. 16. (= *W. longirostris*).
v. non 2001 *Windsoporella* cf. *tulayae* (Chanton-Güvenç) - Berkhli and Vachard, p. 43, fig. 6. 7 (= *W. longirostris*).
? 2006 *Windsoporella* cf. *tulayae* (Chanton-Güvenç) - Sanz López et al., fig. 7. 11.

Description. As defined by its holotype (the large longitudinal section showing by the illustration of Chanton-Güvenç, 1972), this species is defined by a large central cavity and thin wall. L = 0.750-2.685 mm, D = 0.250-0.420 mm, d = 0.090-0.280 mm, skeleton thickness = 0.045-0.095 mm, lateral diameter ("pore") = 0.017-0.037 (0.060-0.074) mm.

Occurrence. Castelsec (MA10-I); Japhet (DV856.2, DV857); Serre de Péret (MA.SP.9); La Serre (MA.LS.Feldweg13).

Windsoporella longirostris n. sp.
Pl. 10, figs. 14-16.

p. 1972 *Diplopora tulayae* n. sp. Chanton-Güvenç, fig. 4 (non p. 16-20, figs. 1-3, 5-6 = *A. carbonica*).
v. 1991 *Windsoporella tulayae* (Chanton-Güvenç) - Vachard and Tahiri, p. 23, pl. 2, figs. 9-10.
v. 1991 *Windsoporella tulayae* (Chanton-Güvenç) - Ouarache et al., p. 50, 51, pl. 2, figs. 4, 8.
v. 1992 *Windsoporella tulayae* (Chanton-Güvenç) - Vachard and Berkhli, pl. 2, figs 6-10, pl. 4, fig. 10?
v. 1999 *Windsoporella tulayae* (Chanton-Güvenç) - Berkhli, p. 111, pl. 3, fig. 6.
v. 2000 *Windsoporella tulayae* (Chanton-Güvenç) - Berkhli et al., pl. 1, fig. 16.
v. 2001 *Windsoporella* cf. *tulayae* (Chanton-Güvenç) - Berkhli and Vachard, p. 43, fig. 6. 7.
v. 2005 *Windsoporella* sp. - Saïd, p. 181, fig. X. 1. 10.

Etymology. Latine longus and rostris, because of the prominent and acute periphery of the articles.

Locus typicus. Road D 13, near Roquessels (Hérault, France) (see location in Vachard, 1977b, text-fig. 12).

Stratum typicum. Latest Asbian (assemblage SF1).

Holotype. Sample DV.FB3 (photo 7/166); Pl. 10, fig. 16.

Diagnosis. A *Windsoporella* with proeminent segments and laterals relatively wide.

Description. Length (= Height of an article in this specimen) = 0.370-0.420mm, D = 0.250-0.375 mm, d = 0.150-0.200 mm, lateral diameter ("pore") = 0.020-0.030 mm, height of segments = 0.300 mm.

Type material. Circa twenty specimens in the Montagne Noire. Numerous specimens in Morocco.

Repository of the types. Collection of Palaeontology of Lille University.

Comparison. The new species differs from *W. solida* n. sp. in the protruding whorls.

Occurrence. Early Asbian-early Brigantian of central Morocco. Latest Asbian (assemblage SF1; common), rare at the Asbian/Brigantian boundary (assemblage SF2), rather common in early Serpukhovian (assemblage SF6): Lenses of the road, near Roquessels (DV293F, DV332C?, DV332F?, DV.FB3, DV.FB18); Castelsec (MA.10.9); and La Serre (MA.LS.Feldweg.13).

Windsoporella rara n. sp.
Pl. 10, figs. 17-18.

p. 1975a *"Velebitella" pareyni* n. sp. Mamet and Roux, p. 263, pl. 12, fig. 1 (only).
2005d "Velebitella" pareyni Mamet and Roux - Cózar and Somerville, fig. 4. 11.

Etymology. Latin rarus, rare because less frequent in Montagne Noire than the other species of *Windsoporella*.

Locus typicus. Japhet (Cabrières, Hérault).

Stratum typicum. Assemblage SF3 (earliest Brigantian).

Diagnosis. A *Windsoporella* with a truncated central cavity .

Description. Length = 0.640-1.100 mm, D = 0.300-0.340 mm, d = 0.150-0.180 mm, lateral diameter ("pore") = 0.010-0.020 mm, height of segments = 0.200-0.250 mm

Holotype. Sample DV856(2); Pl. 10, fig. 17.

Type material. 4 specimens.

Repository of the types. Collection of Palaeontology of Lille University.

Comparison. *Windsoporella rara* differs from *W. pareyni* in the truncated central cavity.

Occurrence. Early Brigantian of Algeria (Igli). Early Brigantian of SE Ireland. Earliest Brigantian of Montagne Noire (SF3): Japhet (DV856(2), DV856C.2).

Genus *Eovelebitella* Vachard, 1974a

Type species. *Eovelebitella occitanica* Vachard, 1974a.

Synonym. *Japhetella* Mamet and Roux, 1983.

Diagnosis. Thallus large, articulated and vestibuled. Central cavity cylindrical corresponding more or less to 1/3 of the total diameter. Grooves well developed, from the periphery to the central cavity. Articles rectangular to corona-shaped, generally rectilinear at the external periphery. Laterals phloiphore, metaspondyl, with one tuft per article. Pores covering all the height of the article. Small vestibules.

Composition. *Eovelebitella occitanica occitanica*, *E. o. marbellensis* Cózar et al. (in press-a) (= *E. occitanica* sensu Mamet and Herbig, 1990, pl. 3-4), *E. betica* Cózar et al. (in press-a) (= *E.* aff. *occitanica* sensu Buchroithner et al., 1980).

Excluded taxa. *Eovelebitella robertsi* Mamet and Roux, 1983 [and "*Eovelebitella* (Vachard, 1974) Mamet and Roux, 1983" sensu Roux, 1985; Mamet, 1991; Deloffre, 1988; Granier and Deloffre, 1995 = *Austreovelebitella* Cózar et al., in press]; *Eovelebitella* sp. sensu Lys et al. (1978); *Eovelebitella* sp. sensu Cózar, 2004 (pl. 1, fig. 1) and Cózar and Somerville, 2005a (fig. 14. 8).

Remarks. *Windsoporella* is probably the ancestor of *Eovelebitella* (see also Cózar et al., in press). *Eovelebitella* is not present in Ireland, England or Southwestern Spain (*Eovelebitella* sp.: Cózar and Somerville, 2004, fig. 4. 32; Cózar, 2004, p. 370, pl. 1, fig. 1; Cózar and Somerville, 2005a, fig. 14. 8; Cózar and Somerville, 2005b, p. 75, are truly *Windsoporella*; for example, *Eovelebitella* n. sp. sensu Cózar and Somerville (2005b, pl. 1. 6) or *Eovelebitella* sp. (sensu Cózar and Somerville (2005d, fig. 4. 5) will be described as *Windsoporella clogrenensis* n. sp. by Cózar et al. (submitted: pl. 1, figs. 1-9, text-fig. 7A). The *Eovelebitella* mentioned in Algeria by Sebbar and Mamet (1996: text-fig. 5.13), in the latest Viséan-earliest Serpukhovian, were never illustrated, they might correspond to another genus. The "*Eovelebitella*?" of Saïd (2005, p. 181) is a metaspondyl form which belongs to a different taxon (Vachard, pers. comm., 2005).

Palaeoecology. Very abundant in the lagoons protected by the microbialitic build-ups, *Eovelebitella* is also present in the slopes (Roque Redonde section); reelaborated (i.e. penecontemporary reworked) specimens are present up to the toe of these buildups (sample RR1, RR6).

Occurrence. Assemblages SF2-6 of Montagne Noire (boundary Asbian/Brigantian to early Serpukhovian). Limited to a narrow Subprovince of the Northwestern Palaeotethys including Montagne Noire, Eastern Spanish Pyrenees, central French Pyrenees, and Betic Cordillera (Sanz Lopez et al., 2005).

Eovelebitella occitanica Vachard, 1974a
Pl. 11, figs. 1-31.

v. 1974a *Eovelebitella occitanica* n. sp. Vachard, p. 1857, fig. 2 a-c.
v. 1974b *Eovelebitella occitanica* n. sp. - Vachard, p. 179-180, pl. 6, figs 1-2, pl. 8, figs. 4, 6-11.
? 1975a *Anatolipora* sp. - Mamet and Roux, p. 262, pl. 11, fig. 6 (a tangential section?).
1975a *Eovelebitella occitanica* Vachard - Mamet and Roux, p. 262, text-fig. 5, pl. 12, figs. 21-27.
1976 *Eovelebitella occitanica* Vachard - Emberger, p. 36 (no illustration) (with 3 references in synonymy).
v. 1977a *Eovelebitella occitanica* Vachard - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977b *Eovelebitella occitanica* Vachard - Vachard, p. 135, pl. 1, figs. 12-18 (with 3 references in synonymy).
1988 *Eovelebitella* (Vachard) Mamet and Roux (sic) - Deloffre, pl. 6, fig. 3.
1988 *Japhetella* Mamet and Roux - Deloffre, pl. 5, fig. 14 (an illustration of Vachard, 1974a attributed to Mamet and Roux, 1983).
1990 *Eovelebitella occitanica* Vachard - Mamet and Herbig, p. 203-204, 207, pl. 3, figs. 1-10, pl. 4, figs. 1-10.
non 1991 *Eovelebitella occitanica* Vachard - Mamet, pl. 1c (erroneous reconstruction).
1991 *Japhetella boehmi* Mamet and Roux - Mamet, pl. 1d (the reconstruction of *Eovelebitella occitanica*).
1991 *Eovelebitella occitanica* Vachard - Mamet, pl. 2m.
v 2004 *Eovelebitella occitanica* Vachard - Vachard and Aretz, p. 653-654 , fig. 7. 6, fig. 8. 7 (with synonymy).
2004 *Eovelebitella occitanica* Vachard - Flügel, pl. 59, fig. 1.
v. 2005 *Eovelebitella* aff. *occitanica* Vachard - Sanz-López et al., pl. 2, figs. 12, 15, 17.
v. 2006a *Eovelebitella occitanica* Vachard - Vachard et al., p. 120-121 (no illustration).

Description. Length of thalli (L) = 0.440-7.000 mm, outer diameter (D) = 0.780-1.600 mm, inner diameter (d=st) = 0.240-0.470 mm, wall thickness (e) = 0.205-0.515 mm, height of articles (H=h) = 0.440-1.000 mm, number of tufts per verticil (w) = 16-20, number of laterals per tuft (b) = circa 20, proximal diameter of pores (pi) = 0.022-0.030 mm, distal diameter of laterals (pe) = 0.030-0.050 mm, diameter of vestibule = circa 0.060 mm, inclination of the laterals (α) = 45°-90°.

Remarks. More of one thousand of specimens were observed (the photographied specimens are indicated below), an accurate biometric study was possible. The richest outcrops are Castelsec, Roquemaillère and Japhet. The holotype is located in the Vailhan area.

Occurrence. Brigantian-early Serpukhovian (assemblages SF2 to 6) in the Montagne Noire, with an acme in the Asbian/Brigantian boundary (SF2): Castelsec (MA10-?: 46 specimens, MA10.1: 4 specimens, MA10.2: 40 specimens, MA10.2.3: 1 specimen, MA10.2.II.2: 1 specimen, MA10.3: 1 specimen, MA10.6.2: 12 specimens, MA10.7.1: 7 specimens MA10.7.2:1 specimen, MA10.12: 2 specimens, MA10.14: 4 specimens, MA10.15: 8 specimens, MA10.17: 8 specimens, MA10.I: 5 specimens, MA10.I.2: 15 specimens, MA10.I.2.2: 1 specimen, MA10.II.122: 1 specimen, MA10.IV.100: 3 specimens, MA11.1: 2 specimens, MA11.9.3: 1 specimen, MA11.11.B: 1 specimen, MA11.VIII.3: 1 specimen); Roquemaillère (DV133E: 1 specimen, DV134G: 2 specimens, DV134'E: 1 specimen; DV137A: 7 specimens, DV137B: 5 specimens, DV137C: 4 specimens, DV137D: 3 specimens, DV137E: 12 specimens, DV137F: 7 specimens, DV137G: 1 specimen, DV137I: 5 specimens, DV138A: 1 specimen); Roc du Cayla (MA12.23: 1 specimen, MA12.25: 1 specimen, DV466B: 1 specimen); Japhet (DV164A: 2 specimens, DV856.2: 9 specimens, DV857: 3 specimens, DV857.3: 2 specimens); Roque Redonde (RR1: 1 specimen; RR6: 1 specimen); Vailhan-Château (DV246C: 2 specimens, DV246D: 2 specimens, DV246E: holotype, DV246F: 1 specimen, DV246H: 2 specimens);Vailhan-Roque de Loup (DV315: 1 specimen); Les Pascales (MA.PA7: 1 specimen, DV601A: 7 specimens, DV601B: 2 specimens, DV601C: 4 specimens, DV601E: 1 specimen, DV601F: 1 specimen, DV609.3: 1 specimen); Saint-Rome (DV132D: 1 specimen); Mounio (DV431B: 1 specimen), Roc de Murviel (MA10: 3 specimens, MA33.59: 1 specimen, MA.33.85: 1 specimen, MA33.102: 4 specimens, MA33.C.2: 1 specimen, MA330.1: 1 specimen, MA330.3: 1 specimen, MA330.5:

3 specimens, MA330.9: 2 specimens, MA330.11: 9 specimens); La Serre (MA.LSV.2008: 1 specimen).

Subtribe Cabrieroporinae n. subtrib.

Synonyms. Velebitelleae (pars)

Diagnosis. Thallus rather small, cylindrical, segmented. Laterals are rectilinear and strongly phloiphore. They arise proximally from a short vestibule, and distally cover the complete superficie of the article.

Composition. *Cabrieropora,* Mamet and Roux, 1975a; *Guadiatella* Cózar, Somerville, Rodriguez and Medina-Varea, in press-b; *Paracabrieropora* Cózar et al. nomen nudum.

Comparison. Cabrieroporinae differs of the other subtribes of Velebitelleae in the strongly phloiphores, sometimes nearly quadrate phloiphore laterals.

Occurrence. ?Latest Asbian of Spain. Early Brigantian to Brigantian/Serpukhovian boundary , Western Palaeotethys, ? British Columbia (Canada).

Genus *Guadiatella* Cózar, Somerville, Rodriguez and Medina-Varea, in press-b

Type species. *Guadiatella delicata* Cózar, Somerville, Rodriguez and Medina-Varea, in press-b.

Synonym. ?*Cabrieropora* (pars).

Diagnosis. Thallus rather small, cylindrical, segmented. The central cavity is cylindrical and relatively broad. Articles annular; i.e., rectangular in longitudinal section with lower and upper plane superficies. Their outer surface is markedly convex. The grooves between the articles are deep, reach the central cavity, and are as broad as a lateral. Each article contains a tuft of metaspondyl laterals. These laterals are rectilinear and strongly phloiphore. They arise proximally from a short vestibule, and distally cover the complete superficie of the article.

Composition. *G. delicata*, *G. heraldica* n. sp., ?*Cabrieropora opalae* Mamet, 2006.

Remarks. *Guadiatella* is transitional between *Windsoporella* and *Cabrieropora*. It differs from the former in the organization of the tufts (less inclination of laterals, all attaining the outer surface with a small angle (consequently the petaliform aspect disappears) and the more distally enlarged phloiphore laterals, and differs from the latter in the less enlarged (they are almost trapezoidal in *Cabrieropora*) and less numerous laterals in the tufts.

Occurrence. Latest Asbian? of Southwestern Spain. Brigantian-early Serpukhovian of Montagne Noire. ? Questionable in Opal Member of British Columbia (Canada).

Guadiatella heraldica n. sp.
Pl. 12, figs. 1-4.

1975a Dasycladacée indéterminée (no. 2) - Mamet and Roux, pl.13, figs. 1-3.

Etymology. From the département de l'Hérault (France).

Locus typicus. La Serre-vineyard (near Cabrières, Hérault).

Stratum typicum. Brigantian/Serpukhovian boundary beds (SF 6).

Diagnosis. *Guadiatella* with broad laterals and segments poorly individualized.

Description. This metaspondyl dasycladale measures: Length = 3.950 mm, D = 0.450-0.500 mm; d = 0.105 mm; wall thickness = 0.040-0.060 mm; height of segments = 0.170-0.200 mm; pores = 0.023-0.066 mm; interpores = 0.016-0.020 mm, number of segments: 2-15.

Holotype. Sample; Pl. 12, fig. 1.

Type material. 5 specimens.

Comparison. It differs from *G. delicata* in the broader laterals, and the segments less individualized, and from *G.*? *opalae* in the irregularity of the segments.

Occurrence. Earliest Brigantian of Japhet (SF3). Latest Brigantian-early Serpukhovian of Montagne Noire (assemblages SF 6-7). Murviel, MA.330.9; La Serre (MA.LS. Feldweg.13)

Genus *Cabrieropora* Mamet and Roux, 1975a

Type species. *Cabrieropora pokornyi* Mamet and Roux, 1975a.

Diagnosis. Thallus small, articulated. Central cavity cylindrical proportionally wide. Grooves poorly developed. Articles rectangular to subspherical, generally incurved at the external periphery. Laterals very phloiphore, metaspondyl, vestibuled, with one tuft by article. Pores very wide and calcification very thin.

Composition. Monospecific.

Occurrence. Assemblages SF3-7 (Brigantian-early Serpukhovian) of Montagne Noire. The geographical distribution is very poorly known (and apparently reduced to Southern France, Southwestern Spain, central Morocco, Northern England and southeast Ireland, see Vachard and Aretz, 2004; Cózar, 2005a; Cózar and Somerville, 2005d). The specimens of Northern Spain (Vachard and Beckary, 1991, pl. 1, figs. 8-9) are misinterpreted and correspond more to an alga relatively similar to *Anatolipora* emend herein).

Cabrieropora pokornyi Mamet and Roux, 1975a
Pl. 9, figs. 8, 12, Pl. 12, figs. 5-17.

v. p. 1974b *Anatolipora carbonica* Konishi - Vachard, p. 176-177, pl. 5, fig. 6 only (non pl. 7, fig. 7 = *Secundoporella konishii*).
1975a *Cabrieropora pokornyi* n. sp. Mamet and Roux, p. 262, text-fig. 5, l. 12, figs. 15-20.
1976 *Cabrieropra pokornyi* Mamet and Roux - Emberger, p. 24 (no illustration).
v. 1977a *Cabrieropora pokornyi* Mamet and Roux - Vachard, p. 374, tabl. 1 (no illustration).
1988 *Cabrieropora pokornyi* Mamet and Roux - Deloffre, pl. 6, fig. 5.
non v. 1991 *Cabrieropora* ex gr. *pokornyi* Mamet and Roux - Vachard and Beckary, pl. 1, figs. 8-9.
v. 2004 *Cabrieropora pokornyi* Mamet and Roux - Vachard and Aretz, p. 653, fig. 7. 6, fig. 8. 4 (with synonymy).
? 2004 *Cabrieropora pokornyi* Mamet and Roux - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 6 p. 47, text-fig. 8 p. 48 (no illustration).
? 2004 *Cabrieropora pokornyi* Mamet and Roux - Cózar, p. 370, text-fig. 3 p. 371, text-fig. 4 p. 372 (no illustration).
? 2005a *Cabrieropora pokornyi* Mamet and Roux - Cózar and Somerville, text-fig. 5 p. 7 (no illustration).
? 2005b *Cabrieropora pokornyi* Mamet and Roux - Cózar and Somerville, pl. 1. 16 (very questionable; moreover, the reconstruction of the genus fig. 4H in text p. 77 is incorrect, because of the absence of vestibules at the base of the tufts).
2005a *Cabrieropora pokornyi* Mamet and Roux - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 7. 14.
2005d *Cabrieropora pokornyi* Mamet and Roux - Cózar and Somerville, fig. 4. 7.

Description. The smallest metaspondyl dasycladale measures: Length = 0.500-0.600 mm, D = 0.130-0.165 (0.215)(0.220-0.400) mm; d = 0.055-0.090 (0.100-0.180) mm; wall thickness = 0.040-0.060 mm; height of segments = 0.100-0.130 mm; pores = 0.020-0.030 (0.040-0.060)mm; interpores = 0.005-0.010 mm.

Occurrence. As for the genus. Brigantian-early Serpukhovian of Montagne Noire (assemblages SF3-6). Japhet (DV126F: 1 doubtful specimen, DV127A: 6 specimens, DV127B: 2 specimens, DV127C: 5 specimens, DV 127D: 1 specimen, DV127E: 3 specimens and 2 doubtful, DV856: 6 specimens, DV856A: 1 specimen, DV856.2: 4 specimens and 2 doubtful, DV857.2: 1 specimen, DV857.3: 1 specimen); Tiberet (ML.FSL.TIB); Vailhan-Château (DV246H: 1 specimen); Les Batailles (DV608: 3 specimens, DV609: 2 specimens, DV609.4: 1 specimen, DV611B: 1 specimen); La Serre (MA.LS.I.top.2049: 1 doubtful specimen, MA.LS. Feldweg.10: 1 complete specimen, MA.LS. Feldwed.17: 2 specimens; GIK1824: Vachard and Aretz, 2004: 1 specimen).

Subtribe Kulikiinae n. subtrib.

Diagnosis. A subtribe of Velebitelleae characterized by metaspondyl, articulated, vestibules, with cladophore laterals.

Comparison. Differs from the Velebitellinae in the acrophore laterals of the whorls.

Composition. ?*Sphinctoporella* Mamet and Rudloff, 1972, *Kulikia* Golubtsov, 1961, *Frosterleyella* Elliott, 1988. Furthermore, the "Diploporeae gen. indet., Form A" of Shuysky (1986, pl. 1, fig. 5) can correspond to another genus, with articles separated by a long fewly calcified central cavity. *Eovelebitella* sp. sensu Lys et al. pars (1978, pl. 1, fig. 9, non pl. 2, figs. 1-5 = *Windsoporella*) with relatively inflated laterals can also belong to this subtribe; as well as *Diplopora anatoliana* Güvenç, 1969, from the Late Permian of Turkey. *Sphinctoporella* might be distinct of *Kukikia*, by the parallelism between the shape of the central cavity and of the outer surface; i.e., a moniliform trend. Nevertheless, that is difficult to believe. *Kulikia* exhibit a cylindrical central cavity, few individualized, more or less spherical articles. *Frostereyella* is entirely segmented, the Diploporeae of Skompski (1986) are identical or similar due to the shape more elongate of the articles and a longer distance between them. Another important criterion is the number of tufts per article in axial section, but no precise data about it are available.

Occurrence. ?Mid-Viséan of Alaska and the Yukon Territory. Late Viséan-early Serpukhovian. Palaeotethyan and North American. ?Late Permian of Turkey.

Genus *Kulikia* Golubtsov, 1961

Type species. *Kulikia sphaerica* Golubtsov, 1961 (= *Sphinctoporella* (?) *rozovskaiae* Mamet and Roux, 1975a).

Synonyms. ? *Sphinctoporella* Mamet and Rudloff, 1972, *Sphinctoporella* (?) sensu Mamet and Roux, 1975a), *Coelosporella* (pars: sensu Conil and Lys, 1966), *Pekiskopora* Mamet, 1974c (pars: sensu Jansa et al., 1978).

Diagnosis. Thallus segmented metaspondyl. Tufts with a basal vestibule and numerous distal cladophore laterals.

Remarks. The calcification is generally weak and is responsible of many mistakes in the interpretation. Because they are very numerous, the laterals of the tufts can appear externally aspondyl (Mamet et al., 1980, fig. 2; Skompski, 1984, fig. 3A). Only the reconstruction of Skompski (1984, fig. 1 A-B) is relatively exact.

Occurrence. Asbian-early Serpukhovian (Cózar and Somerville, 2005b, text-fig. 6 p. 84). V3bγ-V3c inférieur of Belgium. Possible FAD in the late Asbian and acme in the latest Asbian-early Brigantian (see Cózar and Somerville, 2004, text-figs. 12, 15; Cózar and Somerville, 2005b, p. 75, text-fig. 3 p. 76). Still relatively frequent in the early Serpukhovian of the Great Limestone of Northern England (Vachard, pers. comm., 2005). Northwestern Palaeotethyan. Belarus, Donbass, Moscow Basin, Poland, Belgium, Spain, Northern England, Ireland, Algeria, Libya, Alaska and Canada (Yukon, New Scotland, Newfoundland: under the name *Pekiskopora*).

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Kulikia sphaerica Golubsov, 1961
Pl. 13, figs. 1-12.

1961 *Kulikia sphaerica* n. sp. Golubtsov, p. 349-351, pl. 1, figs. 1-18.
1966 *Coelosporella wetheredii* Wood - Conil and Lys, pl. 1, fig. 2.
1970 *Coelosporella* sp. nov. - Hallett, pl. 2, figs. 3-4.
?1972 *Sphinctoporella lisburnensis* n. sp. Mamet and Rudloff, p. 84, pl. 4, figs. 1-6.
1972 *Sphinctoporella* sp.- Mamet and Rudloff, p. 84, pl. 4, fig. 7.
1975a *Sphinctoporella*? *rozovskaiae* n. sp. Mamet and Roux, p. 260, pl. 11, figs. 7-13.
1975a *Sphinctoporella*? aff. *S.*? *rozovskaiae* n. sp. - Mamet and Roux, p. 260, pl. 11, figs. 14-16.
1976 *Sphinctoporella*? *rozovskaiae* Mamet, Roux - Emberger, p. 74 (no illustration) (with 3 references in synonymy).
1977 *Sphinctoporella lisburnensis* Mamet and Rudloff - Armstrong and Mamet, p. 104, pl. 36, figs. 6-9.
1977 *Kulikia* sp. - Vdovenko, pl. 5.64, fig. 7.
1978 *Pekiskopora* sp. - Jansa et al., p. 1432, pl. 2, figs. 8-11.
1979 *Kulikia sphaerica* Golubtsov (= *Sphinctoporella? rozovskaiae* Mamet and Roux) - Massa and Vachard, pl. 3, fig. 1.
p. 1980 *Kulikia sphaerica* Golubtsov - Mamet, Dejonghe and Roux, p. 292-294, pl. 1, figs. 1-2 (partly erroneous synonymy).
p. 1984 *Kulikia sphaerica* Golubtsov - Skompski, p. 429-430, figs. 2.A-D, G, H, 3.C-F, 4A (with synonymy).
1984 *Kulikia rozovskaiae* (Mamet and Roux) - Skompski, p. 430-433, figs. 2.E-F, 3.A-B, 4.B (with synonymy).
1986 *Kulikia sphaerica* (Golubtsov) Skompski - Skompski, p. 261 (no illustration) (with synonymy).
1986 *Kulikia rozovskaiae* (Mamet and Roux) Skompski - Skompski, p. 261 (no illustration) (with synonymy).
1987 *Kulikia sphaerica* Golubtsov - Chuvashov et al., pl. 13, fig. 5.
non 1988 *Kulikia sphaerica* Golubtsov - Deloffre, pl. 4, fig. 14 (erroneous reconstruction).
1988 *Sphinctoporella* - Deloffre, pl. 4, fig. 13 (after Mamet and Rudloff, 1972).
1989 *Kulikia sphaerica* Golubtsov - Skompski et al., pl. 1, fig. 5, pl. 2, fig. 2.
1993 *Sphinctoporella* sp. - Vdovenko and Zhulitova in Makhlina et al., pl. 24, fig. 14.
1996 *Kulikia sphaerica* Golubtsov - Sebbar and Mamet, text-fig. 5. 27, pl. 2, fig. 20.
1996 *Sphinctoporella*? *rozovskaiae* Mamet et Roux - Sebbar and Mamet, text-fig. 5. 41.
1996 *Kulikia sphaerica* (Golubtsov) (sic) - Skompski, pl. 22, fig. 2.
non 1997 *Kulikia* sp. - Gallagher and Somerville, text-fig. 4 p. 318, fig. 9W (= *Anatolipora* emend. herein).
1999 *Kulikia sphaerica* Golubtsov - Sebbar and Mamet, text-fig. 3. 46 (no illustration).
1999 *Sphinctoporella*? *rozovshayae* (sic) Mamet et Roux - Sebbar and Mamet, text-fig. 3. 82 (no illustration).
2000 *Kulikia sphaerica* Golubtsov - Sebbar, pl. 4, fig. 15.
2004 *Kulikia rozovskaiae* (Mamet and Roux) - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 6 p. 47, text-fig. 8 p. 48, text-fig. 9 p. 49, fig. 13. 5.
? 2004 *Kulikia sphaerica* Golubsov (sic) - Cózar, p. 370, text-fig. 4 p. 372 (no illustration).
2005a *Kulikia rozovskaiae* (Mamet and Roux) - Cózar and Somerville, fig. 14. 5.
2005b *Kulikia rozovskaiae* (Mamet and Roux) - Cózar and Somerville, pl.1. 2, 9.
2005a *Kulikia sphaerica* Golubtsov - Cózar, text-fig. 4 p. 409, fig. 7. 17.

Description. Outer diameter = 0.500-1.270 mm; inner diameter = 0.300-0.660 mm; thickness of skeleton = 0.100-0.300 mm lateral diameter = 0.075-0.150 mm, interpore = 0.020-0.040 mm.

Remarks. The synonymy between *Kulikia sphaerica* and *Sphinctoporella*? *rozovskaiae* is evident on the illustrations of Chuvashov et al. (1987) and Skompski et al. (1989). The species is rare in Montagne Noire with 10 specimens.

Occurrence. As for the genus. Discovered in the Brigantian of the Montagne Noire (SF2, 5): Roc du Cayla (MA12.1, DV84B); Les Pascales (MA.PA2: 6 specimens); Les Mentaresses (DV687A); Roc de Murviel (MA34).

Genus *Frostereyella* Elliott, 1988

Type species. *Frostereyella diaspora* Elliott, 1988

Synonyms.?*Sphinctoporella* (?) sensu Mamet and Roux, 1975a), *Kulikia* (auct. pars).

Diagnosis. Thallus segmented metaspondyl. Prominent verticilles separated by a central cavity individually calcified. Tufts with a basal vestibule and numerous distal cladophore laterals.

Occurrence. Brigantian -early Serpukhovian of England, Poland, and Montagne Noire.

Frostereyella diaspora Elliott, 1988
Pl. 13, figs. 13-22.
1988 *Frostereyella diaspora* n. gen. n. sp. Elliott, p. 743-744, text-fig. 1A-D p. 743.

Description. Articles corona-shaped, short vestibule, vesiculifer laterals relatively numerous at each tuft. Length = up to 4.300 mm, outer diameter (D) = 1.100-1.500 mm, inner = diameter = 0.300-0.400 mm; thickness of wall around the inner cavity = 0.010-0.050 mm; height of verticille = 0. 500 mm; maximal diameter of the vesiculifer laterals = 0.073 mm.

Occurrence. Brigantian of Les Mentaresses (SF5) and Roque Redonde (RR50: 1 specimen; RR54: 1 specimen; RR56: 1 specimen; RR62: 2 specimens; RR63: 2 specimens; RR69: 1 specimen; RR77: 1 specimen).

Subtribe Borladellinae n. subtrib.

Diagnosis. A subtribe of Velebitelleae characterized by the individualization of each verticille of metaspondyl tuft, and the arrangment euspondyl, mesospondyl or even aspondyl of these individually calcified tufts, forming very protruding “sub-articles”. Each sub-article contains its own tuft of metaspondyl, vestibuled, phloiphore to pirifer laterals. The complete microsparitization of the sub-articles is common. The central cavity is rarely cylindrical but more or less enlarged conical, or narrow and irregular.

Comparison. Differs from the other Velebitelleae in the individualized calcification of each tuft.

Composition. *Borladella* Cózar et al, in press, *Murvielipora* n. gen., *Cabrieroporellopsis* n. gen., *Murvielipora* n. gen., ?*Sertulella* Shuysky and Shirshova, 1988 (possible homeomorph in the Devonian).

Occurrence. ?Devonian of Urals (or homeomorphy). Latest Asbian? of Southwestern Spain. Brigantian to early Serpukhovian of Montagne Noire. Questionable in the early Bashkirian of Northern Spain.

Genus *Murvielipora* n. gen.

Type species. *Murvielopora aretzii* n. gen. n. sp.

Etymology. The holotype originated from the Roc de Murviel.

Diagnosis. Borladellinae with a slightly conical, enlarged downward central cavity. Irregular shape of protuberances from hemispherical to prismatic. Each protuberance contains a tuft of laterals. No vestibule. The calcification is generally strong and masks the detail of the laterals; consequently, this alga can be confused with a costulate bivalve. Wall whitish, microsparitic.

Composition. *Murvielopora aretzii* n. gen. n. sp.; ?*Velebitella emaciata* Vachard, 1990 sensu Vachard and Beckary, 1991.

Comparison. *Murvielopora* differs from *Borladella* Cózar, Somerville, Rodriguez and Medina-Varea, in press-b by the conical central cavity, the polygonal shape of the verticille envelope, the stronger calcification of this one verticil where the metaspondyl structure is rarely preserved. The tufts are most comparable with those of Devonian dasyclads, *Sertulella* Shuysky and Shirshova, 1988, which differ in the flower-shaped transverse sections of the protuberances. *Velebitella emaciata* Vachard, 1990 sensu Vachard and Beckary, 1991, pl. 1, fig. 10, might correspond to a new species of *Borladella* or another new genus of Borladellinae.

Occurrence. Latest Viséan (Brigantian) to early Serpukhovian of Montagne Noire. Questionable in the early Bashkirian of Northern Spain.

Murvielopora aretzii n. gen. n. sp.
Pl. 14, figs. 1-14.

Etymology. Dedicated to Markus Aretz, which discovered the type material.

Locus typicus. Roc de Murviel (Hérault, France).

Stratum typicum. Assemblage SF6 (latest Brigantian).

Diagnosis. *Murvielopora aretzii* is characterized by numerous hemispherical to prismatic protuberances of the thallus, each contains a metaspondyl whorl. The central cavity is cylindrical to conical.

Description. Slightly downward tapering central cavity giving elongate to hemicircular sections. Inner surface regular, external surface undulating due to regularly spaced, closely arranged, hemispherical to prismatic protuberances. Each protuberance shows a vestibule in the central bottom, which gives rise to a regular tuft of laterals. General dimensions of thallus: D = 1.110-2.260 mm, d = 0.740-1.400 mm, dimensions of protuberances = 0.200-0.520 x 0.280-0.400 mm, distance between protuberances = 0.460 mm, dimensions of vestibule = 0.100 x 0.050 mm, characteristics of the tufts: pores = 0.050-0.100 mm.

Holotype. Sample MA330.3; Pl. 14, fig. 2.

Type material. 28 specimens.

Repository of the types. University of Köln.

Comparison. As for the genus.

Occurrence. Brigantian of Montagne Noire: Roquemaillère (DV134'E; three specimens; DV137A, five specimens; DV137E, five specimens), Roc du Cayla (MA12.14, two specimens), Roque Redonde (RR86, one specimen); Roc de Murviel (MA53, two specimens; MA330.3, six specimens; MA330.9, two specimens) and Les Mentaresses (DV329C, two specimens; SF5: 1 specimen).

Genus *Cabrieroporellopsis* n. gen.

Type species. *Cabrieroporellopsis inopinatus* n. gen. n. sp.

Etymology. From Cabrières, where this genus is well preserved.

Diagnosis. Thallus composed of a cylindrical? central cavity connected by irregularly arranged articles. Each article contains a tuft of metaspondyl phloiphore laterals. These tufts are generally found isolated. Wall whitish microsparitized, laterals filled with micritic cements.

Composition. Monospecific.

Comparison. Differs from *Borladella* Cózar, Somerville, Rodriguez and Medina-Varea, in press-b in the irregular central cavity, the different shape of the laterals and consequently of the verticille envelope. from *Murvielipora* in the shape of the central cavity and verticille envelope. It differs from *Cabrieropora* relatively similar in oblique sections, in the shape of the tufts, whorls and segments, and in the aspects of longitudinal sections.

Occurrence. Latest Viséan (Brigantian) Montagne Noire, easternwestern Spanish Pyrenees (Sanz et al., 2005). Early Serpukhovian of Eastern Morocco (unpublished data).

Cabrieroporellopsis inopinatus n. gen. n. sp.
Pl. 15, figs. 1-20.

v. 2003 *Windsoporella*? *pareyni* (Mamet and Roux) - Berkhli and Vachard, p. 10 (no illustration).
v. 2005 *Windsoporella* (?) sp. - Sanz-Lopez et al., pl. 2, figs. 8, 11.
v. 2005 *Cabrieropora* (?) n. sp. - Sanz-Lopez et al., pl. 2, figs. 13, 16.

Etymology. Latine *inopinatus*, unexpected, because of the puzzling aspect of this new taxon.

Locus typicus. Japhet, near Cabrières (Hérault, France).

Stratum typicum. Assemblage SF3 (earliest Brigantian).

Holotype. Japhet, Sample DV857.3, Photo 9.1/73 (Pl. 15, fig. 2).

Diagnosis. As for the genus.

Description. Length = 2.220-3.160 mm, D segments = 0.320-0.600 mm, pores = 0.050-0.080 (pi)-0.120-0.150 (pe) mm, interpores = 0.005-0.010 mm.

Type material. 20 specimens.

Repository of the types. Collection of Palaeontology of Lille.

Occurrence. As for the genus. Assemblage SF1, 3,6 (latest Asbian-earliest Serpukhovian) of the Montagne Noire: Lenses of the road, near Roquessels (DV.FB23); Japhet (DV856: 2 specimens, DV856: 5 specimens, DV856.2: 5 specimens, DV856B: 2 specimens, DV857: 3 specimens, DV857.3: 3 specimens); La Serre (LStop-2049).

Tribe Albertaporelleae Güvenç, 1979 nomen translat. Deloffre, 1988 for subtribe

Emended diagnosis. Thallus metaspondyl, slightly articulated to cylindrical, with two orders of laterals, the first one euspondyl and the second one metaspondyl.

Comparisons. Differs from the Velebitelleae in the absence of vestibule, and from Diploporeae in the absence of deep segments.

Composition. Two subtribes: Albertaporellinae Güvenç, 1979 and Japhetellopsinae n. subtrib.

Occurrrence. Devonian-Permian, Palaeotethyan and North American.

Subtribe Japhetellopsinae n. subtrib.

Diagnosis. Albertaporelleae with two orders of laterals.

Composition. *Pekiskopora* Mamet, 1974c; *Columbiapora* Mamet, 1974c; *Japhetellopsis* n. gen.; *Herakella* (Kochansky-Devidé, 1970b); *Clavaporella* Kochansky-Devidé and Herak, 1960; *Albertaporella*? sensu Cózar and Somerville, 2005c.

Comparison. Differs from Albertaporellinae Güvenç, 1979 (*Albertaporella* Johnson, 1966; *Ivdelipora* Shuysky and Shirshova in Chuvashov et al., 1987; *Diplopora praehexaster* Poncet, 1967; *Ligeripora* Vachard, 1993) in the absence of the third order of laterals.

Occurrence. Tournaisian-Middle Permian, Palaeotethyan and North American.

Genus *Japhetellopsis* n. gen.

Type species. *Japhetellopsis robustus* n. gen. n. sp.

Etymology. From Japhet, with the ending *opsis*, because *Japhetella*, although invalid (Cózar et al., in press-a), is preoccupied.

Diagnosis. Thallus cylindrical, robust, with laterals of first and second orders.

Composition. *Japhetellopsis robustus* n. gen. n. sp., *Albertaporella? carlowensis* Cózar and Somerville, 2005c; ? cf. *Clavaporella* sp. sensu Cózar, 2005a (fig. 7. 18; or other Japhetellopsinae).

Comparison. Differs from A*lbertaporella* in the absence of the third order, and from *Diplopora* in the absence of articulation and the same length of L1 and L2.

Occurrence. Late early Viséan (Arundian) of SE. Ireland. Latest Viséan (earliest Brigantian)-?Early Serpukhovian of Southwestern Spain.

Japhetellopsis robustus n. gen. n. sp.
Pl. 10, fig. 1, Pl. 16, figs. 1-5.

Etymology. Latine robustus, robust, because of the thick skeleton.

Locus typicus. Japhet, near Cabrières (Hérault, France).

Stratum typicum. Assemblage SF3 (earliest Brigantian).

Diagnosis. As for the genus.

Description. Length = 0.520-0.875 mm, D = 0.320-0.570 mm; d = 0.175-0.330 mm; wall thickness = 0.070-0.150 mm; pores = 0.017-0.035 (0.050) mm.

Holotype. Sample DV126G; Pl. 16, fig. 2.

Type material. 17 specimens.

Repository of the types. Collection of Palaeontology of University of Lille.

Comparison. It differs from *Japhetellopsis carlowensis* (Cózar and Somerville, 2005c) n. comb. in all the parameters.

Occurrence. Brigantian of Montage Noire (SF3, 5): Japhet (DV126D: 2 specimens, DV126E: 3 specimens, DV126F; 2 specimens, DV126G: 2 specimens, DV856: 2 specimens, DV856.2: 3 specimens); Roque Redonde (RR56: 1 specimen); Mounio (DV431E), Roc de Murviel (MA28: 1 specimen).

Family indeterminate
Tribe indeterminate (Aciculelleae, Epimastoporelleae or new tribe?)
Genus *Coelosporella* Wood, 1940

Type species. *Coelosporella wetheredii* Wood, 1940.

Diagnosis. Thallus probably spherical, always broken in quadratic segments, giving elongate longitudinal sections with a row of cavities. These cavities (acrophore laterals or sporanges) are spherical and aspondyl to euspondyl.

Remarks. *Coelosporella* is similar to the Aciculelleae in the spherical cavities within the skeleton, also similar to the Epimastoporelleae in the fragments of probably spherical thallus, but these cavities appear as special laterals, and in this case, the tribe is new (more or less related to the Kulikinae n. subtrib.).

Occurrence. Latest Asbian-late Serpukhovian (acme in the early Brigantian) Palaeotethyan (Great Britain, Ireland, Belgium, France, Spain, Germany, Moravia, Poland, Eastern Morocco, Algeria, Donbass, Southern Urals, Nepal, ?Tarim, Tennessee, Alabama, ? Idaho, ?Colorado and Newfoundland) (see Rich, 1974; Perret and Vachard, 1977; Jansa et al., 1978; Mamet, 1991; Cózar and Somerville, 2005b; and Vachard, unpublished data). Mentioned in Germany by Conil and Paproth (1967, p. 67) but not illustrated, its presence in this country remains doubtful.

Coelosporella jonesii Wood, 1940
Pl. 16, figs. 6-18.

1940 *Coelosporella jonesii* n. gen. n. sp. Wood, p. 16, pl. 2, figs. 3-4.
1968a *Coelosporella jonesii* Wood - Conil and Lys, pl. 1, figs. 1-2.
v. 1974b *Coelosporella jonesii* Wood - Vachard, p. 177-178, pl. 5, fig. 6, pl. 7, fig. 6, pl. 8, fig. 5 (with synonymy).
1975a *Coelosporella jonesii* Wood - Mamet and Roux, p. 259, pl. 10, figs. 2-13 (with synonymy).
1976 *Coelosporella jonesii* Wood - Emberger, p. 20 (no illustration).
v. 1977 *Coelosporella wetheredi* (sic) Wood - Perret and Vachard, p. 103-104, pl. 3, fig. 4 (with synonymy).
v. 1977a *Coelosporella wetheredi* (sic) Wood - Vachard, p. 374, tabl. 1 (no illustration).
1977 *Coelosporella jonesii* Wood - Paproth et al., p. 74 (no illustration).
v. 1977b *Coelosporella jonesii* Wood - Vachard, p. 134, pl. 1, fig. 3.
1978 *Coelosporella jonesii* Wood - Jansa et al., p. 363, pl. 5, figs. 1-8 (with synonymy).
1981 Dasycladaceae - Zukalova, pl. 70, fig. 2.
1982 *Atractyliopsis* ? sp. - Mu Xinan, p. 219, pl. 5, figs. 4-5.
non 1983 *Coelosporella* cf. *jonesii* Wood - Berchenko in Aizenverg et al., pl. 83, fig. 1.
1986 *Coelosporella jonesii* Wood - Skompski, p. 260, pl. 2, figs. 2-5.
1990 *Coelosporella* cf. *jonesii* Wood - Bogush et al., tabl. 1 p. 10, p. 116, pl. 14, fig. 9.
v. 1991 *Coelosporella jonesii* Wood - Ouarache et al., p. 50, pl. 2, fig. 13.
v. 1992 *Coelosporella jonesii* Wood - Vachard and Berkhli, pl. 3, figs. 10-11, pl. 4, figs. 13, 19.
v. 1993 *Coelosporella jonesii* Wood - Berkhli et al., fig. 4. 14, fig. 6. 1.
non 1995 *Coelosporella jonesii* Wood - Pajic and Filipovic, pl. 49, fig. 5 (*Gyroporella*?).
1997 *Coelosporella jonesii* Wood - Gallagher and Somerville, fig. 9u.
v. 1999 *Coelosporella jonesii* Wood - Berkhli, p. 111, 114, pl. 3, fig. 5.
2000 *Coelosporella* cf. *wetheredii* Wood - Sebbar et al., text-fig. 7, n° 59, p. 214, 215.
v. 2003 *Coelosporella jonesii* Wood - Berkhli and Vachard, p. 10 (no illustration).
? 2004 Indeterminate Dasycladaceae - Brenckle, pl. 6, fig. 11.
2004 *Coelosporella wetheredii* Wood - Cózar and Rodríguez, fig. 9. 15.
2004 *Coelosporella wetheredii* Wood - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 6 p. 47, text-fig. 8 p. 48, fig. 13. 3, 14. 27.
2004 *Coelosporella* sp. - Cózar and Somerville, fig. 13. 4.
? 2004 *Coelosporella jonesi* (sic) Wood - Cózar, p. 370, text-fig. 3 p. 371 (no illustration).
?2004 *Coelosporella wetheredii* Wood - Cózar, p. 370, pl. 1, fig. 2.
2004 *Coelosporella wetheredii* Wood - Piecha et al. pl. 1, fig. 8.
2004 *Coelosporella wetheredii* Wood - Cózar and Rodríguez, fig. 9. 15.
2005a *Coelosporella wetheredii* Wood emend. Perret and Vachard - Cózar and Somerville, text-fig. 5 p. 7, text-fig. 6 p. 8, text-fig. 7 p.10, text-fig. 8 p. 11, text-fig. 10 p. 13, text-fig. 11 p. 15, text-fig. 16 p. 25, fig. 14. 2.

2005b *Coelosporella wetheredii* Wood emend. Perret and Vachard - Cózar and Somerville, pl. 1. 10, 15.
2005a *Coelosporella jonesii* Wood - Cózar, text-fig. 4 p. 409, fig. 7. 12.
2005d *Coelosporella wetheredii* Wood emend. Perret and Vachard - Cózar and Somerville, fig. 4. 4.
2006 *Coelosporella jonesii* Wood - Cózar et al., p. 276 (no illustration).
2006 *Coelosporella jonesii* Wood - Gallagher et al., fig. 13. 8.

Description. The species is characterized by the following parameters. Length = 1.230-3.500 (6.480) mm; thickness of skeleton = 0.140-0.280 mm, diameter of laterals = (0.090)-0.116-0.220 mm; interlateral interval = (0.015)- 0.025-0.050 (0.070) mm.

Remarks. The diameter of the acrophore laterals are very variable but I assign the taxon to *C. jonesii*, because, as previously indicated by Cózar (2004), *C. wetheredii* exists and the emendation of Perret and Vachard (1977) seems to be not justified.

Occurrence. Latest Asbian-late Serpukhovian (acme in the Brigantian) Palaeotethyan (Great Britain, Ireland, Belgium, Donbass, Urals, Tennessee, Spain, Germany, France, Nepal, Alabama, Newfoundland). Asbian-Brigantian of central Morocco. Brigantian/early Serpukhovian of Eastern Morocco. Late Serpukhovian of Southwestern Spain. Latest Asbian-late Brigantian of Montagne Noire (assemblage SF1 to SF5): Lenses of the road, near Roquessels (DV332A, DV332', DV.FB4); Castelsec (MA.10.9, MA11.8); Japhet (DV126A, DV126D, DV126E, DV126G, DV164A, DV164B, DV164C, DV350A, DV350B); 500m de Vailhan (ML788); Les Pascales (DV601A); Roc de Murviel (MA7, MA33.9, MA.82). Late Serpukhovian of Ardengost area (MFP.GER10-11B).

Doubtful Dasycladales

In the literature, exist several taxa of "algae" impossible to recognize, e.g., *Sandoella* Mamet and Roux, 1978b, *Dutroella* Mamet and Roux, 1978b, *Bolivianella* Mamet, 1996a, because only characterized by indeterminable perforated and microsparitized remains. Similarly, some specimens of the Ardengost Formation identified by Perret and Vachard (1977) are very questionable: Cyclocrinae? (pl. 4, figs. 3, 8) and especially *Masloviporella conili* Vachard in Perret and Vachard, 1977 (p. 109-111, pl. 4, figs. 1-2, 4-6, 9-10); see also "Dasycladacées (?) indéterminées" of Vachard et al. (1989, pl. 2, fig. 6,pl. 4, figs. 2, 9).

? Order Dasycladales
Family indeterminate

Remarks. The assignment of *Koninckopora* to the dasycladaceans is discussed. The bilayered wall is uncommon among the true dasycladaceans (*Clypeina jurassica* Favre and Richard, 1927, excepted; compare with the illustrations of De Castro, 1997, pl. 2, figs. 1-5, pl. 19, figs. 1?-2?, pl. 20, figs. 1-6, pl. 21, fig. 1 and Flügel, 2004, pl. 28, fig. 2, pl. 59, fig. 7, pl. 62, figs. 5-6; see also *Zergabriella* Granier, 1989). The laterals are also very particular in shape. Some sections of *Koninckopora pruvosti* Güvenç, 1966 look like *Thaumatoporella* Pia, 1927 emend. De Castro, 1990 which is attributed to the cyanobacteria or the green algae Rivulariceae or Cladophoraceae. The unique certitude is the photophile character of *Koninckopora* (see above for the taphonomical analyses).

Genus *Koninckopora* Lee, 1912

Type species. *Calamopora inflata* de Koninck, 1842.
Diagnosis. Test large, conical to roughly cylindrical. Wall perforated by alveoles, polygonal, cylindrical to sphaerical, generally in form of hexagonal prisms. Wall bilayered microgranular and fibrous.

Remarks. Contrary to Mamet and Roux (1975a), I think that the genus is only represented by the following species: *K. pruvosti* Güvenç, 1966; *K. sahariensis* Chanton, 1965 (= *K. minuta* Weyer, 1968); *K. tenuiramosa* Wood, 1942; *K. inflata* (de Koninck, 1842), and *K. mortelmansi* Mamet, 1973. The monolayered *Koninckopora* of the MFZ10-11 = Cf4β-γ biozones are generically different, as well as *Koninckopora* sp. B. The status of *Koninckoporoides* Rich, 1974 and *Eokoninckopora* Saltovskaya, 1984a is not well-established. *Koninckopora inflata* is the unique species described in my material.

Occurrence. Middle-late Viséan (MFZ11-15 = Cf4δ-Cf6δ), cosmopolite. The LAD of *Koninckopora*, earliest Brigantian, latest Brigantian, early Serpukhovian, or eventually late Serpukhovian (Protvinsky), seems to result of inexpected tectonic or sedimentologic complications (compare Conil and Lys, 1964; Kulagina, 1988, p. 26; Bogush et al., 1990, tabl. 1 p. 10; Vachard and Berkhli, 1992; Mamet et al., 1993, fig. 9; Sebbar et al. 2000, fig. 7; Brenckle in Groves et al., 2003; Cózar and Somerville, 2004, 2005b; Cózar, 2004, 2005a; Okuyucu and Vachard, 2006; Mamet, 2006). The FAD is better known as MFZ 11 = Cf4δ (Arundian); the proposed FAD of *Koninckopora inflata* in the MFZ9 = Cf4α of North Wales (Davies et al., 1989) is probably misinterpreted.

Koninckopora inflata (de Koninck, 1842)
Pl. 17, figs. 1-10.

1842 *Calamopora inflata* n. sp. de Koninck, p. 10, pl. A, figs. 8a-b.
1963 *Koninckopora inflata* (de Kon.) - Conil and Pirlet, pl. 1, fig. 1.
1964 *Koninckopora inflata* (de Koninck) - Conil and Lys, p. 26, pl. 3, fig. 5-6.
1967 *Koninckopora inflata* (de Kon.) - Conil and Paproth, p. 60, 62, 69, 70, 71, 75? 76 (no illustration).
?1970 *Koninckopora* sp. - Mamet, n° 39 of text-fig. 3 p. 4-5, p. 12, pl. 9, fig. 3.
1972 *Koninckopora inflata* (de Koninck) - Petryk and Mamet, p. 781, 783, pl. 4, figs. 7-8 (with synonymy).
1972 *Koninckopora inflata* (de Koninck) - Mamet and Rudloff, p. 82, pl. 2, figs. 14-18, pl. 3, figs. 1, 2, 6 (with synonymy).
1972 *Koninckopora inflata* (de Koninck) - Mamet and Rudloff, p. 82, pl. 2, figs. 14-18, pl. 3, figs. 1, 2, 6 (with synonymy).
1973 *Koninckopora inflata* (de Koninck) - Alexandrowicz and Mamet, pl. 4, figs. 4.
non 1974 *Koninckopora inflata* (de Koninck) - Saltovskaya, pl. 37, figs. 3-4 (= *K. sahariensis/minuta*).
v. p. 1974b *Koninckopora tenuiramosa* Wood - Vachard, pl. 6, fig. 1, pl. 7, fig. 9? (non pl. 5, fig. 2 = a true *K. tenuiramosa*).
1975a *Koninckopora inflata* (de Koninck) - Mamet and Roux, p. 255, pl. 6, figs. 7-10, pl. 7, figs. 1-12 (with synonymy).
1976 *Koninckopora inflata* (de Koninck) - Bless et al., pl. 10, fig. 9.
1976 *Koninckopora inflata* (de Koninck) - Mamet, pl. 24, fig. 24, pl. 27, fig. 1, pl. 28, fig. 1, pl. 33, fig. 3, pl. 34, fig. 3.
1976 *Koninckopora inflata* (de Koninck) - Emberger, p. 48, 50 (no illustration) (with 37 references in synonymy).
1977 *Koninckopora inflata* (de Koninck) - Armstrong and Mamet, p. 103, pl. 36, figs. 1-4 (with synonymy).
1977 *Koninckopora inflata* (de Koninck) - Paproth et al., p. 73 (no illustration).
v. 1977a *Koninckopora inflata* (de Koninck) - Vachard, p. 374, tabl. 1 (no illustration).
non 1978 *Koninckopora inflata* (de Koninck) - Jurkiewicz and Zakowa, p. 30, pl. 5, figs. 9-10 (= bryozoans).
1978 *Koninckopora inflata* (de Koninck) - Jansa et al., p. 1432, pl. 2, fig. 3 (with synonymy).
1978 *Koninckopora inflata* (de Koninck) - Lys et al., pl. 1, figs. 7-8.
1980 *Koninckopora inflata* (de Koninck) - Buchroithner et al., p. 23-24, pl. 4, figs. 8-9.
v. 1981 *Koninckopora inflata* (de Koninck) - Fontaine and Vachard, p. 15, pl. 1, fig. 1.
1982 *Koninckopora inflata* (de Koninck) - Baxter and Brenckle, text-fig. 3 p. 140, p. 142.
1983 *Koninckopora inflata* (de Koninck) - Conil and Paproth, tabl. 1 p. 34 (no illustration).
1984 *Koninckopora inflata* (de Koninck) - Somerville and Strank, fig. 5M.
1985 *Koninckopora inflata* (de Koninck) - Mamet and Pinard, pl. 2, figs. 4-5.
1987 *Koninckopora inflata* Lee (sic) - Chuvashov et al., pl. 14, fig. 1.
1988a *Koninckopora inflata* (de Koninck) - Ivanova, p. 6 (no illustration).
v. 1989b *Koninckopora inflata* (de Koninck) - Vachard, figs. 6, 12.

1989 *Koninckopora inflata* (de Koninck) - Davies et al., text-fig. 8 p. 39, fig. 9 K.
1990 *Koninckopora inflata* (de Koninck) - Strogen, Jones and Somerville, fig. 11 P.
1990 *Koninckopora inflata* (de Koninck) - Bogush et al., tabl. 1 p. 10, pl. 15, figs. 5-6, pl. 16, fig. 2.
v. 1990 *Koninckopora inflata* (de Koninck) - Caridroit et al, p. 338 (no illustration).
v. 1991 *Koninckopora inflata* (de Koninck) - Vachard and Fadli, pl. 1, fig. 16.
v. 1991 *Koninckopora inflata* (de Koninck) - Vachard and Tahiri, p. 324, pl. 3, fig. 10.
v. 1992 *Koninckopora inflata* (de Koninck) - Vachard and Berkhli, pl. 1, fig. 20, pl. 2, fig. 17, pl. 4, fig. 19.
v. 1993 *Koninckopora inflata* (de Koninck) - Berkhli et al., fig. 6. 7.
1994 *Koninckopora inflata* (de Koninck) - Herbig and Mamet, text-fig. 4 p. 101, pl. 10, fig. 6.
1996 *Koninckopora inflata* (de Koninck) - Skompski, pl. 13, fig. 4.
1996 *Koninckopora inflata* (de Koninck) - Gallagher, text-fig. 2 (no illustration).
1997 *Koninckopora inflata* (de Koninck) - Gallagher and Somerville, text-fig. 4 p. 318, text-fig. 5 p. 320, text-fig. 6 p. 321, text fig. 8 (no illustration).
v. 1999 *Koninckopora inflata* (de Koninck) - Berkhli, p. 102, 106, 107, 108, 109, 111, 114, 117, 120, 122 (no illustration).
2000 *Koninckopora inflata* (de Koninck) - Sebbar et al., text-fig. 7, n° 8, p. 214, 215.
v. 2002a *Koninckopora inflata* (de Koninck) - Berkhli et al., p. 192 (no illustration).
v. 2002b *Koninckopora inflata* (de Koninck) - Berkhli et al., p. 138 (no illustration).
2003 *Koninckopora inflata* (de Koninck) - Groves et al., p. 387, fig. 6. 1-5.
? 2004 *Koninckopora inflata* (de Koninck) - Cózar, p. 370 (no illustration).
? 2004 *Koninckopora inflata* (de Koninck) - Brenckle, pl. 7, fig. 9.
? 2004 *Koninckopora mortelmansi* (Mamet) - Brenkle, pl. 7, fig. 10.
2004 *Koninckopora inflata* (de Koninck) - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 8 p. 48, text-fig. 9 p. 49, text-fig. 15 p. 61, fig. 13. 2.
2005a *Koninckopora inflata* (de Koninck) - Cózar and Somerville, fig. 14.1.
2005b *Koninckopora inflata* (de Koninck) - Cózar and Somerville, pl. 1. 14.
2005a *Koninckopora inflata* (de Koninck) - Cózar, text-fig. 4 p. 409, fig. 7. 15.
2005d *Koninckopora inflata* (de Koninck) - Cózar and Somerville, fig. 4. 2.
2006 *Koninckopora inflata* (de Koninck) - Mamet, p. 325-326, pl. 1, fig. 10 (with 20 references in synonymy).
?2006 *Koninckopora* sp. - Sanz et al., fig. 7. 8 (intermediate between *K. tenuiramosa* and *K. inflata*).
2006b *Koninckopora inflata* (de Koninck) - Herbig, pl. 1, figs. 7-8.

Description. The width indicated for the alveoles/laterals by Conil and Lys (1964) is 0.100-0.275 mm, by Mamet and Rudloff (1972), 0.180-0.310 mm, and by Jansa et al. (1978), 0.190 to 0.260 mm. The average diameter seems to be 0.250-0.275 mm. Here, I measured: Lenght = 3.840-6.000 mm, Diameter = 2.670 mm, thickness of ribbons = 0.140-0.350 mm, diameter of laterals 0.100-300 mm; wall thickness = 0.050-0.075 mm (with 0.004-0.005 for the dark thin layer).

Occurrence. As for the genus. Lenses of the road, near Roquessels (DV293.2A, DV293.2B, DV293C, DV.FB4); sommet 224-Valuzières (DV600B); Castelsec (MA.10-?, MA10.6); Roquemaillère (ML764); Japhet (DV126D, DV856 (almost complete)); 500m E. de Vailhan (ML788); Vailhan-Château (DV246A, DV246E, DV246F); Les Batailles (DV609.3); Les Mentaresses (DV329C, DV329D; both accompanied by *Janischewskina*); Jeantels (DV?690B, DV690E); Les Boutinelles (MA.BOU25.17); Roc de Murviel (MA33.0, MA33.9, MA47, MA82, MA330.11); Serre de Péret (MA.SP28).

cf. *Koninckopora* sp. B

Pl. 17, figs. 11-13.

cf. p. 1967 *Koninckopora inflata* (de Koninck) - Weyant, pl. 1, fig. 4 only (non figs. 1-2 = *K. pruvosti*, nec fig. 3 = *K. tenuiramosa*).
1992 *Koninckopora* sp. B (monolaminar stipes) - Somerville et al. fig. 6M.
1996 *Koninckopora inflata* (de Koninck) - Gallagher, text-fig. 2 (no illustration).
1997 *Koninckopora* sp. B - Gallagher and Somerville, text-fig. 6 p. 321, text-fig. 8 p. 325, fig. 9v.
2004 *Koninckopora* sp. B - Cózar and Somerville, text-fig. 5 p. 46, text-fig. 8 p. 48, text-fig. 15 p. 61 (no illustration).
2005a *Koninckopora* sp. B - Cózar and Somerville, fig. 14. 2, text-fig. 16 p. 25.
2005d *Koninckopora* sp. B - Cózar and Somerville, fig. 4. 3.
2006 *Koninckopora* sp. B - Gallagher et al., fig. 13. 5.

Description. Small micritic ribbons with rounded laterals. Length of ribbons = 2.000 mm, thickness of ribbons = 0.200 mm, diameter of laterals = 0.350 mm.

Occurrence. Middle Viséan of Western France. Latest Asbian of Ireland (upper MZFZ14 = upper Cf6γ2) and Northern England. Latest Brigantian of Montagne Noire: Mounio (DV 431D).

2.4. Chlorophyta incertae sedis

Genus *Nostocites* Maslov, 1929

Type species. *Nostocites vesiculosa* Maslov, 1929.

Synonyms. *Litostroma* Mamay, 1959 (pars: sensu Jansa et al., 1978).

Diagnosis. Sheet of circular cells completely calcified in a yellowish calcite, with dark center.

Remarks. Contrary to *Baccanella* (see above) this structure is ontogenetic and not diagenetic (see the taphonomical relations with the matrixes or the cements).

Occurrence. Devonian-Carboniferous Europe, Russia, Ukraine, Uzbekistan, South China, Thailand, Australia, North America (Mamet, 1991), Spain, Algeria, Morocco and Greenland. Early Permian of Canada (Mamet et al., 1987). Late Middle Permian of Oman (Vachard et al., 2001). ? Triassic of Poland and Iran (see Groves, 1986; most probably *Globochaetete*).

Nostocites vesiculosa Maslov, 1929

Pl. 17, fig. 16.

1929 *Nostocites vesiculosa* n. sp. Maslov, p. 1538, pl. 70, figs. 2, 7, 9-10, text-figs. 1-3, 7.
v. p. 1977a *Globochaete* sp. - Vachard, p. 374, tabl. 1 (pars: only the late Viséan specimens) (no illustration).
1978 *Litostroma* sp. - Jansa et al., p. 1436, pl. 1, figs. 10, 11.
1978b *Nostocites vesiculosa* Maslov - Mamet and Roux, p. 80, pl. 6, fig. 2 (non figs. 1, 3 = ostracods) (with synonymy).
1981 *Nostocites vesiculosa* Maslov emend. (sic) - Mamet and Martínez, pl. 3, fig. 8.
1983 *Nostocites* cf. *N. vesiculosa* Maslov - Groves, p. 31-32, pl. 7, figs. 7, 10-12 (with synonymy).
p. 1983 *Nostocites vesiculosa* Maslov - Mamet and Roux, p. 98, pl. 10, figs. 9-11 (non figs. 12-13 = ostracods) (with synonymy).
1985 *Nostocites vesiculosa* Maslov - Mamet and Pinard, pl. 1, fig. 19.
? 1987 *Nostocites vesiculosa* Maslov - Mamet, Roux and Nassichuk, p. 58, pl. 30, figs. 1-2 (with synonymy).
v. 1990 *Nostocites vesiculosa* Maslov - Vachard, p. 94 (no illustration).
v. 1991 *Nostocites* ex gr. *vesiculosa* Maslov - Vachard and Beckary, p. 322-323, pl. 2, fig. 10 (with synonymy).
v. 1991c *Nostocites vesiculosa* Maslov - Vachard et al., p. 677, pl. 1, fig. 7.
1992 *Nostocites vesiculosa* Maslov - Mamet and Préat, pl. 1, fig. 6.
non 1996 *Nostocites vesiculosa* Maslov - Sebbar and Mamet, text-fig. 5. 31, pl. 3, fig. 3 (= hinge of ostracod).
v. 1996 *Nostocites vesiculosa* Maslov - Vachard and Maslo, text-fig. 2 p. 361
1996 *Globochaetes* (sic) - Jones and Somerville, fig. 4h.
1996 *Globochaete alpina* (Lombard) - Skompski, pl. 16, fig. 4.
?1999 *Nostocites vesicula* (sic) Maslov - Sebbar and Mamet, text-fig. 3. 53 (no illustration).
2000 *Nostocites vesiculosa* Maslov (= *Globochaete* auct.) - Mamet and Stemmerik, fig. 9 G.
v. 2001 *Nostocites vesiculosa* Maslov - Vachard et al., p. 390-391, 393, fig. 18. 1 (with 7 references in synonymy).
2003a *Nostocites vesiculosa* Maslov - Krainer et al., pl. 3**,** fig. 13, pl. 5, fig. 3.
2003 *Nostocites vesiculosa* Maslov - Khodjanyazova and Mamet, pl. 5, fig. 14.
?2004 *Nostocites vesiculosa* Maslov - Cózar, text-fig. 3 p. 371 , text-fig. 4 p. 372 (no illustration).
?2004 *Nostocites vesiculosa* Maslov - Cózar and Somerville, text-fig. 3, text-fig. 9 (no illustration).
v. 2005 *Nostocites vesiculosus* (sic) Maslov - Saïd, p. 178, fig. X. 1. 12.
2006 *Nostocites vesiculosa* Maslov - Mamet, p. 346, 348, pl. 7, figs. 20-23 (with 25 references in synonymy, where many are truly *Globochaetete*).

Description. Length of colonies = more than 1.000 mm; diameter of "cells" = 0.025-0.060 mm.
Occurrence. As for the genus. Very rare in the earliest Brigantian of Montagne Noire: Japhet (DV126F).

3. Rhodophycophyta

3.1. Solenoporaceae

Family Solenoporaceae Pia, 1927 (sensu stricto)

Remarks. The validity of the family "Solenoporaceae" as an uniform group is currently questioned (Woelkerling 1988; Brooke and Riding 1998, 2000; Aguirre and Barattolo 2001; Riding 2004; Cózar and Vachard, 2006), and is in need of revision. Brooke and Riding (1998, 2000) described the new family Graticulaceae, which is rather similar to the family Sporolithaceae, and also included in the order Corallinales Silva and Johansen, 1996. Woerkerling (1988) and Aguirre and Barattolo (2001) considered the "Solenoporaceae" as a group of *incertae sedis* algae, although, Aguirre and Barattolo (2001) described nemathecia for Paleogene *Parachaetetes*. Riding (2004) interpreted *Solenopora spongioides* Dybowski, 1877 as a chaetetid sponge. The latter author also considered *Marinella* Pfender, 1939; *Metasolenopora* Yabe, 1912; *Petrophyton* Yabe, 1912 and *Solenoporella* Rothpletz, 1908 as red algae. However, he interpreted *Parachaetetes* Deninger, 1906 and *Pseudochaetetes* Haug, 1883, to be also related to the chaetetids. Although an unpublished material of Markus Aretz, from the Viséan of Australia, shows perfectly hypothallic and perithallic structures in a *Parachaetetes*. Finally, the family Solenoporaceae or Solenoporidae can be discussed, but I believe in this assignment to red algae because similar chaetetids seem to be not functional with a such size of tubes.

Occurrence. Ordovician to Triassic, perhaps cosmopolite.

Genus *Anchisolenopora* n. gen.
Type species. *Hedstroemia* (?) *serrana* Vachard and Aretz, 2004.

Etymology. Greek anchi = almost, and *Solenopora*, related genus.

Diagnosis. Nodular, hemispherical or elongate thallus composed of numerous, densely packed tubes, round to sligthly polygonal in cross section. Rare dichotomies occur. In axial section, partitions are scarce also, but some rugosities are visible along the inner surface of the tubes. Wall calcitic, yellowish to brownish.

Composition. *Hedstroemia*? *serrana* Vachard and Aretz, 2004; *Hedstroemia*? *nidarosiensis* Høeg, 1932 emend. Roux, 1985.

Comparison. The new genus differs from *Solenopora* Dybowski, 1877 in the absence of pseudosepta; from *Pseudosolenopora* Mamet and Roux, 1977 in the type of wall (not micritic), from *Guvencipora* Vachard in Vachard et al., 1978 in the absence of mural pores; and from the chaetetid sponges in the smaller size of the tubes of the colonies.

Occurrence. Ordovician of Norway. Latest Brigantian and early Serpukhovian of Montagne Noire (assemblages SF5-6).

Anchisolenopora serrana (Vachard and Aretz, 2004) n. gen. n. comb.
Pl. 18, figs. 1-7.

2004 *Hedstroemia* (?) *serrana* n. sp. Vachard and Aretz, p. 649, fig. 7. 3-4.

Description. General dimensions of thallus = 10.000-15.000x8.000-10.000 mm. Diameter of tubes = 0.080-0.160 mm.
Occurrence. Latest Brigantian and early Serpukhovian of Montagne Noire (assemblages SF 5-6): Roc de Murviel (MA28, MA82, MA330.4); La Serre (MA.LS.I. 2043, MA.LS.IV.B.2015, MA.LS.IV.B, MA.LS.Feldweg. 9, DV227A).

Family "Solenoporaceae" (to emendate)

Remarks. This family is constituted for me by *Parachaetetes* of the Paleozoic authors non Deninger, 1906 (= *Solenophyllum* Maslov, 1935 = *Tomilithon* Maslov, 1962), *Solenopora* auctorum non Dybowski (pars); ?*Pseudochaetetes* auctorum non? Haug, 1883; ?*Solenoporella* Rothpletz, 1908, *Solenoporella* Shuysky in Shuysky and Patrunov, 1991 preoccupied non Rothpletz, *Maimonachaetetes* Cózar and Vachard in press c, *Bija* Vologdin, 1932, ?*Pseudosolenopora* Mamet and Roux, 1977 and *Apophoretella* Elliott, 1975. It belongs clearly to the red algae, with exceptional but not questionable observations of hypothallus and conceptacles (e. g., Berchenko, 1981, pl. 16, figs. 1-4; Mamet et al., pl. 9, fig. 3; Mamet and Shalaby, 1995, pl. 6, fig. 1-2; Cózar and Vachard, in press)

Indeterminate "Solenoporaceae"
Pl. 18, figs. 8-11.

Description. Very few specimens, strongly recrystallized, impossible to determinate generically have been observed in two localities of Montagne Noire.
Occurrence. Assemblages SF2 (Roc du Cayla: MA12.12, MA12.22) and SF5 (Les Pascales: DV601B). The *Solenopora* sp. of Perret and Vachard (1977, pl. 1, fig. 1) might be a *Pseudosolenopora*.

3.2. Archaeolithophyllaceae

Family Archaeolithophyllaceae Chuvashov in Chuvashov et al., 1987
emend. Vachard et al., 2001
Genus *Hortonella* Mamet, 1995b emend. Cózar and Vachard, 2005

Type species. *Hortonella uttingii* Mamet, 1995b.

Diagnosis. (Emended by Cózar and Vachard, 2005) Geniculate subcylindrical to laminar? thallus, occasionally ramified. Differentiation of the thallus in an inner part and a cellular cortex more or less comparable with primitive hypothallus and perithallus. The inner part contains semi-parallel, long, narrow, polygonal, closely packed, irregularly tubular cells in the central axis of the thallus, progressively tapering and curved to the external part. Close to the outer part of the thallus, cells are much larger and occasionally ramified. Cellular cortex composed of a single row of small and subcylindrical cells. Conceptacles can be present in the outer part of the thallus, and some enlarged cells could be sporangia. Cells are internally poorly calcified, and better calcified to the external part of the hypothallus. Cellular cortex well calcified.

Remarks. The phylogeny of the group, before *Hortonella*, is hard to reconstruct. The unique algae which have some morphological similarities with *Hortonella* are *Dimorphosiphonides* Guilbault and Mamet, 1976 and *Lowvillia* Guilbault and Mamet, 1976 and perhaps some Moniliporellaceae (Gnilovskaya, 1972), from the Ordovician. Compare for instance the two

(poor) reconstructions of *Dimorphosiphonoides rouxii* Mamet and Shalaby (1995, fig. 2) and *Hortonella uttingii* Mamet (1995b, fig. 1). As I consider *Dimorphosiphonoides* and *Lowvillia* as advanced Cyanobacteria, the Archaeolithophyllaceae can derivate directly from the Cyanobacteria, independently of other groups like the Solenoporaceae or the Gymnocodiaceae whose appearance is situated respectively in the Cambrian and Permian (contrary to Flügel, 2004), since the *Gymnocodium devonicum* Mamet, Préat and Roux, 1994 is more probably a Vermiporellaceae than a Gymnocodiaceae (see above). Consequently the Rhodophyta are polyphyletic, with several derivations during the Palaeozoic.

Occurrence. Late Tournaisian of New Scotland (Canada). Early Viséan from Belgium (see Conil et al., 1969, pl. 1, fig. 1; identified as Solénoporacée?; and Hance, 1988, pl. 1, figs 2-4, 7?; under various names: Udoteaceae gen. nov., Rhodophyceae, Rhodophyceae ? or Algae). Late Viséan of New Scotland, Newfoundland, Alberta (Canada) and Algeria. Late Viséan of Northern France (Joinville Formation). Brigantian-Serpukhovian from Southern France Southwestern Spain, central Morocco, Eastern Morocco and Algeria. Late Viséan of Taurus (Turkey) (Okuyucu and Vachard, in press) and Tarim (North China) (Brenckle, 2004 as indeterminate Codiaceae: pl. 6, figs. 13-14). Early Bashkirian from Algeria (Sebbar and Mamet, 1999). Up to the Middle Permian in Central Afghanistan (?Vachard, 1980, pl. 25, fig. 12, as *Lysvaella*? sp.; Vachard and Montenat, 1981, pl. 15, fig. 3, et ? 8, as *Lysvaella*? sp.) (see Cózar and Vachard, in press a).

Hortonella ex gr. uttingii Mamet, 1995b
Pl. 19, figs. 1-11.

v. 1977 Genre indéterminé - Vachard in Perret and Vachard, p. 139-140, pl. 10, fig. 5.
1995b *Hortonella uttingii* n. sp. Mamet, p. 1270, pl. 1, figs. 1-13.
1996 *Hortonella uttingii* Mamet - Sebbar and Mamet, text-fig. 22, pl. 2, fig. 14.
1999 *Hortonella uttingii* Mamet - Sebbar and Mamet, text-fig. 3. 79, pl. 2, fig. 16.
2000 *Hortonella uttingii* Mamet - Sebbar, pl. 3, fig. 10.
v. 2003 *Hortonella uttingii* Mamet - Berkhli and Vachard, p. 10 (no illustration).
v. 2004 *Hortonella* sp. - Vachard and Aretz, p. 654, fig. 7. 7.
? 2004 *Hortonella* sp. - Cózar, text-fig. 3 p. 371 (no illustration).
? 2004 *Hortonella uttingii* Mamet - Cózar, text-fig. 4 p. 372 (no illustration).
? 2005 *Hortonella* sp. - Saïd, p. 181, fig. X. 1. 2.
2005a *Hortonella uttingii* Mamet - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 7. 5.
? 2005 *Aphralysia*? sp. - Sanz-Lopez et al., pl. 6, fig. 4.

Description. Length = 1.080-1.300 mm. Outer diameter = 0.270-0.420 mm. Diameter of the medullar zone = 0.150-0.220 mm. Diameter of medullar tubules = 0.050 mm. Diameter of cortical zone = 0.040-0.300 mm. Diameter of cortical tubules = 0.040-0.080 mm.
Occurrence. Brigantian-early Serpukhovian of Montagne Noire (assemblages SF 2, 5-6): Castelsec (MA10.7.2); Roque Redonde (RR45, RR47, RR49, RR51, RR54, RR55, RR56, RR57, RR62, RR73, RR82); Les Mentaresses (DV687A); Saint Rome (DV130B); and La Serre (Vachard and Aretz, 2004: GIK1801, GIK1805; and DV226C: this study). Late Serpukhovian of Ardengost area: RC8559, ?MFP.AH.B/81.6.

Genus *Archaeolithophyllum* Johnson, 1956

Type species. *Archaeolithophyllum missouriense* (sic: *missouriensum*) Johnson, 1956.
Synonym. *Kasimophyllum* Mamet and Villa, 2004.
Description. Attached, phylloid, sometimes ramified thallus. Axial hypothallus composed of wide polygonal cells arranged in poorly organised paraboloid files. Perithallus thin, composed of small regular cells, in regular files. Conceptacles semi-circular in section, located in the

perithallus, relatively arched and prominent (Vachard and Aretz, 2004).
Remarks. *Archaeolithophyllum* was always misinterpreted in the work of Mamet (see for instance, Mamet and Rudloff, 1972, p. 92, pl. 10, fig. 4; Jansa et al., 1978; Mamet, 1994, pl. 1, fig. 22 confused with "*Principia*"; and the *Palaeoaplysina* of Mamet et al., 1987, pl. 29, figs. 1-2, and Mamet and Stemmerik, 2000, fig. 8A-D), it was finally correctly illustrated by this author but denominated "*Kasimophyllum* Mamet and Villa, 2004".
Occurrence. Early Brigantian of Ireland (Cózar and Somerville, 2005b, text-fig. 3 p. 76, p. 80). Early Serpukhovian (Vachard and Aretz, 2004) to late Middle Permian (Vachard et al., 2001). Cosmopolite. *A. johnsoni* Racz, 1964 is early to late Bashkirian (Racz, 1964; Vachard et al., 1989, Vachard and Maslo, 1996, p. 361; Sebbar and Mamet, 1996, 1999; Pille et al., submitted-b). *A. missouriense* is exceptional in the latest Chesterian (Groves, 1986, text-fig. 3), rare in the Bashkirian (Vachard and Beckary, 1991) and the Morrowan-Atokan (Groves, 1984, text-figs. 6-7; 1986, text-figs. 4-5), and common from the late Moscovian to middle Permian (Pasini, 1974; Vachard et al., 2001). *A. delicatium* Johnson, 1956 is Pennsylvanian.

Archaeolithophyllum lamellosum Wray, 1964
Pl. 19, figs. 12-14.

1964 *Archaeolithophyllum lamellosum* n. sp. Wray, p. 8-9, pl. 2, figs. 1, 3, 5, 7.
1969a *Archaeolithophyllum* - Toomey, pl. 123, fig. 1, pl. 124, fig. 3.
1969b *Archaeolithophyllum* sp. cf. *A. lamellosum* Wray - Toomey, p. 1317-1318, pl. 151, figs. 5-7.
1976 *Archaeolithophyllum lamellosum* Wray - Emberger, p. 99 (with 2 references in synonymy) (no illustration).
1980 *Archaeolithophyllum lamellosum* Wray - Flügel, pl. 12, figs. 2, 4.
1980 *Archaeolithophyllum lamellosum* Wray - Flügel and Flügel-Kahler, p. 157-158, 160, pl. 8, fig. 6 (with 3 references in synonymy).
1988 *Archaeolithophyllum* - Wahlman, fig. 4. A, C, E; fig. 11. E-F.
1992 ?*Archaeolithophyllum lamellosum* Wray - Krainer, pl. 5, fig. 3.
1995 *Archaeolithophyllum lamellosum* Wray - Krainer, pl. 41, fig. 3.
1996 *Archaeolithophyllum lamellosum* Wray - Skompski, p. 224-225, pl. 14, figs. 3-6, pl. 21, figs. 1-4.
v. 1996 *Archaeolithophyllum lamellosum* Wray - Izart et al., p. 205 (no illustration).
1998 *Archaeolithophyllum lamellosum* Wray - Forke et al., pl. 3, fig. 7.
2003a *Archaeolithophyllum* - Cózar et al., pl. 4, fig. 12.
2003 *Archaeolithophyllum* (a) - Forsythe, fig. 10 C.
2003 *Archaeolithophyllum lamellosum* Wray - Forsythe, fig. 12 D.
2003a *Archaeolithophyllum lamellosum* Wray - Krainer et al., pl. 1, fig. 6.
v. 2004 *Archaeolithophyllum lamellosum* Wray - Vachard and Aretz, p. 657, fig. 11. 1, 3 (with synonymy).
2004 *Archaeolithophyllum lamellosum* Wray - Cózar and Rodríguez, fig. 9. 14.
2004 *Archaeolithophyllum lamellosum* Wray - Flügel, pl. 56, fig. 8.
2005b *Archaeolithophyllum* ex gr. *lamellosum* Wray - Cózar and Somerville, p. 90, pl. 2, fig. 3.
2005a *Archaeolithophyllum lamellosum* Wray - Cózar, text fig. 3 p. 408, text-fig. 4 p. 409, fig. 7. 10-11.

Description. Very thin foliose encrusting thalli, generally completely sparitized. Thickness of the thallus = 0.160-0.260 mm (up to 0.400). Width of hypothallic cells = 0.050-0.200 mm.
Occurrence. Early Serpukhovian in Montagne Noire (La Serre: MA.LSI.2040, MA.LSI top. 2047, MA.LSIII.2021), Southwestern Spain and Poland. Late Pennsylvanian of Midcontinent. Late Pennsylvanian-Early Permian of Italy, Carnic Alps, Ukraine, USA (Texas, New Mexico); up to the Leonardian of Mexico (see Vachard and Aretz, 2004).

Genus *Neoprincipia* Cózar and Vachard, 2003

Type species. *Neoprincipia guadiatica* Cózar and Vachard, 2003.
Diagnosis. Branched circular to irregular thallus composed of hypothallic and perithallic zones. The hypothallus is composed of polygonal cells, elongate in longitudinal section, and in some cases corners of these cells are slightly rounded, but not circular. Cells are similar in size in the centre and periphery of the hypothallus. Some larger cells are observed but

inequally distributed. Perithallus always present, variable in thickness and composed of small polygonal cells, often completely recrystallized. Thin wall divided the cells. Wall formerly aragonitic, always preserved as white sparite or microsparite. Rare conceptacles, apparently located at the limit of hypothallic and perithallic zones.

Occurrence. Latest Asbian-late Serpukhovian from Spain, Ireland, Northern England, Poland, Austria, Southern France (Montagne Noire, Pyrenees), Algeria, central and Eastern Morocco (Jerada), South China, Australia and Alaska (Cózar and Vachard, 2003; Cózar, 2004; Cózar and Somerville, 2005b).

Neoprincipia tethysiana Cózar and Vachard, 2003
Pl. 20, figs. 1-2.

?v. 1991c *Principia vailhani* (Mamet and Roux) - Vachard et al., p. 677, pl. 1, figs. 1-4.
v. 2003 *Neoprincipia tethysiana* n. sp. Cózar and Vachard, p. 514-515, fig. 6. 6-9 (with 12 references in synonymy).
v. 2003 *Neoprincipia tethysiana* Cózar and Vachard - Berkhli and Vachard, p. 10 (no illustration)
2004 *Neoprincipia tethysiana* Cózar and Vachard - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 6 p. 47, fig. 13. 9, 12, 14, fig. 14. 31, 33.
2004 *Neoprincipia tethysiana* Cózar and Vachard - Cózar, text-fig. 4 p. 372, p. 373, pl. 1, fig. 7.
2005a *Neoprincipia tethysiana* Cózar and Vachard - Cózar and Somerville, text-fig. 6 p. 8, text-fig. 7 p. 10, text-fig. 8 p. 11, text-fig. 9 p. 12, text-fig. 10 p. 13, text-fig. 11 p. 15, text-fig. 16 p. 25 (no illustration).
2005b *Neoprincipia tethysiana* Cózar and Vachard - Cózar and Somerville, pl. 2, figs. 1-2.
? 2006 *Principia donbassica* (Kossenko) - Groves and Beason, pl. 1, figs. 30-31.

Description. Large, cylindrical thallus, with a minimum diameter of usually 0.500-0.750 mm. Poor development of branches and a well developed perithallus with a thickness of 0.060-0.080 mm, rarely 0.050 mm. Cells in the hypothallic zone are markedly polygonal in the centre and develop circular corners in the periphery. Inner diameter of the hypothallic cells is 0.050-0.150 mm and in the perithallus 0.020-0.040 mm. Cells in the perithallus are rarely preserved. Thickness of the wall between the cells is 0.005-0.010 mm. Conceptacles oval, excentred and located at the limit of the perithallus and hypothallus (Vachard et al., 1991c, pl. 1, fig. 1).

Occurrence. Probable FAD in the latest Asbian of Ireland with an acme during the earliest Brigantian of Northern England and Ireland (Cózar and Somerville, 2004, text-fig. 15; 2005b, text-fig. 3). Brigantian of central Morocco, Southern Spain, Northern England and Ireland. Late Brigantian of Eastern Morocco. Latest Brigantian of South China. Questionable in the Viséan /Serpukhovian boundary? of Iowa (Groves and Beason, 2006, pl. 1, figs. 30-31, re-interpreted). Early Serpukhovian in Northern England (Cózar and Somerville, 2004, 2005b) and Algeria (Sebbar and Mamet, 1999, text-fig. 3. 85). Earliest Brigantian of Montagne Noire: Japhet (DV126D, DV126F).

Neoprincipia fluegeli (Vachard in Krainer and Vachard, 2002)
Pl. 20, figs. 3-6.

v. 2002 *Principia fluegeli* n. sp. Vachard in Krainer and Vachard, p. 12, pl. 1, figs. 3-5, pl. 2, figs. 2-4, 8, 14, pl. 3, fig. 6.
v. 2003 *Neoprincipia fluegeli* n. comb. - Cózar and Vachard, p. 513 (no illustration).
v. 2004 *Neoprincipia fluegeli* (Krainer and Vachard) - Vachard and Aretz, p. 655,
fig. 9. 9, fig. 10. 2, 5-7, fig. 11. 2, 5.
?2005c *Neoprincipia* sp. - Cózar and Somerville, fig. 9. 8.

Description. A *Neoprincipia* with large, elongate, sometimes curvated segments, with a reduced hypothallus and proportionally wide perithallus. Largest specimens in longitudinal sections measure 1.500-3.300 mm. Segments are generally short and show a diameter of

0.300-0.700 mm. The microsparitic recrystallisation is generally complete.
Occurrence. Late Serpukhovian of Austria, ?Spain. Early Serpukhovian of the Montagne Noire (as previously indicated by Vachard and Aretz, 2004): ?Roc de Murviel (MA7); La Serre (MA.LSI.2044, ?MA.LSII.U.2039, MA.LSIV.2010). Late Serpukhovian of Ardengost area: MFP.AH81.1

Neoprincipia petschoriaeformis Vachard and Aretz, 2004
Pl. 20, figs. 7-11.

v. 1977 aff. *Petschoria* sp. - Perret and Vachard, p. 139, pl. 10, figs. 8-9.
v. 1977a *Petschoria*? sp. - Vachard, p. 375, tabl. 1 (no illustration).
v. 2003 *Neoprincipia petschoriaeformis* Vachard and Aretz - Berkhli and Vachard, p. 10 (no illustration; nomen nudum).
v. 2004 *Neoprincipia petschoriaeformis* n. sp. Vachard and Aretz, p. 655, fig. 11. 3, 10 (with synonymy).

Description. *Neoprincipia* of small to medium size, not bifurcated, with very narrow perithallus and rather irregular hypothallus. Largest specimens in longitudinal sections measure 1.600-3.300 mm. Segments are generally short and show a diameter of 0.600-2.660 mm. The periphery can be irregular. The perithallus is narrow with a width of 0.060-0.100 mm. The hypothallus contains polygonal cells, which have an inner diameter of 0.060-0.080 mm. The wall is yellowish, microsparitic.
Occurrence. Earliest Serpukhovian of Eastern Morocco. Early Serpukhovian, Montagne Noire: La Serre (MA.LSII.U.2039, MA.LSI top.2049, MA.LS.Feldweg.16); Gare de Laurens (ML789); Mounio (DV344A). Late Serpukhovian, Pyrénées: Ardengost (MFP.Per1A, MFP. AH2, AH20E, ?MFP.CAS15 (or other species of *Neoprincipia*), MFP.CAS15bis.A, MFP.CAS23.

Neoprincipia claviformis Vachard and Aretz, 2004.
Pl. 20, fig. 12.

2004 *Neoprincipia claviformis* n. sp. Vachard and Aretz, p. 657, fig. 9. 8, fig. 10. 4, 8, fig. 11. 9.

Description. *Neoprincipia* characterized by its small size, the claviform shape of the segments, and the frequent total microsparitization. The material is very sporadic in the investigated thin sections, but rather common when present. The thallus diameter is usually 0.240-0.680 mm for a length of 1.600-2.400 mm. The differentiation into a hypothallus and a perithallus is poorly obvious. Thickness of the perithallus (rarely observed) = 0.040-0.060 mm. The hypothallus is clear-coloured, microsparitic, always recrystallised (formely aragonitic). Some preserved cells reach a thickness of 0.020-0.040 mm, but are generally destroyed by a complete recrystallization. Accumulations of *N. claviformis* look like accumulation of *Saccamminopsis* (Vachard and Aretz, 2004: fig. 10. 8). They differ in the small size, the more elongate "neck", and the presence of some specimens with preserved hypothallic structures.
Occurrence. Early Serpukhovian of La Serre (see Vachard and Aretz, 2004).

4. Algospongia (Problematical algae equivalent to Palaeoberesellaceae and Palaesiphonocladales auct.)

Class Algospongia G. Termier, Termier and Vachard, 1977
Diagnosis. Small calcareous problematical algae exhibiting several morphological characters also developed among the foraminifers, because this group takes occasionnally algal morphologies. The difference with the foraminifera is essentially the microstructure of the wall, with a yellow, calcitic, perforated or finely canaliculate wall, with a reduced space for

the organic tissue. Growth habit erect to attached and encrusting. Boundaries of chambers generally diversely calcified introducing morphologies similar to typical foraminifers (e. g., *Moravammina* Pokorny, 1951; *Triangulinella* Mamet and Préat, 1985b), atypical foraminifers (compare *Praedonezella* and *Donezella* with *Rhizammina algaeformis* Brady emend. Cartwright et al., 1989), microstromatoporids (*Komia*) or hypercalcified microsponges (*Stacheia*, *Conilalia, Anthracoporellopsis*). Rare genera have a structure similar to red algae (*Ungdarella*), green algae (*Exvotarisella*, Beresellaceae) or labyrinthic/sarmentoid microsponges (*Labyrinthoconus*, *Sinustacheoides*). Organizations in tissues supposed in some genera (i. e., *Epistacheoides*) remain very primitive and is never comparable with the perithallus and hypothallus of the corallinales red algae. The characters shared by all the Algospongia are the dominance during the Palaeozoic, the multichambered (or multicellular for the supporters of algal assignment) structure unknown in all the fossil, extant, and Recent groups of algae as well as foraminifers, the disphotic to aphotic habitus, and especially the wall yellowish, pseudo-fibrous or granular (sometimes monocrystalline), often perforated (Issinelleae, Bereselleae, *Exvotarisella*) with aspondyl groups of wall perforations, often blind (i.e., no communicating with the outer environment).

Composition. Four orders (see volume 1): Wetheredellales nomen translat. herein; Beresellales nomen translat. herein; Moravamminales Pokorny, 1951 nomen translat. Vachard in Termier et al., 1975; Aoujgaliales Termier, Termier and Vachard, 1975.

Occurrence. Ordovician-Permian (rare but unquestionable taxa in the Jurassic-Cretaceous). Ordovician with Wetheredellales and some *Moravammina*? (see below).?Late Silurian. Early Devonian-late Permian for the other families. Rare Lazarus effects in the Mesozoic (e.g., *Kamaena khuraisensis* Adams and Al-Zahrani, 2000; *Koskinobullina socialis* Cherchi and Schroeder, 1979; and *Hensonella dinarica* Elliott, 1960 sometimes considered as a dasyclad *Salpingoporella*, see De Castro, 1997, pl. 6, figs. 2-4, pl. 9, figs. 1-3; pl. 10, figs. 1-2).

4.1.Beresellales (= Dasycladales auctorum pars)

Order Beresellales Maslov and Kulik, 1956 nomen translat. herein.

Diagnosis. Cylindrical thallus, undivided but with diaphragms according to the genera. Wall hyaline yellowish, with randomly arranged (aspondyl) laterals or diverse groups of thin, single and blind laterals (cf. euspondyl to metaspondyl).

Composition. Two families, Issinellaceae Deloffre, 1987 emend. Vachard, 1991 and Beresellaceae Maslov and Kulik, 1956.

Discussion. Algospongia composed of single tubular thalli, occasionally bifurcated, and with outer surface smooth (*Beresella*, *Uraloporella*), irregular (*Zidella*) or tiny costulate (*Ardengostella*, *Lemosquetella*), and tiny canaliculate. In the Issinellaceae, the wall is single-layered; in the Beresellaceae, the wall is two-layered with an outer yellow layer forming re-entrants until the internal cavity. In between the re-entrants, darker rings are finely canaliculate (see Vachard 1991, fig. 5). The canalicules are blind, because of the continuous external yellow layer. This type of wall is defined here as bereselloid wall. In many genera, several diaphragms (Vachard 1991, fig. 4.4) can occupy the entire central cavity (mainly in *Jansaella*, *Issinella*?, *Luteotubulus*, *Beresella* and *Uraloporella*; see especially Saltovskaya, 1984b, pl. 12). Because of these diaphragms, Berger and Kaever (1992, p. 31) admit that some genera of this family "may not even be algae". Indeed, with the diaphragms, the blind canalicules and the yellowish hyaline wall, the similarity with Dasycladales is only subjective (see also discussion on true and false *Nanopora* by Vachard and Aretz, 2004). Despite its

small size, *Nanopora* is a true dasyclad, because of their euspondylity and their white microsparitic wall (probably formerly aragonitic). The issinellaceans and especially *Serrisinella* Vachard, differ in the aspondility and the calcitic, yellowish wall. For instance, *Nanopora fragilissima* (Maslov) described by Bogush et al. (1990, p. 112-113, pl. 13, fig. 5-8) belongs to *Serrisinella*. Other Devonian *Nanopora* such as *N. uralica* Shirshova in Shuysky and Shirshova, 1988, are also interpreted as issinellaceans. Both genera, *Nanopora* and *Serrisinella* exemplify the differences between the dasyclad algae and the tubular Algospongia. It seems to be surrealistic that Endo and Horiguchi (1957) have compared *Mizzia* (a dasyclad paragon) and *Dvinella* (denominated "*Eomizzia*"). That explains perhaps that many authors assign Beresellales to Dasycladales (Herak et al., 1977; Deloffre, 1987, 1988, Granier and Grgasovic, 2000), whereas the same ones (De Castro, 2002; Granier and Hofmann, 2003, Mu et al., 2003) discuss the assignment to the dasycladales of *Anthracoporella* (a seletonellacean paragon, i. e. a very close group). Only one conclusion is therefore possible: the micropaleontologists don't see always the same things… For me, Beresellales differ absolutely from the Dasycladales, because the "laterals" are blind, the "central cavities" are interrupted by diaphragms, and the skeleton is originally calcitic not aragonitic. Due to their extraordinary abundance, they are most probably algae than animals, but the group of algae remains entirely unknown. The absence of a proloculus advocates against the foraminifers, and the small diameter of the canalicules is not in harmony with the patterns of canalicules of the Spongia, particularly in *Disyringia* Ridley (see Brien, 1973, fig. 106, and Fry and Fry, 1979, fig. 1), although the atypical sponge *Disyringia* is rather morphologically similar to *Baculella* or *Uralites*.

Occurrence. Late Silurian-earliest Permian (Asselian). Cosmopolite to endemic according to the taxa. A Lazarus taxon in the Early Cretaceous: *Hensonella dinarica* Elliott, 1960 (often considered as a dasyclad *Salpingoporella*, see De Castro, 1997, pl. 6, figs. 2-4, pl. 9, figs. 1-3; pl. 10, figs. 1-2; but clearly similar to some issinellaceae).

Family Issinellaceae Deloffre, 1987 emend. Vachard, 1991

Diagnosis: Beresellales with single wall, without pseudosepta and commonly with inner diaphragms.

Composition. One tribe: Issinelleae.

Occurrence. Late Silurian-late Serpukhovian, rare up in the Bashkirian (Amarellina), and then in the Jurassic (*Hensonella*). Geographic distribution poorly known, but probably cosmopolite.

Tribe Issinelleae Deloffre, 1987 emend. Vachard, 1991
(see also Issinelleae Deloffre, 1988; Issinelleae Saltovskaya, 1990
and Issinellinae nomen translat. Vachard, 1991 ex family)

Emended diagnosis. Cylindrical thalli with perforated walls. Some diaphagms and groups of canalicules can be present according to the genera.

Synonym. Uralitinae Vachard, 1991.

Composition. Thirteen genera: *Issinella* Reitlinger, 1954 (= *Tubus* Chuvashov in Chuvashov et al., 1985); *Amarellina* Mamet, 1995a; *Baculella* Conil and Dreesen in Dreesen et al, 1985 (= *Dreesenulella* Vachard, 1991 nom. van.); *Eouraloporella* Berchenko, 1981; *Hensonella* Elliott, 1960; *Issinellina* Shuysky in Shuysky and Shirshova, 1988; *Jansaella* Mamet and Roux, 1975c; *Lemosquetella* Mamet and Sebbar, 1998; *Luteotubulus* Vachard in Vachard et

al., 1977; *Pseudonanopora* Mamet and Roux, 1975a (pars); *Serrisinella* Vachard, 1991; *Zidella* Saltovskaya, 1984a, ?*Uralites* Chuvashov, 1973.

Remarks. Diaphragms of *Luteotubulus* were illustrated by Vachard, 1994b, pl. 1, figs. 1-8, those of *Uraloporella* by Saltovskaya, 1984b, pl. 12, figs. 1-10, pl. 13, figs. 2, 7, 9, and Mamet and Villa, 1995, pl. 1, fig. 5, with four or five diaphragms.True conceptacles more or less associated with diaphragms have been illustrated by Saltovskaya (1984b, pl. 12, figs. 1, 1A, pl. 13, figs. 5-8) and Chuvashov et al. (1987, pl. 16, fig. 14). Many so-called issinellaceans could be fragments of metazoans. For example, a costulate triaxone spicule of Roque Redonde (RR53), in oblique sections, might explain *Amarellina*.

Discussion. Contrary to Vachard (1991), (1) *Dreesenulella* Vachard, 1991 is interpreted here as a nomen vanum, because *Baculella* Conil and Dreesen in Dreesen et al, 1985 is only preoccupied in the animal kingdom (see Loeblich and Tappan, 1987), and not in the botanical realm, and because, although only described as a "microproblematicum", it is clearly associated by its creators with "*Issinella*" (here *Serrisinella*), both considered here as algae; (2) *Magnitella* Malakhova, 1975b belongs more probably to the foraminifera Earlandioidea, as indicated by Vdovenko et al. (1993, p. 41), and *Beresella praecursor* Vachard, 1977b is interpreted to be a *Magnitella*. Among the Issinellaceae, the ancestors of Beresellaceae are probably *Luteotubulus* (with diaphragms) and *Zidella* (first concentrations of blind canalicules). *Uralites* must be revised, the subtribe Uralitinae is not admitted here, as distinct.

Occurrence. Early Devonian-middle Pennsylvanian, Palaeotethyan and Uralian. Lazarus taxa in the Cretaceous. In Belgium, *Luteotubulus* is a good marker of late Moliniacian (= Arundian). In Ireland, *Luteotubulus* is regarded as a marker for the early Viséan (Chadian-Arundian) (Jones and Somerville, 1996). In the Montagne Noire, *Zidella* seems to be limited to the latest Asbian.

Genus *Issinella* Reitlinger, 1954

Type species. *Issinella devonica* Reitlinger, 1954.

Diagnosis. Small, cylindrical, undivided, single thalli, perhaps bifurcated. No perforations, no diaphragms (difference with *Luteotubulus* and *Zidella*). Wall yellowish, without visible macles (difference with *Kettnerammina* Pokorny, 1951)

Remarks. The monolithic work of Mamet contributes to many questions about this genus. The true *Issinella* were probably re-intrepreted as *Jansaella* Mamet and Roux, 1975c because of the age of the type level of Reitlinger (Frasnian).

Occurrence. Early Devonian-Viséan, cosmopolite. The LAD of the genus seems to be poorly known, the species of Urals disappear at the end of the middle Viséan (Bogush et al., 1990, tabl. 1, p. 10); questionable specimens are present in our late Serpukhovian material of Pyrenees (see below).

Issinella (?) sp.

Pl. 21, figs. 1-8.

Description. Rare specimens poorly characterized which can also correspond to incomplete stages of *Fasciella* and/or *Kamaenella* (for instance, the *Issinella devonica* Reitlinger of Mamet and Roux, 1981a, pl. 1, fig. 7, shows the septation and the gregarity of the tubes of *Kamaenella*). The *Palaeoberesella lahuseni* illustrated by Cózar and Somerville (2005d, fig. 5.5) looks like *Issinella* by an almost complete reduction of the septa. No *Luteotubulus* Vachard in Vachard et al., 1977, the principal Viséan issinellid, were observed. Issinelleae can be relatively abundant in Ardengost area but they are easily confused, in transverse sections, with associated *Ardengostella* or *Praedonezella.*

Occurrence. Lenses of the road, near Roquessels (DV293C, D293E, DV293F, DV293G, ?DV332A, ?DV332D); Roquemaillère (DV139A); Roque Redonde (RR58); Vailhan-Château (DV246F, DV248A), Les Pascales (DV601C). Late Serpukhovian of Ardengost area: MFP.Mar3B, MFP.AH.18A, AH18I, AH20 (= DV778A), AH20 (= DV778C), AH20A, CAS21.

Genus *Zidella* Saltovskaya, 1984a

Type species. *Zidella maxima* Saltovskaya, 1984a.

Synonyms. *Einoriella* sensu Bogush et al. (1990, p. 107), *Issinella* sensu Mamet (pars)

Diagnosis. Cylindrical thallus, with external and internal irregularities, and groups of blind, thin laterals linked in irregular rings within the skeleton. No diaphragms were observed (see Vachard, 1991, fig. 2).

Remarks. *Zidella* is questionably assigned to Uraloporelleae by Shuysky (1985, p. 94). Herbig and Mamet (1991, text-fig. 4 p. 101) seem to consider "Luteotubus" (sic, for Luteotubulus), *Zidella*, etc." (sic, this"etc." is funny) as synonyms of *Issinella grandis* Chuvashov, 1965. Nevertheless, no arguments are given. The three genera are different (see Vachard, 1993), but I agree partially with the opposite idea, because I consider *Zidella* minor Ivanova, 1988a as an *Issinella* and no a *Zidella* .

Occurrence. Late Viséan of Tadzhikistan, Sumatra, middle and Southern Urals (e. g., Ivanova, 1988a; Bogush et al., 1990; Ivanova and Bogush, 1992), Spain, Pyrenees, Montagne Noire and Morocco.

Zidella aurivella (Vachard, 1977b) emend. herein

Pl. 21, figs. 9-17.

v. 1974b *Uraloporella* cf. *sieswerdai* Racz - Vachard, p. 182, pl. 8, figs. 2-3.
v. 1977a *Uraloporella aurivella* Vachard - Vachard, p. 374, tabl. 1 (no illustration) (nomen nudum).
v. 1977b *Uraloporella aurivella* n. sp. Vachard, p. 133, pl. 1, fig. 11 (with 1 reference in synonymy).
? 1981 *Issinella devonica* Reitlinger - Mamet and Martínez, pl. 2, figs. 2-3 (or another species of *Zidella*).
1990 *Einoriella elongata* Saltovskaya - Bogush et al., p. 107, pl. 11, fig. 11.
v. 1991 *Zidella aurivella* (Vachard) - Ouarache et al., p. 51, 52 (no illustration).
1995 *Issinella licis* (Malakhova) - Sánchez-Chico, pl. 1, fig. 7-5.
v. 1998 *Zidella aurivella* (Vachard) n. comb. - Delvolvé et al, p. 366 (no illustration).
v. 2002 *Zidella aurivella* (Vachard) - Berkhli and Vachard, p. 69 (no illustration).

Description. This large species is especially well represented in the Lenses of the road, but rare specimens exist also in Roquemaillère and Roc de Murviel. This species is very similar to *Zidella* maxima Saltovskaya; it differs in smaller dimensions, and from Z. minor Ivanova, 1988a, in its larger ones. Length = 0.420-1.640 mm, outer diameter = 0.270-0.590 mm, inner diameter = 0.100-0.370 mm; wall thickness = 0.085-0.110 mm.

Remarks. *Einoriella elongata* sensu Bogush et al. (1990, p. 107, pl. 11, fig. 11) non Saltovskaya, 1984a, possesses the same dimensions; the true *E. elongata* looks like *Donezella*.

Occurrence. Late Viséan of Tien-Shan, central and Southern Urals and Sumatra. Asbian of central Morocco (the FAD is probably lower MFZ13 = Cf6α = Cfm4 = V3bα, deduced of Berkhli, 1999, p. 108). Questionable in Spain. Latest Asbian (rather common) to latest Brigantian (rare) in the Montagne Noire: Lenses of the road, near Roquessels (DV293D, DV293E including the holotype, DV293F, DV293G, DV293H, DV293.2.C, DV332'A, DV.FB4); sommet 224-Valuzières (DV600B); Roquemaillère (DV134F, DV134G); Roc de Murviel (MA82, MA83).

Family Beresellaceae Maslov and Kulik, 1956
nomen translat. H. Termier, Termier and Vachard, 1977
see also G. Termier et al., 1977, p. 141 (ex tribe)
orth mut. Shuysky, 1985 (ex Beresellidae)
(non Deloffre, 1987, nec Shuysky, 1987a, nec Deloffre, 1988)

Diagnosis. Beresellales with isolated tubular thalli and walls with more or less well individualized groups of blind canalicules (the beresellid double-layered wall), and/or diaphragms. Conceptacles occasionnally present. (see Vachard, 1991, fig. 5).
Composition. One tribe: Bereselleae Maslov and Kulik, 1956.
Remarks. Berger and Kaever (1992, p. 31) admit that some genera of this family "may not even be algae".
Occurrence. ?Latest Viséan-early Bashkirian Palaeo-Tethyan, late Bashkirian (= late Morrowan; see Brenckle et al., 1982a)-Earliest Permian; cosmopolite.

Tribe Bereselleae Maslov and Kulik, 1956 emend. herein
Emended Diagnosis. Cylindrical thallus, undivided but with internal diaphragms more or less numerous according to the genera. Wall hyaline yellowish forming an external thin layer and periodic re-entrants between alternating groups of thin, single and blind canalicules (see Vachard, 1991, fig. 5).
Synonym. Uraloporelleae Shuysky, 1985. The primitive character of these forms is not considered here as characteristic of a tribe. The classification as subtribe is possible and can be discussed.
Composition. Five genera. *Beresella* Makhaev, 1937 ex Maslov and Kulik, 1956, *Dvinella* Khvorova, 1949, *Ardengostella* Vachard in Perret and Vachard, 1977, and *Trinodella* Maslov and Kulik, 1956, *Uraloporella* Kordé, 1950 (= *Samarella* Maslov and Kulik, 1956).
Occurrence. ?Latest Viséan-early Serpukhovian of Urals (with "Beresella" machaevii Kuluk, 1964 which can be more precisely a Pseudonanopora or an Einoriella, i. e. belong to another group; Vachard (pers. comm.)). Late Serpukhovian-earliest Permian, cosmopolite. Acme during the Moscovian. The Bereselleae are rare during the late Pennsylvanian (see Vachard and Krainer, 2001a). The last populations seem to be constituted of Trinodella in the Asselian of Urals (as Donezella lutugini sensu Chuvashov, 1974) and in the earliest Permian of New Mexico (D.V., unpublished data).

Genus *Ardengostella* Vachard in Perret and Vachard, 1977
Type species. *Ardengostella* perretae Vachard in Perret and Vachard 1977.
Diagnosis. Cylindrical thallus, with regular central cavity, and groups of blind, thin laterals linked in relatively regular rings crossing through the wall. Two orders of ramifications in the laterals. External layer, yellow, not perforated, costulate. Attachment by bracelets. No diaphragms were observed.
Remarks. *Ardengostella* is the first true Bereselleae. It is different of the Bashkirian-Moscovian genus Dvinella Khvorova, 1949, in the costulate periphery and the faint differenciation of the rims with and without canalicules (Vachard, 1991, fig. 5).
Occurrence. Apparently endemic of the type locality (late Serpukhovian of Pyrenees), but some *Beresella machaevii* Kulik, 1964, *Dvinella secunda* Kulik, 1964, and *D. distorta* Kulik, 1964 of Bogush et al. (1990) might correspond to *Ardengostella* because they are coeval and because true *Beresella* and *Dvinella* are only known since the late Bashkirian (Vachard, pers. comm.). Unfortunately, these forms of Urals were very poorly or never illustrated.

Ardengostella perretae Vachard in Perret and Vachard, 1977
Pl. 22, figs. 1-11.

v. 1971 *Dvinella* - Perret, pl. 1, fig. 1.
v. 1977 *Dvinella* (*Ardengostella*) *perretae* n. subgen. n. sp. Vachard in Perret and Vachard, p. 125-127, pl. 5, fig. 1, pl. 7, figs. 1, 5-11, pl. 10, fig. 3 (with synonymy).
?1990 *Dvinella secunda* Kulik - Bogush et al., tabl. 1 p. 10, p. 109, pl. 12, fig. 3.
?1990 *Dvinella distorta* Kulik - Bogush et al., tabl. 1 p. 10 (no illustration).

Description. Length = 3.900 mm, outer diameter = 0.160-0.300 mm, inner diameter = 0.060-0.130 mm, wall thickness = 0.040-0.085 mm, external yellowish layer thickness = 0.010-0.012 mm, height of yellowish rims (i. e., without canalicules) = 0.030-0.070 mm, height of rims with canalicules = 0.020-0.060 mm.

Remarks. *Dvinella secunda* sensu Bogush et al. (1990) possesses the same dimensions as *A. perretae*, and is probably synonym, because coeval, whereas the true *D. secunda* are middle Pennsylvanian in age.

Occurrence. As for the genus. Late Serpukhovian of Ardengost area: MFP.AH18E, AH18I, AH20 (= DV778C), AH20A, AH20C, AH20F, AH20'F.

4.2. Algospongia Moravamminales

Order Moravamminales Pokorny, 1951
nomen translat. Vachard in Termier et al., 1975 (ex family)
nomen correct. and emend. herein (pro Moravamminida)

Diagnosis. Tests generally tubular, sometimes bifurcated, rarely laminar, divided by foraminifer-like septa or pseudosepta, but proloculus is always lacking. The system of attachment, generally unknown or constituted of a whorl of chambers around the substrate (e.g., *Kettnerammina*, *Moravammina*) or by "bracelets" (Dil et al., 1977) (*Exvotarisella*, *Ardengostella*); very rarely it is encrusting (*Evlania*). Wall calcareous, hyaline, with relatively common visible macles of calcite, and occasionally "echinodermic" extinction. Perforations nearly always present within the walls; these aspondyl pores (until the thirth order of ramification) vary from rare and sporadic to abundant and concentrated in specialized sectors. Generally functional and communicating with the exterior, they become blind and affected to another function among the Beresellales. Tubular thalli, sometimes bifurcated, with cellular walls similar to foraminiferal septa or pseudosepta, but proloculus is lacking. The system of attachment, generally unknown, can be preserved as "bracelets". Wall calcareous, hyaline, occasionally with "echinodermic" extinction or visible macles of calcite. Isolated wall perforations or canalicules, or groups of wall perforations or canalicules, can exist (ramified until the thirth order) within the walls, blind or communicating with the exterior.

Synonyms. Palaeoberesellinae Mamet and Roux, 1974; Palaeosiphonocladales Shuysky, 1985.
Composition. Three families: Moravamminaceae Pokorny, 1951 emend. Termier et al., 1975 nomen translat. Vachard and Cózar (submitted) (including the tribe Kettnerammineae Termier et al., 1975 nomen translat. herein and the "Palaeoberesellaceae" auctorum); Anthracoporellopsidaceae Shuysky, 1985 emend. Vachard, 1994a nomen translat. Vachard and Cózar (submitted); and Donezellaceae Termier et al., 1975 nom. translat. Chuvashov et al., 1987 (as tribe Donezelleae).

Discussion. The lateral walls of chambers/pseudo-septa are absent or almost absent in Kettnerammineae, moderate to strong in Moravammineae (= "Palaeoberesellaceae"), strong but asymmetrical in Anthracoporellopsideae, irregular in Labyrinthoconeae. Wall yellowish, hyaline, occasionally monocrystalline. Additional characteristic structures are the bracelets (in particular among *Exvotarisella*: Vachard in Dil et al., 1977, fig. 13, pl. 6, fig. 1; Vachard, 1991, pl. 5, fig. 2; Madi et al., 1996, pl. 24, fig. 7, re-interpreted), diaphragms and false-conceptacles of Beresellaceae (see also issinelleae and *Evlania*), and bereselloid-walls (Beresellaceae, *Evlaniopsis, Alanyana*). Many representatives of the family Moravamminaceae are the most inconsistent with the previous algal interpretations of the Algospongia, and remain assigned to the foraminifers by several authors (Loeblich and Tappan, 1964, 1984 and 1987; Vdovenko et al., 1993). The other families (Beresellaceae, Donezellinaceae) are generally warmly advocated as truly algal. The discussion is difficult. For example, Mamet and Roux (1978a) considered that the "Paleoberesellacean" have nothing in common with *Moravammina* although *Kamaena index* Antropov, 1967 was synonymized with *Moravammina simplex* Eickhoff, 1968a by Mamet and Roux, 1974, p. 138, and Mamet, 1991, p. 407. The "alga" *Triangulinella* Mamet and Préat, 1985b is clearly synonym of *Moravammina*. Nevertheless, to the detailed Vachard's (1991, 1994a) arguments, Mamet (2006, p. 346) answered shortly.

Remarks. This order is the most inconsistent with the algal interpretation of the Algospongia, and remains assigned to the foraminifers by several authors (Loeblich and Tappan, 1964, 1984 and 1987; Vdovenko et al., 1993). Arguments for an assignment to algae (e. g., Mamet and Roux, 1978a) are generally deficient: (a) confusion between dasyclads *Mizzia* and sphinctozoa *Guadalupia* in the literature; (b) inconsistencies in the hierarchies of the authors advocating a sponge attribution; (c) morphological similarity between the dasyclad *Nanopora* and *Issinella* (it is not really true, and the microstructure of wall is fundamentally different; see hereafter); (d) Paleoberesellacean have nothing in common with *Moravammina* (but *Kamaena index* Antropov, 1967 is synonymized with *Moravammina simplex* Eickhoff, 1968a by Mamet and Roux, 1974, p. 138, and Mamet, 1991, p. 407); (e) they are rock-building, whereas "On ne connaît pas de boundstones à Foraminifères ou à Eponges" ("no boundstones with foraminifers or sponges are known") (the literature about the building foraminifers and sponges (notably in late Pennsylvanian and Permian) is huge!). I admit as a unique argument that the very great abundance of Moravamminales and Donezellaceae corresponds more to algal accumulations; foraminifers and sponges are fewer. The macroevolution of the Algospongia differs also from that of Paleozoic foraminifers and calcispongia, which are rather well-established now. Contrary to the Skompski's (1987) opinion, the "palaeoberesellid algae" are not interpreted here of "dasycladacean nature", because of (a) the type of wall composed of hyaline calcite, occasionaly monocrystalline; (b) the regular septation is not convenient with a dasyclad intusannulation (see definition in De Castro, 1997, p. 187); (c) the perforations (often interpreted as dasyclad laterals) are not really verticillate (compare e. g., Dil et al., 1977 and Skompski 1987, with De Castro, 1997). and the groups of canalicules are in fact aspondyles and not metaspondyles (Dil et al., 1977, fig. 14). In addition, no modern equivalent of these modes of perforations is known. The bracelets, interpreted as a system of attachment (Dil et al., 1977), can be regarded also as reproductive cavities more or less similar to some conceptacles of red algae.

Phylogeny. From the Issinellaceae, which are the first to present the tubular test, the Moravamminaceae derive by progressive development of the septation (pseudo-septa to well-developed septa). It is also the case for the foraminifers Fusulinata, with the trend Pseudoammodiscida-Tournayellida-Endothyrida-Fusulinida. Because of the calcitic, yellowish type of wall, and despite the difference in the canalicule textures, all the

Moravamminina were assigned to a unique order (Termier et al., 1975; H. Termier et al., 1977; Vachard, 1991). The Anthracoporellopsidaceae although very “deformed” in shape are included here in the Moravamminaceae because their evolution follow the same great lines. It is not the case for the Issinellaceae, Beresellaceae and Donezellaceae (hence, they were individualized since long time by the Russian authors); consequently, they are considered here as three different families. The Moravamminales possess typically tubular tests, but advanced forms, as such as the Donezellaceae Pokorninellinae n. trib. become laminar and lead to the Aoujgaliales, according to the phylogeny (stages 2 to 4) previously indicated by Vachard and Montenat (1981, fig. 20) and Vachard (1991, fig. 10). It was difficult to accept this hypothesis when the Moravamminida/Palaeosiphonales were considered as green algae (Shuysky, 1985; Mamet, 1991) and the Aoujgaliida were attributed to red algae (e.g., Mamet and Roux, 1977; Roux, 1985; Mamet, 1991).

Occurrence. Ordovician with some *Moravammina*? (see below). ?Late Silurian. Early Devonian-Late Permian for the other families. A Lazarus effect in the Mesozoic (*Kamaena khuraisensis* Adams and Al-Zahrani, 2000).

Family Anthracoporellopsidaceae Shuysky, 1985
nomen translat. Vachard in Vachard et al., 1989 (ex tribe Anthracoporellopsiae), emend. Vachard, 1994a

Diagnosis. Tubular to laminar thalli, and irregular development of a strong septation.

Composition. Two tribes: Anthracoporellopsideae Shuysky, 1985 orth. mut. Vachard and Cózar (submitted) and Labyrinthoconeae Langer, 1979 nomen translat. Vachard and Cózar (submitted).

Occurrence. Silurian-Middle Permian

Tribe Anthracoporellopsideae Shuysky, 1985 orth. mut. Vachard and Cózar (submitted)

Diagnosis. Tubular with rather strong and regular cellular wall ("septa").

Composition. Eigth genera.

Occurrence: As for the family.

Genus *Evlania* Bykova, 1952

Type species. *Evlania transversa* Bykova, 1952.

Diagnosis. Moravamminales very irregular in shape and with an incomplete to complete septation, never so regular as the one of Moravamminaceae. Attached initial stage, occasionaly coiled, followed by an uncoiled stage, erect or prostrate. Wall yellowish, with sometimes visible macles.

Remarks. (See Vachard, 1980, 1991 and 1994a).

Occurrence. Late Silurian-Late Permian, Palaeotethyan.

Evlania? sp.
Pl. 23, figs. 1-3.

v. ? p. 1974b *Kamaena* sp. - Vachard, p. 190, pl. 7, fig. 11 (non fig. 10 = *Exvotarisella*).
? 1975a *Anthracoporellopsis machaevii* Maslov - Mamet and Roux, p. 264, pl. 13, figs. 9-11.
v. 1977a *Evlania* (?) sp. - Vachard, p. 374, tabl. 1 (no illustration).
v. 1991c *Evlania* (?) sp. - Vachard et al., p. 677, pl. 1, fig. 25.

Description. Length = 0.700- 1.560 mm, outer diameter = 0.340-0.400 mm, inner diameter = 0.300-0.340 mm, wall thickness = 0.020-0.030 mm, diameter of "apertures" = 0.080-0.200 mm, height of cells = 0.200-0.400 mm.
Remarks. Due to the type of wall and perforations this form might be the ancestor of *Anthracoporellopsis* Maslov, 1956a.
Occurrence. Viséan from Belgium, Russia and Montagne Noire: Lenses of the road, near Roquessels) (DV293B, DV332A, DV.FB18); Roc du Cayla (DV466B); Japhet (DV126F, DV856.2); Roque Redonde (?RR56); Vailhan-Château (?DV246F); Les Pascales (?DV601A).

Genus *Pseudokamaena* Mamet in Petryk and Mamet, 1972
Type species. *Pseudokamaena armstrongi* Mamet in Petryk and Mamet, 1972.
Diagnosis. Cylindrical thallus, bifurcated. Curvated cell walls. Cells spherical, ovoid or pear-shaped. Communications between cells through the walls relatively long and arcuate. Wall yellowish, hyaline, granular.

Occurrence. Middle Devonian-Serpukhovian. Paleotethyan, Uralian and Northamerican.

Pseudokamaena cf. *armstrongi* Mamet in Petryk and Mamet, 1972
Pl. 23, fig. 4.
cf. 1972 *Pseudokamaena armstrongi* n. sp. Mamet in Petryk and Mamet, p. 779-780, pl. 3, fig. 2.
1976 *Pseudokamaena armstrongi* Mamet, Petryk (sic) - Emberger, p. 73 (no illustration) (with 3 references in synonymy).
v. 1977 *Pseudokamaena* cf. *armstrongi* Mamet in Petryk and Mamet - Perret and Vachard, p. 123, pl. 5, fig. 6.
cf.? 1988a *Pseudokamaena armstrongi* Mamet in Petryk and Mamet - Ivanova, p. 6 (no illustration).
cf. 1990 *Pseudokamaena armstrongi* Mamet in Petryk and Mamet - Bogush et al., tabl. 1 p. 9, p. 101, pl. 9, figs. 14-16 (with 6 references in synonymy).
1996 *Pseudokamaena armstrongi* Mamet in Petryk and Mamet - Sebbar and Mamet, text-fig. 5. 56, pl. 2, figs. 16-17.
1999 *Pseudokamaena armstrongi* Mamet in Petryk and Mamet - Sebbar and Mamet, text-fig. 3. 91.

Description. Length = 1.080 mm, outer diameter = 0.170-0.200 mm, inner diameter = 0.110 mm, wall thickness = 0.025-0.040 mm, diameter of "apertures" = 0.045-0.050 mm, height of cells = 0.070-0.090 mm.
Occurrence. Latest Devonian-middle Viséan (Bogush et al., 1990), North America, Urals, Donbass, Siberia and Afghanistan. Late Serpukhovian of Algeria. Late Serpukhovian of Ardengost area: RC 8559 (see Perret and Vachard, 1977).

Family Moravamminaceae Pokorny, 1951 nomen translat. Loeblich and Tappan, 1961
(ex subfamily Moravammininae) emend. Termier et al., 1975
orth mut. herein pro Moravamminidae

Diagnosis. Thallus tubular, septate, conical or with coiled initial part. Wall hyaline, yellowish, perforated by laterals with one, two or three orders of ramifications.

Synonyms. Palaeoberesellinae Mamet and Roux, 1974 = Palaeoberesellaceae nomen translat. Shuysky, 1985; Kamaeneae Shuysky, 1985; Exvotariselleae Shuysky, 1985.

Composition. Two tribes: Kettnerammineae and Moravammineae.

Remarks. Because of three orders of ramifications of the laterals, Exvotarisella can appear similar to dasycladaceans (Skompski, 1987, 1996), but the septation, the areal aperture and the yellowish originally calcitic wall and the tufts aspondyl and not metaspondyl, are different and belong to another order of incertae sedis algae.

Occurrence. Early Devonian-Serpukhovian (Vachard, 1991). Palaeotethyan and Uralian.

Tribe Moravammineae Pokorny, 1951 nom. translat. Vachard and Cózar (submitted)

Diagnosis. Regularly and strongly septate, bifurcated, isolated tubes, occasionally coiled in the initial stage.

Composition. Nine genera.

Occurrence. As for the family.

Genus *Moravammina* Pokorny, 1951 emend. Vachard, 1991

Type species. *Moravammina segmentata* Pokorny, 1951.

Synonyms. *Triangulinella* Mamet and Préat, 1985b, *Kamaena* Antropov, 1967 (pars), *Nodosinella* (pars) sensu Malakhova, 1975b, ?*Halysis* Høeg, 1932 sensu Mamet et al., 1992 (pars) (see also Vachard, 1991); *Luteotubulus* sensu Cózar and Somerville, 2005d (fig. 5.8).

Diagnosis. Moravamminacean tubular, septated, occasionaly bifurcated. Attached, coiled and after uncoiled. Wall yellowish, oligocrystalline, without laterals.

Remarks. The best section of a Viséan *Moravammina* was published by Bless et al. (1976).

Occurrence. Early Devonian-Serpukhovian, Palaeotethyan (until Thailand) and Uralian.

Moravammina cf. *carbonica* Fomina, 1960

Pl. 23, figs. 5-10.

1960 *Moravammina carbonica* n. sp. Fomina, p. 117, pl. 2, figs. 1-4.
v. p. 1974b *Moravammina*? sp. 1 - Vachard, p. 191, pl. 27, fig. 13 only (non fig. 14 = basal? part of a *Kamaenella* colony, nec fig. 15 = *Stacheoides cannindahensis* Mamet and Roux, 1983; see below).
? 1976 *Moravammina* sp. - Bless et al., pl. 12, fig. 19 (or another species).
v. 1977a *Moravammina* cf. *carbonica* Fomina - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977a *Moravammina* n. sp. - Vachard, p. 374, tabl. 1 (no illustration).
v. 1982 *Moravammina*? n. sp. - Fontaine et al., p. 48 (no illustration).
? 1995 *Kamaena awirsi* Mamet y Roux - Sánchez-Chico, p. 74, pl. 1, fig. 10.
? 2005 *Moravammina* cf. *segmentata* Pokorny - Sanz-Lopez et al., pl. 6, fig. 7.
? 2006 *Kamaena* spp. (sic) - Gallagher et al., fig. 13. 6.

Description. Length of tubular part = 1.600 mm; outer diameter = 0.070-0.200 mm; inner diameter = 0.060-0.100 mm; thickness of wall = 0.020-0.050 mm; thickness of septa = 0.020-0.050 mm; height of cells = 0.040-0.060 mm.

Remarks. Many *Kamaena* seems to be incomplete section of *Moravammina*. The oldest *Moravammina/Kamaena* seem to be illustrated under the name *Halysis moniliformis* Høeg, 1932 by Mamet et al. (1992, pl. 13, 17 only).

Occurrence. ?Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (?DV293I); Japhet (DV127A, DV350A, DV856A); Roquemaillère (DV133E, DV 134, DV134C, DV134F); Roc du Cayla (MA12.26); Roque Redonde (RR61); Laurens (ML.UM.LAU.T); Vailhan area (DV246D, DV313, DV325, DV327A); Les Batailles (DV609); Saint Rome (DV132C); late Serpukhovian of Ardengost area: MFP.AH18E.

Genus *Kamaena* Antropov, 1967

Type species. *Kamaena delicata* Antropov, 1967.

Diagnosis. Thallus cylindrical, bifurcated, perforated by rare aspondyl primary canalicules, or imperforate. Strong cell walls (= septa) with a median single aperture.

Remarks. *Moravammina* nor *Devonoscala* are synonyms of *Kamaena* , as well as *Triangulinella*. All correspond to different genera of Moravamminales.

Occurrence. Middle Devonian-latest Brigantian (Mamet and Roux, 1974; Vachard et al., 1991c), Palaeotethyan, plus Siberia, North America, Bolivia. Lazarus effect with *K. khuraisensis* Adams and Al-Zahrani, 2000 in the late Jurassic of Saudi Arabia.

Kamaena aff. *magna* Ivanova, 1988a
Pl. 23, figs. 11-15.

aff. 1988a *Kamaena* magna n. sp. Ivanova, p. 9, pl. 1, figs. 1-2 (with synonymy).
aff. 1990 *Kamaena* magna Ivanova - Bogush et al., p. 89-90, pl. 7, figs. 2-4 (with 4 references in synonymy).

Description. The thallus is bifurcated, of great size for the genus, with regular septation and shape of cells, the wall is yellow, granular and slightly maculate. Outer diameter = 0.160-0.200 mm; thickness of wall = 0.015-0.030 mm; thickness of septa = 0.020-0.025 mm; height of cells = 0.050-0.100 mm.
Remarks. *K. magna* is a perfect homeomorph of *K. pirleti* Mamet and Roux, 1974, but the age and the microstructure of the wall seem to be different. Because of this character, I determinate this unique specimen as more related to *K. magna* than *K. pirleti.*
Occurrence. Early-late Viséan of Urals, Kuzbass and Kolyma Massif. Earliest Brigantian of Montagne Noire: Castelsec (MA10.12).

Genus *Exvotarisella* Elliott, 1970

Type species. *Nodosinella index* (Ehrenberg, 1854) sensu von Möller, 1879 = *Exvotarisella maponi* Elliott, 1970 (fide Mamet and Roux, 1974, 1983).
Diagnosis. Large and cylindrical Moravamminaceae. Curvated septa, thick, perpendicular to truncated ellipsoidal cells. Laterals aspondyl, numerous, with three or rarely four orders of ramification. Attachment by bracelets (Mamet and Roux, 1974, pl. 6, fig. 2; Vachard in Dil et al., 1977, fig. 13; Vachard, 1991, pl. 5, fig. 2; Madi et al., 1996, pl. 24, fig. 7; Flügel, 2004, pl. 108, fig. 3; see also the examples in the similar genus *Palaeoberesella* Mamet and Roux, 1974: pl. 2, fig. 19, pl. 4, figs. 10, 14).
Remarks. With is several times ramified perforations, this genus narrowly looks like dasycladales, but two arguments can be opposed to this assignments: (1) although arranged in tufts, the wall perforations of *Exvotarisella* are aspondyl in their base, not euspondyl or metaspondyl; (2) similar ramified perforations can exist among the foraminifers Cyclammininae (compare with Banner, 1970, pl. 3, figs. 1-12; McNeil, 1988, text-fig. 3 p. 120).

Occurrence. ?Givetian of Belgium (Mamet and Préat, 1992, pl. 1, fig. 15). Famennian-Serpukhovian. England, Ireland, Belgium, France, Spain, Poland, Greece, Donbass, Russian Platform, Southern and middle Urals, Kuzbass, Siberian Platform, Omolon Massif; Algeria, Tarim, Newfounland, Morocco, Montagne Noire, Turkey, Australia (Dil et al., 1977; Mamet and Roux, 1983; Roux, 1985; Ivanova and Bogush, 1988; Bogush et al., 1990; and Cózar, 2004). Early Bashkirian of Algeria (Sebbar and Mamet, 1996; Sebbar, 2000).

Exvotarisella index (Ehrenberg, 1854 sensu von Möller, 1879) Mamet and Roux, 1974
Pl. 24, figs. 1-9.

1854 *Nodosaria Index* n. sp. Ehrenberg, pl. 37, fig. 10.
1879 *Nodosinella index* (Ehrenberg) n. comb. - von Möller, p. 74-75, pl. 2, fig. 7a-b, pl. 5, fig. 5.
1973 "*Kamaena*" *index* (von Möller) - Mamet, pl. 2, fig. 11-12, 14.
1974 *Exvotarisella index* (Ehrenberg, 1854 emend. von Möller) - Mamet and Roux, p. 148, 150, pl. 1, figs. 1-24, pl. 6, figs. 1-6 (with synonymy).
v. p. 1974b *Kamaena* sp. - Vachard, p. 190, pl. 7, fig. 10 (non fig. 11; perhaps *Evlania*? sp.).

1976 *Exvotarisella index* (Ehrenberg) Mamet, Roux - Emberger, p. 42 (no illustration, with 10 references in synonymy).
v. 1977a *Exvotarisella index* (Ehrenberg) - Vachard, p. 374, tabl. 1 (no illustration).
1978 *Exvotarisella index* (Ehrenberg emend. von Möller) - Jansa et al., p. 1434, pl. 1, fig. 14 (with synonymy).
1983 *Exvotarisella index* (Ehrenberg sensu von Möller) - Mamet and Roux, p. 73, pl. 5, figs. 9-11, 14 (with synonymy).
1985 *Exvotarisella index* (Ehrenberg emend. von Möller) - Roux, pl. 3, fig. 7.
1988 *Exvotarisella index* (Ehrenberg) - Ivanova and Bogush, p. 46 (pars) (no illustration).
1988a *Exvotarisella index* (Ehrenberg) - Ivanova, p. 6 (no illustration).
1990 *Exvotarisella index* (Ehrenberg emend. Möeller) - Bogush et al., p. 100, pl. 9, figs. 5-9 (with 6 references in synonymy).
1995 *Exvotarisella index* (Ehrenberg emend. von Möller) - Sánchez-Chico et al., p. 74, pl. 1, figs. 12-16.
1996 *Exvotarisella index* (Ehrenberg emend. von Möller) - Sebbar and Mamet, text-fig. 5. 16, pl. 2, fig. 9.
1996 *Exvotarisella* - Madi et al., pl. 24, figs. 7-8.
v. 1999 *Exvotarisella index* (Ehrenberg emend. von Möller) - Berkhli, p. 103, 105, 117, 119, 121, 122 (no illustration) .
2000 *Exvotarisella index* (Ehrenberg emend. von Möller) - Sebbar, pl. 4, fig. 11.
v. 2002a *Exvotarisella index* (Ehrenberg) Mamet and Roux - Berkhli et al., p. 193 (no illustration).
v. 2002b *Exvotarisella index* (Ehrenberg) Mamet and Roux - Berkhli et al., p. 138, 139 (no illustration) .
? 2004 *Exvotarisella index* (Ehrenberg emend. von Möller) - Cózar, text-fig. 3 p. 371, text-fig. 4 p. 372 (no illustration).
? 2004 *Exvotarisella index* (Ehrenberg emend. von Möller) - Cózar and Somerville, text-fig. 8 p. 48, text-fig. 9 p. 49 (no illustration).
2004 *Exvotarisella* - Flügel, pl. 108, figs. 3-4 (from Madi et al., 1996).
v. 2005 *Exvotarisella* sp. - Saïd, p. 176, p. 185, p. 187, p. 188, p. 190, p. 193 (no illlustration).
v. 2005 *Exvotarisella index* (Ehrenberg emend. von Möeller) emend. Mamet and Roux - Saïd, p. 181, p. 188, p. 190, p. 193 (no illlustration).

Description. No bifurcations were observed, the tubes have a rather great size, with irregular septation and shape of cells, the wall is yellow, granular, never monocrystalline. Outer diameter 0.175-0.350 mm; thickness of wall = 0.025-0.075 mm; thickness of septa = 0.050-0.100 mm; height of cells = 0.100-0.200 mm.

Occurrence. As for the genus. Brigantian-early Serpukhovian of Montagne Noire: Castelsec (MA10.10, MA10.12); Roquemaillère (ML.UM.ROQ; the specimen pl. 5, fig. 23 of Mamet and Roux, 1974 comes also from Roquemaillère); Les Pascales (DV601A); Les Mentaresses (DV328'B, DV328'C, DV328'D, DV328'E, DV687A).

Family Donezellaceae Termier et al., 1975
nom. translat. Vachard et al., 2001
(pro tribe Donezelleae Shuysky, 1985;
and pro family Donezellidae Termier et al., 1975)

Diagnosis. Atypical Moravamminales with colonial, erected and septate tubes, eventually looking like Aoujgaliidales, by their initial concentric layers of cells. Wall yellowish, sometimes perforated as Bereselleae (*Donezella*).

Composition. Four tribes Pokorninelleae n. trib., Donezelleae Termier et al., 1975 nomen translat. Shuysky, 1985; Labyrinthoconeae Langer, 1979 emend. Vachard, 1994a, nomen translat. herein; and Claracrusteae Vachard and Cózar (submitted).

Occurrence. Early Devonian-Late Permian, cosmopolite (*Donezella*) or limited to the Palaeotethys (*Kamaenella*, *Praedonezella*). ?Middle Permian of Turkey.

Tribe Pokorninelleae n. trib.

Diagnosis. Donezellaceae with well-developed concentric laminae, and septate tubular elements relatively rare to absent. Wall yellowish, occasionally perforated.

Composition. *Pokorninella* Vachard in Perret and Vachard, 1977 (= *Proninella* sensu Mamet and Roux, 1978b or 1983 non Reitlinger in Menner and Reitlinger, 1971), *Asphaltinella* Mamet and Roux, 1978b, *Precorninella* Vachard, 1991, and *Kleinbergella* Mamet and Boulvain, 1992.

Remarks. Morphologically, this tribe is exactly transitional between Moravamminales and Aoujgaliales because of the joint presence of tubes and laminae.

Occurrence. Early Devonian-Bashkirian, probably cosmopolite but poorly known.

Genus *Asphaltinella* Mamet and Roux, 1978b

Type species. *Asphaltinella horowitzi* Mamet and Roux, 1978b.

Diagnosis. Thallus encrusting, constituted of interwoven layers of cylindrical small tubes. Wall hyaline yellowish.

Occurrence.Viséan-early Moscovian. North America (Alaska), Algeria (Sebbar and Mamet, 1999), Spain (Cózar, 2005a, text-fig. 4 p. 409), Moscow Basin (Kabanov and Vachard, submitted).

Asphaltinella? sp.

Pl. 24, figs. 10-14.

Description. A part of these thalli can also belong to *Pokorninella strigosa* (as well as *Asphaltinella*? *bangorensis* Mamet and Roux, 1978b), or constitute the basal layers of *Kamaenella* colonies.

Occurrence. Latest Asbian-early Serpukhovian of Montagne Noire: Lenses of the road, near Roquessels (DV293A, ?DV293E, DV.FB3, DV.FB4); sommet 224-Valuzières (DV600B, ?DV600E); Castelsec (?MA10.9); Roquemaillère (DV134F, DV137C); Les Mentaresses (DV328'C, DV328'D); Roc de Murviel (MA.82); La Serre (?MA.LSI.top.2047).

Genus *Pokorninella* Vachard in Perret and Vachard, 1977

Type species. *Pokorninella strigosa* Vachard in Perret and Vachard, 1977.

Diagnosis. Thallus encrusting, constituted of interwoven layers followed by cylindrical, small, divided, erect tubes. Cells pear-shaped to barrel-shaped. Wall hyaline yellowish.

Synonym. *Proninella* sensu Mamet and Roux, 1978b or 1983, non Reitlinger in Menner and Reitlinger, 1971.

Remarks. Contrary to Mamet, this genus is absolutely different of *Proninella*. At least, in 2002, Mamet uses a question mark for "*Proninella*?" *strigosa*.

Occurrence. ?Late Devonian-early Tournaisian of Kazakhstan and Siberia. Middle Viséan (MFZ 11 = Cf4δ)-earliest Bashkirian (Voznesensky of Donets Basin). Palaeotethys and North America. Late Bashkirian of Thailand (Vachard, 1990).

Pokorninella strigosa Vachard in Perret and Vachard, 1977 emend.

Pl. 24, fig. 15.

1974 *Nostocites*? sp. - Rich, p. 368, 371, pl. 3, figs. 1-2, 5, 7-9, 11 (pars), 12-13, 16, 23.
1974 *Proninella* sp. - Rich, p. 373, pl. 3, figs. 3?, 4, 6?, 10?, 11?, 14-15, 17?, 18-21, 22?, 24, 25?, 26-27.
1975 *Donezella*? sp. 1 - Termier, Termier and Vachard, p. 82, pl. 9, figs. 7-9.
v. 1977 *Pokorninella strigosa* n. gen. n. sp. Vachard in Perret and Vachard, p. 122-123, pl. 7, figs. 2-4.
1977b *Nostocites*? sp. (see Rich, 1974) - Brenckle, pl. 4, figs. 6, 10-11.

p. 1978b *Asphaltinella* ? *bangorensis* n. sp. Mamet and Roux, p. 78-79, pl. 4, fig. 12-14 (non fig. 11 = *Pokorninella gracilis*. The proposed synonymy is completely incorrect, because of the correctly identified *Globochaete* of the Moroccan Devonian of Termier et al., 1975).
1978b *Proninella enigmatica* n. sp. Mamet and Roux, p. 83, pl. 7, figs. 1-5, 7-10.
v. p. 1979 *Donezella* cf. *lutugini* Maslov - Bensaïd, Termier, Termier and Vachard, pl. 16, fig. 1 (non pl. 1, fig. 8 = *Stacheoides*).
1983 *Proninella strigosa* (Vachard in Perret and Vachard) - Groves, p. 31, pl. 9, figs. 11-12.
non 1985 *Proninella strigosa* (Vachard in Perret and Vachard) - Mamet and Pinard, pl. 2, fig. 10 (an *Evlania*).
1987 *Asphaltinella* sp. - Brenckle and Groves, fig. 12: 20.
v. 1990 *Pokorninella strigosa* Vachard in Perret and Vachard - Vachard, p. 94 (no illustration).
1990 *Proninella enigmatica* Mamet and Roux - Bogush et al., pl. 10, fig. 20.
?1990 *Proninella minuscula* n. sp. Ivanova in Bogush et al., p. 105-106, pl. 10, figs. 18-19.
v. 1992 *Donezella* cf. *lutugini* Maslov emend. Vachard in Meissami et al., non auct. (sic) - Vachard and Berkhli, pl. 4, fig. 18.
1996 *Asphaltinella* sp. - Sebbar and Mamet, pl. 1, figs. 7-8.
v.1996 *Pokorninella strigosa* Vachard in Perret and Vachard - Vachard and Maslo, text-fig. 2 p. 360, pl. 1, figs. 3-8.
1997 *Asphaltinella* sp. - Harris et al., fig. 9. 14.
2000 *Asphaltinella* sp. - Sebbar, pl. 4, figs. 3-4.
p. 2002 *Proninella*? *strigosa* (Vachard in Perret and Vachard) - Mamet, p. 502-503, pl. 7, figs. 7-8 (with debatable synonymy).
2006 *Proninella strigosa* (Vachard in Perret and Vachard) - Mamet, p. 345, pl. 7, fig. 12 (with 11 references in synonymy discussed herein).

Description. Length of thallus = 0.440-0.800 mm, diameter of a tube = 0.076-0.140 mm; inner tube diameter = 0.060-0.125 mm, wall thickness = 0.008-0.020 mm, diameter of "apertures"= 0.080-0.120 mm, height of cell = 0.080-0.120 mm.

Remarks. In 2002 and 2006, the synonymy with *Proninella enigmatica* Mamet and Roux, 1978b is admitted by Mamet himself, but extended to *Pokorninella gracilis* Vachard in Meissami et al., 1978 which is another species due to the primitive characters listed in its diagnosis.

Occurrence. As for the genus. Rare in the late Serpukhovian of Pyrenees: MFP.AH.A/81, AH.B/81.6.

Tribe Donezelleae Termier et al., 1975
nomen translat. Shuysky, 1985 non Chuvashov et al., 1987
(ex family Donezellidae) emend. Vachard and Cózar (submitted)

Description. Contrary to the Pokorninelleae, this tribe is characterized by the development of the tubular structures, forming small bafflestones. They are erected and often bifurcated tubes, gregarious, regularly and strongly septate.

Composition. *Donezella* Maslov, 1929 (= *Goksuella* Güvenç, 1965), *Praedonezella* Kulik, 1973, *Kamaenella* Mamet and Roux, 1974, ? *Einorella* Saltovskaya, 1984a, ?*Groenlandella* Mamet and Stemmerik, 2000, ?*Alanyana* Güvenç, 1967.

Synonym. Goksuellinae H. Termier et al., 1977.

Remarks. The palaeoecology of *Donezella* is a definite argument against a dasyclad origin for the donezellaceans and related genera (thus the Algospongia). In the Cantabrian Mountains, patches of *Donezella* in growth position have been recorded at 200-300 m depth (Della Porta et al., 2002). There is no living dasyclads at such similar depth.

Occurrence. Viséan-Moscovian, cosmopolite (*Donezella*) or limited to the Palaeotethys (*Kamaenella*, *Praedonezella*). ?Middle Permian of Turkey.

Genus *Kamaenella* Mamet and Roux, 1974

Type species. *Kamaenella denbighi* Mamet and Roux, 1974.

Diagnosis. Colonies of small, intensively bifurcated and septate thalli. Cells higher than wide. No laterals. Base of colonies unknown. Wall yellow.

Remarks. Contrary to Vachard et al. (2004a), I think that *Kamaenella* is the direct ancestor of *Praedonezella*. The basal fasciellid layer described by Perret and Vachard (1977) is an advanced character, absent in the primitive species *P. primitiva*. The great productivity of this alga (constituting up to 50-60% of the rock volume, according to Cózar, 2004, p. 373) announces that of *Praedonezella* and *Donezella*, and justify the phylogeny adopted here, contrary to Mamet and Roux, 1974.

Occurrence. Middle-late Viséan, Palaeotethyan until Newfoundland. Acme in the late Asbian (Gallagher, 1996, fig. 2), or two successive acmes, early and late Asbian, respectively (Cózar and Somerville, 2004, text-fig. 12; Cózar and Somerville, 2005b, text-figs. 3, 6). Early Serpukhovian of Algeria (Sebbar and Mamet, 1996, text-fig. 5. 24).

Kamaenella denbighi Mamet and Roux, 1974

Pl. 25, figs. 1-8.

1974 *Kamaenella denbighi* n. sp. Mamet and Roux, p. 150, text-fig. 8 p. 152 (pars), pl. 7, figs. 1-5.
v. p. 1974b *Moravammina*? sp. 1 - Vachard, p. 191, pl. 27, fig. 14 only (non fig. 13 = a tube of *Moravammina*, nec fig. 15 = *Stacheoides cannindahensis* Mamet and Roux, 1983).
1976 *Kamaenella denbighi* Mamet and Roux - Emberger, p. 48 (no illustration).
v. 1977a *Kamaenella* sp. - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977 *Kamaenella denbighi* Mamet and Roux - Vachard, Termier and Termier, pl. 2, fig. 14.
1978 *Kamaenella denbighi* Mamet and Roux - Jansa et al., p. 1434, pl. 1, figs. 1-7.
non 1981 *Kamaenella denbighi* Mamet and Roux - Berchenko, p. 16, pl. 6, figs. 19-21, pl. 27, figs. 3, 8, pl. 28, fig. 5 (= small *Kamaena*).
1981 *Kamaenella denbighi* Mamet and Roux - Mamet and Martinez, pl. 1, fig. 1.
1985 *Kamaenella denbighi* Mamet and Roux - Roux, p. 572, pl. 3, fig. 9.
?1986 *Kamaenella* aff. *denbighi* Mamet and Roux - Skompski, p. 266-267, pl. 8, fig. 4.
1988a *Kamaenella denbighi* Mamet and Roux - Ivanova, p. 6, pl. 1, figs. 9-10.
1990 *Kamaenella denbighi* Mamet and Roux - Bogush et al., tabl. 1 p. 9, p. 93, pl. 7, figs. 8-9 (with synonymy).
1991 *Kamaenella denbighi* Mamet and Roux - Mamet, pl. 1, fig. h.
1992 *Kamaenella denbighi* Mamet and Roux - Horbury, fig. 5 A-B, D?, fig. 6A, fig. 7A-C?
1995 *Kamaenella denbighi* Mamet and Roux - Sánchez-Chico et al., p. 74, pl. 1, fig. 9.
2004 *Kamaenella denbighi* Mamet and Roux - Cózar, p. 373, text-fig. 3 p. 371 (pars), text-fig. 4 p. 372 (pars), pl. 1, fig. 3.
2004 *Kamaenella denbighi* Mamet and Roux - Cózar and Somerville, text-fig. 5 p. 46, text-fig. 6 p. 47, text-fig. 8 p. 48, text-fig. 15 p. 61 (no illustration).
2004 *Kamaenella denbighi* Mamet and Roux - Brenckle, pl. 6, fig. 17.
2005b *Kamaenella denbighi* Mamet and Roux - Cózar and Somerville, p. 86 (no illustration).

Description. Diameter of a tube = 0.080-0.140 mm, wall thickness = 0.008-0.020 mm, bifurcation angle of thalli = 55-85°.

Occurrence. Viséan, France, England, Spain, Morocco, Newfoundland, Southern Urals, Northern China (Tarim). Latest Asbian (acme zone) of Northern England. Brigantian of Southwestern Spain. Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293C, DV293.2A, DV332', DV848, DV.FB3); Castelsec (MA10.6, MA10.12); Roc du Cayla (?MA83A); Roque Redonde (RR4, RR70); Jeantels (DV690B); Roc de Murviel (MA40).

Tribe Claracrusteae Vachard and Cózar (submitted)

Diagnosis: Encrusting Donezellaceae, crustose, laminar with concentric to uniseriate growth, with rare erected rows of cells. The endoskeleton is composed of continuous rows of cells, more or less arranged in concentric laminae growing laterally. Wall calcitic, yellowish, hyaline.

Composition. *Claracrusta* (= *Berestovia*), *Ungdarellina* Mamet, 2002.

Discussion. Many morphological similarities exist between ungdarellaceans and claracrustan (see *Claracrusta ungdarelloidea* Vachard et al., 2001; see also *Ungdarellina* Mamet, 2002 more similar to a *Claracrusta* than to a *Ungdarella*). This similarity is interpreted as convergence and not as a phylogeny. This group is relatively particular and atypical (as well as the Labyrinthoconeae), and the phylogeny established in the Donbass Basin Ukraine (Vachard and Maslo, 1996) is supposed here as misinterpreted.

Occurrence: Latest Viséan-Middle (?Late) Permian, cosmopolite.

Genus *Claracrusta* Vachard in Vachard and Montenat, 1981

Type species. *Girvanella catenoides* Homann, 1972.

Synonyms. *Girvanella* (pars), *Berestovia* Berchenko, 1982 (non sensu Mamet and Villa, 2004).

Diagnosis. Thallus crustose composed of continuous rows of highly calcified hemisphaerical to ellipsoidal cells, flattened at the base. Wall hyaline, yellowish.

Remarks. The *Valuzieria sescenti* illustrated by Vachard et al. (1991a, pl. 1, fig. 7) of the MFZ13 = Cf6β of Morocco can constitute a transitional form to *Claracrusta*, which appears at the base of the MFZ14 = Cf6δ biozone (see below). *Claracrusta* associated with *Girvanella* and/or other cyanobacterial crusts constitute the assemblages of "*Ottonosia*"-type, very numerous during the Permian, but yet present since the Brigantian in Morocco (Saïd, 2005, fig. XII.4b, fig. XII.6d). In the investigated material of the Donets Basin (collection D. Vachard), I have not seen differences between *Berestovia* and *Claracrusta*.

Occurrence. In Northern England and southeast Ireland, the FAD is earliest Brigantian in age (Sebbar et al., 2000; Cózar and Somerville, 2004, 2005a, 2005b), and Kurmakovsky-Serpukhovian in Urals (Ivanova, 1988a, p. 7; Bogush et al., 1990, p. 9), as well as in S.E. Ireland (Cózar and Somerville, 2005d, text-fig. 3 p. 101). In Morocco, the FAD might to be latest Asbian in the type locality of the Tizra Formation (Saïd, 2005, fig. XII. 4; Karim and Vachard, unpublished data); the report in the late Asbian of SW Spain (Cózar and Somerville, 2005b, p. 88) seems to be an exception. The total range is latest Viséan to late Permian, cosmopolite.

Claracrusta ex gr. *catenoides* (Homann, 1972) Vachard in Vachard and Montenat, 1981

Pl. 25, figs. 9-15.

1972 *Girvanella catenoides* n. sp. Homann, p. 239-241, pl. 8, figs. 59 a, b, c.

1979 *Cuneiphycus johnsoni* Flügel - Zagorodnyuk, p. 12, pl. 3, fig. 5.

1974 *Donezella intertexta* n. sp. Chuvashov, p. 33-34, pl. 20, figs. 5-9.

1980 *Claracrusta catenoides* (Homann) n. gen. n. comb. Vachard, p. 392-393, pl. 7, fig. 5, pl. 25, fig. 1, pl. 26, figs. 1-3 (nomen nudum).

1980 *Girvanella catenoides* Homann - Flügel, pl. 9, figs. 2, 5.

v. 1981 *Claracrusta catenoides* (Homann) - Vachard and Montenat, p. 57-58, pl. 1, fig. 1, pl. 8, figs. 8, 10, 12, pl. 9, fig. 1, pl. 12, fig. 10 (with synonymy).

1982 *Berestovia filaris* n. gen. n. sp. Berchenko, p. 53, pl. 12, figs. 1-4.

1983 *Berestovia filaris* Berchenko - Berchenko in Aizenverg et al., p. 128, pl. 84, fig. 2, pl. 86, figs. 5-6, pl. 87, fig. 1.

p. 1983 *Donezella delicata* Berchenko - Berchenko in Aizenverg et al., p. 126, pl. 86, figs. 2-3 (non pl. 85, figs. 5-9, true *D. delicata*).

1986b *Claracrusta catenoides* (Homann) - Poncet, p. 192, pl. 3, fig. 5.

1988a *Claracrusta catenoides* (Homann) - Ivanova, p. 7 (no illustration).
1989 *Claracrusta* sp. - Sebbar and Lys, pl. 1, fig. 6.
v. 1989b *Claracrusta catenoides* - Vachard, pl. 8, fig. 6.
1990 *Claracrusta catenoides* (Homann) - Flügel, pl. 1, fig. 4.
1990 *Claracrusta catenoides* (Homann) - Bogush et al., tabl. 1 p. 9, p. 84-85, pl. 5, fig. 10 (with 5 references in synonymy).
v. p. 1992 no legend (encrusting the *Coeloporella*) - Vachard and Berkhli, pl. 3, fig. 11.
1993a *Claracrusta catenoides* (Homann) - Vachard et al., pl. 2, fig. 5.
1994 *Claracrusta catenoides* (Homann) - Mamet, pl. 2, figs. 8-14, pl. 3, figs. 6-7.
1995 *Claracrusta catenoides* (Homann) - Forke, p. 241, pl. 15, fig. 7.
1996 *Claracrusta catenoides* (Homann) - Sebbar and Mamet, pl. 1, figs. 4-5.
v. 1996 *Claracrusta catenoides* (Homann) - Proust et al., p. 346 (no figuration).
v. 1996 *Claracrusta catenoides* (Homann) - Vachard and Maslo, p. 369-370, text-fig. 2 p. 360-365, pl. 1, figs. 1-2 (with synonymy).
1997 *Berestovia filaris* Berchenko - Harris et al., fig. 9. 12.
v. 1997 *Claracrusta catenoides* (Homann) - Fontaine et al., p. 7 (no illustration).
1999 *Berestovia*? ou *Iberiaella*? - Sebbar and Mamet, text-fig. 3. 100.
1999 *Claracrusta catenoides* (Homann) - Sebbar and Mamet, text-fig. 3. 99.
2000 *Claracrusta* sp. - Sebbar, pl. 1, fig. 10.
2000 *Claracrusta catenoides* (Homann) - Mamet and Stemmerik, fig. 9 E-F.
2001a *Claracrusta* ex gr. *catenoides* (Homann) - Vachard and Krainer, pl. 5, fig. 8.
2002 *Claracrusta catenoides* (Homann) - Mamet, p. 502, pl. 7, fig. 3 (with synonymy).
2003 *Claracrusta catenoides* (Homann) - Khodjanyazova and Mamet, pl. 5, figs. 8-9.
2003a *Claracrusta catenoides* (Homann) - Cózar et al., pl. 5, fig. 1.
2003a *Claracrusta catenoides* (Homann) - Krainer et al., pl. 3, fig. 32.
? 2004 *Claracrusta* spp. (mostly *C. catenoides* (Homann) (sic) emend. Vachard) - Cózar, p. 373, text-fig. 3 p. 371 (no illustration).
2004 *Claracrusta catenoides* (Homann) - Cózar and Rodríguez, fig. 9. 17.
2004 *Claracrusta catenoides* (Homann) Vachard - Cózar and Somerville, text-fig. 5 p. 46, text-fig. 8 p. 48, text-fig. 9 p. 49, fig. 13. 6, 10, fig. 14. 25.
2004 *Claracrusta catenoides* (Homann) (= *Berestovia filaris* Berchenko, 1982; see Mamet 2002) - Brenckle, pl. 6, fig. 10.
2004 *Berestovia filaris* Berchenko - Mamet and Villa, p. 172, fig. 14 n-o (with 4 references in synonymy).
2004 *Claracrusta catenoides* (Homann) - Mamet and Villa, p.172, fig. 14 k-m, 15 o (with 19 references in synonymy).
2004 *Claracrusta catenoides* (Homann) - Cózar et al., fig. 11. 21.
2005a *Claracrusta catenoides* (Homann) - Cózar and Somerville, text-fig. 16 p. 25, fig. 14. 6.
v. 2005 *Claracrusta* sp. - Saïd, p. 177, p. 178, p. 179, p. 181, p. 183, p. 185, p. 187 (no illustration).
2005a *Claracrusta catenoides* (Homann) - Cózar, text-fig. 3 p. 408, text-fig. 9 p. 409, fig. 5. 8.
2005b *Claracrusta catenoides* (Homann) - Cózar and Somerville, pl. 2, fig. 5.
2005b *Claracrusta catenoides* (Homann) emend. Vachard - Cózar et al., fig. 8. 32.
2005c *Claracrusta catenoides* (Homann emend. Vachard) - Cózar et al., fig. 11. 21.
2005 *Claracrusta catenoides* (Homann) - Mamet and Zhu, fig. 5I.

Description. The rows of cells are entirely horizontal, large, proportionally very long, very a continuous upper surface. No roofs are observed at the base of cells. The cells are weakly semiellipsoidal. Some synapses between cells, and perforations of the walls are visible in well preserved specimens. Diameter of cells = 0.035-0.057 mm; height of cells = 0.040-0.085 mm; wall thickness = 0.008-0.011 mm.

Occurrence. As for the genus. Brigantian-early Serpukhovian of Montagne Noire. Castelsec (MA10-I); Japhet ?DV127C, ?DV857.2); Roque Redonde (RR1); Tourière (DV341B); Les Pascales (DV601D, DV602A, DV602C); Roc de Murviel (MA24, MA47); La Serre (?MA.LSI.2039, ?MA.LSI.2040).

4.3. Algospongia Aoujgaliales

Order Aoujgaliales Termier, Termier and Vachard, 1975
(orth. mut. herein pro Aoujgaliida) emend. Vachard and Cózar (submitted)

Diagnosis. Attached, laminar to cylindrical or conical, bifurcated thalli, composed of cellular rows, concentric or uniseriate. Encrusting or erect thallus. Irregular shape, generally subconical, occasionally cylindrical, ramified. Endoskeleton constituted of rows of cells connected with a central or basal communication. Cells quadratic to hemisphaerical, generally irregular. The system of attachment is generally undifferentiated but can be preserved as "baskets" (e. g., *Ungdarella*). Wall calcitic, yellowish, hyaline and granular, generally compact or finely perforated (*Pseudostacheoides*). Wall perforations are lacking in typical specimens. Some interruptions of the cell wall can exist (*Claracrusta*, *Ungdarella*).

Composition. Five families: Aoujgaliaceae G. Termier, Termier and Vachard, 1975; Pseudokomiaceae n. fam., Stacheiaceae Loeblich and Tappan, 1961; Ungdarellaceae Maslov, 1956b; and Calcifoliaceae G. Termier, Termier and Vachard, 1977.

Discussion. The Aoujgaliales differ from the red algae Melobesioidea in the irregularities of cells; in the communication between the cells (the cells of Melobesioidea are completely closed) and the absence of conceptacles (Vachard et al. 2001). We interpret *Ungdarella* such as Vachard and Montenat 1981 (fig. 19), and this reconstructed organization differs from that of a true red algae morphologically similar, such as the Triassic *Dendronella* Moussavian and Senowbari-Daryan, 1988. The Aoujgaliales differ from the Calcispongia in the too weak communication between the skeletal elements and the absence of spongocoele. The Aoujgaliales differ from the stromatoporoids in the less regular skeletal structure and a much smaller size. The Pharetronid sponges *Vaceletia crypta* (Vacelet, 1977) and *Stylophthalmia* sp. (Vacelet, 1977, 1979; Gautret 1985) have a skeletal architecture comparable with the Aoujgaliale *Stacheia marginulinoides* (compare with Vachard and Berkhli, 1992, pl. 4, fig. 17) or *Conilalia africana* (compare with Massa and Vachard, 1979, pl. 8, fig. 7), but this latter group of Aoujgaliales have no spongocoele, nor oscule.

Phylogeny: The ancestor of this order is probably *Pokorninella* or *Kleinbergella*. The most primitive Aoujgaliaceae is probably *Pseudostacheoides* or *Stacheoides*. A lineage possesses cells more quadratic, i.e., the group *Aoujgalia*, *Mametella*. The latter genus generates probably *Fourstonella* and the Stacheiaceae. A second lineage corresponds to an irregular organisation of the entire thallus (*Sinustacheoides*). *Stacheoides tenuis* Petryk and Mamet, 1972 is probably the ancestor of *Ungdarella* (Vachard and Tahiri, 1991). *Claracrusta* can be derived from another species of *Stacheoides*, for example *Stacheoidella spissa* (Petryk and Mamet, 1972). The Calcifoliales could be derived from *Pseudostacheoides* or *Stacheoidella*.

Occurrence. Late Tournaisian-late Permian (acme during the middle-late Viséan), principally Palaeotethyan.

Family Aoujgaliaceae Termier, Termier and Vachard, 1975
(orth. mut. herein pro Aoujgaliidae)

Description. Attached thalli with roughly concentric rows of cells, with quadratic, hemispherical or labyrinthic shape of cells. Wall yellowish granular sometimes entirely recrystallized.

Composition. Two tribes Aoujgalieae Termier, Termier and Vachard, 1975 (with quadratic cells), and Pseudostacheoidideae Chuvashov in Chuvashov et al., 1987 (with hemisphaerical to labyrinthic cells).

Occurrence. Late Tournaisian-late Permian, probably cosmopolite (Vachard, pers. comm.).

Tribe Pseudostacheoidideae Chuvashov in Chuvashov et al., 1987

Description. Aoujgaliidae with hemisphaerical to labyrinthic cells.

Composition. *Pseudostacheoides* Petryk and Mamet, 1972; *Stacheoides* Cummings, 1955c; Chantonia G. Termier, Termier and Vachard, 1977; *Stacheoidella* Mamet and Roux in Mamet et al., 1987; *Sinustacheoides* G. Termier, Termier and Vachard, 1977; ?*Kulikaella* Berchenko, 1981.

Remarks. *Stacheoides* and *Pseudostacheoides* derive probably from the Frasnian genus *Kleinbergella* (the history of the group during the Famennian is unknown). *Stacheoides* generates *Aoujgalia* and *Ungdarella*. *Stacheoidella* is the ancestor of the Calcifoliaceae. *Sinustacheoides* gives the Pseudokomiaceae.

Occurrence. Late Tournaisian-late Permian, probably cosmopolite.

Genus *Stacheoides* Cummings, 1955c

Type species. *Stacheia polytrematoides* Brady, 1876.

Diagnosis. Thallus attached, with roughly concentric rows of irregular cells and external protuberances. Cells irregular more or less hemiellipsoidal in shape. Wall calcitic, yellowish.

Remarks. Among the species initially emplaced in *Stacheoides*, two were attributed to another genera: *Sinustacheoides meandriformis* (Mamet and Rudloff, 1972) and *Stacheoidella spissa* (Petryk and Mamet, 1972). Although perfectly justified, *Sinustacheoides* remain to be completely forgotten by Mamet, Groves and Brenckle.

Occurrence. Late Tournaisian-late Permian, probably cosmopolite (Perret and Vachard, 1977).

Stacheoides polytrematoides (Brady, 1876)

Pl. 26, figs. 1-3

1876 *Stacheia polytrematoides* n. sp. Brady, p. 118-119, pl. 9, figs. 9-13.
1955c *Stacheoides polytrematoides* (Brady) - Cummings, p. 344, figs. 2-3, 7-8.
v. 1977 *Stacheoides polytrematoides* (Brady) - Perret and Vachard, p. 115-116, pl. 5, figs. 2, 7 (with synonymy).
v. 1977 *Stacheoides papillata* Cummings - G. Termier, Termier and Vachard, pl. 6, fig. 3, 9.
v. 1977a *Stacheoides polytrematoides* (Brady) - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977a *Stacheoides papillata* Cummings - Vachard, p. 374, tabl. 1 (no illustration).
1977 *Stacheoides polytrematoides* (Brady) - Mamet and Roux, p. 224-225, pl. 3, figs. 3-12 (with synonymy).
v. 1977b *Stacheoides* cf. *papillata* Cummings - Vachard, p. 165, pl. 18, figs. 18, 23.
v. 1980 *Stacheoides polytrematoides* (Brady) - Vachard, pl. 20, fig. 3.
1980 *Stacheoides* sp. - Malakhova, pl. 20, fig. 3.
? 1983 *Archaeolithophyllum vailhani* Mamet and Roux - Berchenko in Aizenverg et al., p. 82, figs. 3, 6-7 (or *S. papillata* Cummings).
v. 1984 *Stacheoides polytrematoides* (Brady) - Vachard and Massa, pl. 2, fig. 1.
? 1985 *Stacheoides polytrematoides* (Brady) - Mamet and Pinard, pl. 3, fig. 3 (looks like *Aoujgalia variabilis* Termier and Termier).
1985 *Stacheoides polytrematoides* (Brady) - Roux, p. 602 (no illustration).
1986 *Stacheoides polytrematoides* (Brady) - Skompski, p. 270, pl. 11, figs. 1-9, pl. 12, figs. 1-5, pl. 14, figs. 3-4.
1988 *Stacheoides polytrematoides* (Brady) - Ivanova and Bogush, pl. 17, figs. 6-9, pl. 18, figs. 5-6.
1988a *Stacheoides polytrematoides* (Brady) - Ivanova, p. 7 (no illustration).
non 1989 *Stacheoides polytrematoides* (Brady) - Skompski et al., p. 270, pl. 2, fig. 1 (= *S. tenuis*, see below).
? 1989 *Stacheia polytrematoides* Brady - Ebner in Ebner and Kahler, p. 61 (with synonymy) (no illustration).
p. 1990 *Stacheoides polytrematoides* Brady (sic) - Bogush et al., tabl. 1 p. 11, p. 129-130, pl. 27, fig. 14, pl. 28, figs. 1-6 (with 7 references in synonymy; erroneous synonymy).
v. 1991b *Stacheoides polytrematoides* (Brady) - Vachard et al., pl. 1, fig. 16.
v. 1991c *Stacheoides polytrematoides* (Brady) - Vachard et al., p. 677, pl. 1, fig. 24.
v. 1992 *Stacheoides polytrematoides* (Brady) - Vachard and Berkhli, pl. 1, fig. 22.
v. 1993b *Stacheoides polytrematoides* (Brady) - Vachard et al., pl. 3, figs. 13-14.
1994 *Stacheoides polytrematoides* (Brady) - Mamet, pl. 2, fig. 6.
v. 1994 *Stacheoides polytrematoides* (Brady) - Delvolvé et al., fig. 2. 2.

1999 *Stacheoides polytrematoides* (Brady) - Sebbar and Mamet, text-fig. 3. 70 (no illustration).
v. 2002 *Stacheoides* cf. *polytrematoides* (Brady) - Krainer and Vachard, p. 14, pl. 2, fig. 15 (with synonymy).
2004 *Stacheoides polytrematoides* (Brady) - Cózar and Somerville, text-fig. 3, text-fig. 5, text-fig. 6, text-fig. 8 (no illustration).
v. 2005 *Stacheoides polytrematoides* (Brady) - Saïd, p. 188 (no illustration).

Description. See Perret and Vachard (1977). Diameter of the thallus = 0.350-1.700 x 1.100-4.800 mm; thickness of cell walls = 0.020-0.055 mm; with of cells = 0.008-0.010 mm.
Occurrence. Probably as for the genus (see Perret and Vachard, 1977). Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293E); Castelsec (MA.10.9, MA10.10, MA10.12, ?MA10.17); Roc du Cayla (DV82F); Japhet (DV856); Vailhan-Roque de Loup (DV327B); Les Mentaresses (DV329A). Late Serpukhovian of Ardengost area.

Stacheoides tenuis Petryk and Mamet, 1972
Pl. 26, figs. 4-5.

? v. p. 1969 Algues? - Conil et al., pl. 1, fig. 3.
1972 *Stacheoides tenuis* n. sp. Petryk and Mamet, p. 787, text-fig. 5b p. 789, pl. 6, figs. 1-6, pl. 7, figs. 1-4, 5?, 6, 9.
1972 *Stacheoides tenuis* Petryk and Mamet - Mamet and Rudloff, p. 90, pl. 7, figs. 4-8.
v. 1974 *Stacheoides tenuis* Petryk and Mamet - Termier et al., pl. 1, figs. 3, 5.
non 1974 *Stacheoides tenuis* Petryk and Mamet - Rich, p. 371-372, pl. 4, fig. 1-5, 21 (the two best specimens figs. 5 and 21 were attributed to "*Cuneiphycus*" by Mamet and Roux, 1977, p. 224; they belong more probably to *Efluegelia johnsoni* (Flügel)).
v. 1975 *Stacheoides tenuis* Petryk and Mamet - Termier et al., p. 84-85, pl. 10, fig. 6.
v. 1975 *Stacheoides* aff. *tenuis* Petryk and Mamet - Colchen and Vachard, p. 1965 (no illustration).
p. 1975b *Stacheoides tenuis* Petryk and Mamet - Malakhova, p. 86, pl. 8, fig. 4 (only, no figs. 1-3 = *Dromastacheoides*).
1976 *Stacheoides* aff. *tenuis* Petryk and Mamet - Bogush and Juferev in Dubatolov, pl. 6, fig. 2.
1976 *Stacheoides tenuis* Petryk and Mamet - Mamet, p. 116-117, pl. 5, fig. 10.
1976 *Stacheoides tenuis* Petryk and Mamet - Mamet, pl. 30, fig. 3, pl. 32, fig. 2, pl. 35, fig. 2, pl. 67, fig. 2.
non 1977 *Stacheoides tenuis* Petryk and Mamet - Armstrong and Mamet, p. 105-106, pl. 17, fig. 8, pl. 38, figs. 8-10 (8 = *Dromastacheoides*; 9-10 = *Sinustacheoides*).
1977a *Stacheoides* sp. - Brenckle, pl. 1, fig. 10.
1977b *Stacheoides tenuis* Petryk and Mamet - Brenckle, pl. 4, figs. 13-15.
v. 1977 *Stacheoides tenuis* Petryk and Mamet - G. Termier, Termier and Vachard, p. 116-117, pl. 5, fig. 10 (with synonymy).
v. 1977 *Stacheoides tenuis* Petryk and Mamet - Perret and Vachard, p. 32-33, pl. 5, fig. 5.
1977 *Stacheoides tenuis* Petryk and Mamet - Mamet and Roux, p. 225, pl. 2, figs. 10-14 (with synonymy).
1982b *Stacheoides* cf. *S. tenuis* Petryk and Mamet - Brenckle et al., p. 62, pl. 8, figs. 4-5.
1983 *Stacheoides tenuis* Petryk and Mamet - Mamet and Roux, p. 83, pl. 8, fig. 15 (with synonymy).
non 1983 *Stacheoides tenuis* Petryk and Mamet - Berchenko in Aizenverg et al., pl. 83, figs. 10-12 (well preserved crinoidal remains).
1983 *Stacheoides* aff. *S. tenuis* Petryk and Mamet - Groves, p. 28, pl. 7, figs. 2, 4, 6, 8 (with synonymy).
1985 *Stacheoides tenuis* Petryk and Mamet - Mamet and Pinard, pl. 3, figs. 2, 9?.
1985 *Stacheoides tenuis* Petryk and Mamet - Roux, p. 602 (no illustration).
1987 *Stacheoides tenuis* Petryk and Mamet - Mamet et al., p. 46, pl. 23, figs. 4-7 (with synonymy).
? 1988 *Stacheoides tenuis* Petryk and Mamet - Ivanova and Bogush, pl. 7, fig. 10, pl. 18, figs. 1-4, pl. 19, figs. 6-7 (very wide cells).
1988a *Stacheoides tenuis* Petryk and Mamet - Ivanova, p. 7 (no illustration).
v. 1989b *Stacheoides tenuis* Petryk and Mamet - Vachard, pl. 3, fig. 15.
1989 *Stacheoides polytrematoides* Petryk and Mamet - Skompski et al., pl. 2, fig. 1.
v. 1990 *Stacheoides tenuis* Petryk and Mamet - Vachard, p. 92, pl. 1, fig. 12.
v. 1990 *Stacheoides tenuis* Petryk and Mamet - Caridroit et al, p. 338 (no illustration).
? 1990 *Stacheoides tenuis* Petryk and Mamet - Bogush et al., tabl. 1 p. 11, p. 130, pl. 28, figs. 9-13, pl. 29, fig. 1 (with 7 references in synonymy).
1995 *Stacheoides tenuis* Petryk and Mamet - Sánchez-Chico et al., p. 75-76, pl. 5, fig. 6.
1996 *Stacheoides tenuis* Petryk and Mamet - Sebbar and Mamet, text-fig. 5. 44, pl. 3, fig. 12.

v. 1996 *Stacheoides tenuis* Petryk and Mamet - Proust et al., p. 347 (no illustration) .
? 1997 *Stacheoides tenuis* Petryk and Mamet - Harris et al., fig. 9. 15.
1998 *Stacheoides tenuis* Petryk and Mamet - Sebbar, pl. 3, fig. 7.
v. 1999 *Stacheoides tenuis* Petryk and Mamet - Berkhli, p. 106, 108 (no illustration).
1999 *Stacheoides tenuis* Petryk and Mamet - Sebbar and Mamet, text-fig. 3. 71 (no illustration).
2000 *Stacheoides tenuis* Petryk and Mamet - Sebbar et al. , n° 36, text-fig. 7 p. 214, 215.
2000 *Stacheoides tenuis* Petryk and Mamet - Sebbar, pl. 1, figs. 5-7.
2004 *Stacheoides tenuis* Petryk and Mamet - Cózar and Somerville, text-fig. 5 p. 46, text-fig. 8 p. 48 (no illustration).
2006 *Stacheoides tenuis* Petryk and Mamet - Mamet, p. 342, pl. 6, figs. 12-16 (with 25 references in synonymy).

Description. Skeletal network relatively regular and thin, announcing *Ungdarella* (see Vachard and Tahiri, 1991), with generally rectangular cells. Diameter of the thallus = 0.750x1.810 mm; thickness of cell walls = 0.010-0.025 mm; with of cells = 0.020-0.050 mm.
Occurrence. ?Late Tournaisian of Urals (Bogush et al., 1990). Viséan-Bashkirian of Palaeotethys, North America, Australia (Mamet and Roux, 1983), Urals (Bogush et al., 1990), and Algeria (Sebbar and Mamet, 1996, 1999; Sebbar et al., 2000; Sebbar, 2000). Stratotype of Bashkirian in Southern Urals (Proust et al., 1996). Early Moscovian of Siberia and Canadian Arctic. Early Asbian of Thailand. Late Serpukhovian of Ardengost area: MFP.Jez1B, MFP.AH2G, MFP.AH9B, E, F, G and H, MFP.AH10C (see Perret and Vachard, 1977).

Stacheoides cannindahensis Mamet and Roux, 1983
Pl. 26, figs. 6-8.

v. p. 1974b *Moravammina*? sp. 1 - Vachard, p. 191, pl. 27, fig. 15 only (non fig. 13 = a tube of *Moravammina*, nec fig. 14 = *Kamaenella*).
1983 *Stacheoides cannindahensis* n. sp. Mamet and Roux, p. 83, pl. 7, figs. 11-15.
1985 *Stacheoides cannindahensis* Mamet and Roux - Roux, p. 602 (no illustration).
1988a *Stacheoides cannindahensis* Mamet and Roux - Ivanova, p. 7 (no illustration).
1989 *Stacheoides cannindahensis* Mamet and Roux - Sebbar and Lys, pl. 1, fig. 5.
1990 *Stacheoides cannindahensis* Mamet and Roux - Sebbar, p. 140, pl. 1, fig. 4.
v. 1991c *Stacheoides cannindahensis* Mamet and Roux - Vachard et al., p. 677, pl. 1, fig. 20.
1992 *Stacheoides cannindahensis* Mamet and Roux - Vachard and Berkhli, pl. 2, fig. 14.
1993 *Stacheoides cannindahensis* Mamet and Roux - Berkhli et al., fig. 4. 2.
1995 *Stacheoides cannindahensis* Mamet and Roux - Sánchez-Chico et al., p. 77-78, pl. 6, figs. 2-8.
1996 *Stacheoides cannindahensis* Mamet and Roux - Sebbar and Mamet, text-fig. 5. 43, pl. 3, fig. 7.
1997 *Stacheoides cannindahensis* Mamet and Roux - Harris et al., pl. 2, fig. 14.
? 1998 *Stacheoides cannindahensis* Mamet and Roux - Sebbar, pl. 3, fig. 2.
1999 *Stacheoides cannindahensis* Mamet and Roux - Sebbar and Mamet, text-fig. 3. 83 (no illustration).
2000 *Stacheoides cannindahensis* Mamet and Roux - Sebbar et al. , n° 37 text-fig. 7 p. 214, 215.
2005a "*Stacheoides*" aff. *cannindahensis* Mamet and Roux - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 6. 9.

Description. Diameter of the thallus = 0.350-1.700 x 1.100-4.800 mm; thickness of cell walls = 0.020-0.055 mm; with of cells = 0.008-0.010 mm.
Occurrence. Latest Viséan-early Moscovian of Algeria (Sebbar and Mamet, 1999; Sebbar et al., 2000). Late Brigantian of Eastern Morocco. Kurmakovsky of Urals. Latest Brigantian of South China. Latest Asbian of Montagne Noire: Sommet 224-Valuzières (DV600B); Roque Redonde (RR77).

Genus *Stacheoidella* Mamet and Roux in Mamet et al., 1987

Type species. *Stacheoides* (?) *spissa* Petryk and Mamet, 1972.
Description Irregular and encrusting carbonate microfossil. Sometimes, a skeletal organization, similar to *Stacheoides*, is observable but it is followed by undifferentiated crust of yellow calcite.

Remarks. *Stacheoidella* is a phylogenetic link between the Aoujgaliaceae of *Stacheoides*-type and the Fascielleae.
Occurrence. Viséan to Moscovian of North America (Mamet et al., 1987; Mamet, 1991, 2006). Late Viséan of Algeria (Sebbar and Mamet, 1999, text. fig. 3. 72). Doubtful in Austria (Krainer and Vachard, 2002). Early Serpukhovian of Montagne Noire.

Stacheoidella spissa (Petryk and Mamet, 1972)
Pl. 26, fig. 9.

1972 *Stacheoides*? *spissa* n. sp. Petryk and Mamet, p. 785, pl. 5, fig. 1-7.
1972 *Stacheoides*? *spissa* Petryk and Mamet - Mamet and Rudloff, p. 90, pl. 7, figs. 16-17.
1976 *Stacheoides*? *spissa* Petryk and Mamet - Mamet, pl. 50, figs. 1-2.
1983 "*Stacheoides*" *spissa* Petryk and Mamet - Groves, p. 28-29, pl. 8, figs. 1-4.
1985 *Stacheoides*? *spissa* Mamet in Petryk and Mamet (sic) - Mamet and Pinard, pl. 1, fig. 17.
1987 *Stacheoidella spissa* (Petryk and Mamet) n. comb. - Mamet et al., p 47, pl. 23, fig. 12.
v. ? 2002 *Fasciella*? sp. - Krainer and Vachard, pl. 2, fig. 2, pl. 3, fig. 6.
? 2004 *Fasciella* sp. - Cózar and Somerville, fig. 13. 13.
v. 2004 *Stacheoidella spissa* (Petryk and Mamet) - Vachard and Aretz, p. 658, fig. 8. 10.
2006 *Stacheoidella spissa* (Petryk and Mamet) - Mamet, p. 342, pl. 6, figs. 10-11 (with 6 references in synonymy).

Description. The three specimens of Vachard and Aretz (2004, in the thin section GIK 1818) encrust *Neoprincipia petschoriaeformis*. Their crusts attain 1 mm in thickness.
Occurrence. As for the genus. Early Serpukhovian from La Serre (Vachard and Aretz, 2004: GIK1818).

Tribe Aoujgalieae Termier et al., 1975
nomen translat. Chuvashov in Chuvashov et al., 1987

Diagnosis. Aoujgaliaceae with subquadratic cells.

Synonym. Mametelleae Chuvashov in Chuvashov et al., 1987.

Composition. *Aoujgalia* Termier and Termier, 1950, *Mametella* Brenckle, 1977a and *Valuzieria* G. Termier, Termier and Vachard, 1977, *Asteroaoujgalia* Brenckle, 2004.

Discussion: *Stacheoides* and *Pseudostacheoides* derivate probably from the Frasnian genus *Kleinbergella* (the history of the group during the Famennian is unknown). *Stacheoides* generates *Aoujgalia* and *Ungdarella*. *Stacheoidella* is the ancestor of the Calcifoliaceae.

Occurrence. Middle Viséan-?Permian, probably cosmopolite.

Genus *Aoujgalia* Termier and Termier, 1950

Type species. *Aoujgalia variabilis* Termier and Termier, 1950.
Synonym. ? *Mametella* Brenckle, 1977a.

Diagnosis. Thallus encrusting, conical to fusiform. Cells irregularly quadratic grouped in grossly concentric series around the supports generally central. Wall hyaline yellowish. Inner part of the cells often recrystallized in the same calcite as the wall.
Remarks. *Mametella* is only more regularly-celled than *Aoujgalia*; they are probably generically synonyms (see *A. regularis* G. Termier, Termier and Vachard, 1977, as a transitional form).
Occurrence. Middle Viséan-early Bashkirian. Palaeotethyan (Ireland, Morocco, Algeria, Libya, Spain, France, England, Belgium, Germany, Czech Republic, Donbass, Kazakhstan, Siberia, Taimyr, Verkhoyansk, Japan). Rare in North America (Canadian Arctic, British Columbia, Alaska, American Cordillera, Tennessee, Idaho) and Australia. ?Permian of Canadian Arctic (Mamet, 1991, p. 379).

Aoujgalia ? sp.
Pl. 26, figs. 10-12.

Description. Maximal dimension of thalllus = 0.950-1.500 mm, thickness of skeletal elements = 0.010-0.020 mm, dimensions of cells = 0.020-0.050 mm.
Occurrence. Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV.FB3); Castelsec (MA10.I); Roquemaillère (?DV134E, ?DV134G); Roque Redonde (RR51: 2 specimens, RR54, RR77), Les Pascales (DV601B); Roc de Murviel (MA83); Jeantels DV690C).

Genus *Valuzieria* G. Termier, Termier and Vachard, 1977
Type species. *Valuzieria sescenti* G. Termier, Termier and Vachard, 1977.

Diagnosis. Similar to *Aoujgalia*, but with turriform expansions, and an alignment of the lateral walls of the cells.

Occurrence. Asbian-Brigantian of Montagne Noire and Morocco.

Valuzieria sescenti G. Termier, Termier and Vachard, 1977
Pl. 27, figs. 1-5.
p. 1974 *Stacheoides* - Rich, pl. 4, fig. 21 (non p. 371-372, nec pl. 4, figs. 1-5 = true *Stacheoides*).
v. 1977 *Valuzieria sescenti* n. sp. G. Termier, Termier and Vachard, p. 154-155, pl. 6, fig. 1.
v. 1977a *Valuzieria sescenti* Termier and Vachard (sic) - Vachard, p. 374, tabl. 1 (no illustration).
? 1983 *Stacheoides* sp. - Vieslet, pl. 5, fig. 4.
? v. 1991 *Valuzieria* sp. - Ouarache et al., p. 50, 52 (no illustration).
v. 1991a *Valuzieria sescenti* Termier, Termier and Vachard - Vachard et al., pl. 1, fig. 7.
v. 1999 *Valuzieria* sp. - Berkhli, p. 111 (no illustration).

Description. The holotype is defined in the sample DV600B of sommet 224-Valuzières Maximal dimension of thalllus = 2.000 mm, thickness of skeletal elements = 0.020-0.050mm, dimensions of cells = 0.050-0.070 mm.
Occurrence. This form remains very rare in the type locality: DV600A (2 specimens), DV600B (2 specimens). Four specimens more were discovered during this study in Roc de Murviel and Les Jeantels.

Family Pseudokomiaceae Vachard and Cózar (nomen nudum)
Tribe Pseudokomieae Vachard and Cózar (nomen nudum)

Diagnosis. The family and the tribe are composed of aoujgaliaceans presenting two layers of cells: in centre, irregular ones limited by labyrintic walls or absent, in the periphery radial cells limited by radiate walls sometimes T-shaped. These structures differ completely of a perithallus and a hypothallus. Wall yellowish.

Composition. *Epistacheoides* Petryk and Mamet, 1972, *Dromastacheoides* Vachard in Perret and Vachard, 1977; *Roquesselsia* G. Termier, Termier and Vachard, 1977, *Cheggatella* Poncet, 1989b, *Pseudokomia* Racz, 1964; *Komia* Kordé, 1951; ?*Petschoria* Kordé, 1951 (pars). They derivates from *Sinustacheoides* in the Middle Viséan, firstly attached they becomes erected, cylindrical and bifurcated.

Remarks. Contrary to Mamet (1991), *Dromastacheoides* and *Roquesselsia* are valid (see below), but they are probably endemic. After violent criticisms (Mamet and Roux, 1978b, 1983), Mamet, Roux and Nassichuk (1987, p. 50-51) admitted implicitely the differences between *Pseudokomia*, *Epistacheoides* and "*Epistacheoides chantoni*", i. e. *Roquesselsia* (see below). According to me, there are more differences between *Epistacheoides*,

Dromastacheoides and *Roquesselsia* than between *Epistacheoides* and *Pseudokomia*. In this case, all the Pseudokomiaceae could be limited to *Pseudokomia* sensu lato, not to *Epistacheoides.*

Occurrence. Viséan-Moscovian, biogeographic distribution varying according to the genera.

Genus *Roquesselsia* G. Termier, Termier and Vachard, 1977

Type species. *Roquesselsia radians* G. Termier, Termier and Vachard, 1977.

Synonyms. *Epistacheoides* Petryk and Mamet, 1972 (pars); *Anthracoporellopsis* Maslov, 1956a (pars); *Anthracoporella* Pia, 1920 (pars).

Diagnosis. Thallus attached. External shape relatively regular varying from foot-shaped to cross-shaped. Inner cavity narrow and genrally not calcified surrounded but radial skeletal elements regular in shape and organized in one to three rows. In tangential longitudinal section these elements appear parallel and can be confused with a medullar zone ("hypothallus"auctorum). The lateral cells between these radial elements are very narrow, and eventually might be confused with laterals of green algae (e. g., *Anthracoporella*). Wall yellowish, hyaline, granular.

Remarks. *Roquesselsia* emend. exhibits four morphotypes (1) the typical foot-shaped elongate sections (Pl. 27, fig. 16), (2) a form more or less similar to *Epistacheoides* (Pl. 27, fig. 10), (3) the "*Anthracoporella*" of Kulik, 1973 and Ivanova, 1988a (Pl. 27, figs. 11, 14); (4) the false *Anthracoporellopsis machaevii* of Skompsky (1996), which differs from *Anthracoporellopsis machaevii* in a weaker to absent internal septation, and from *Anthracoporella insolita* Ivanova, 1988a in a lesser length (1300-2000 mm versus 3000-3600 mm) for a similar outer diameter (see also Sánchez-Chico et al., 1995: pl. 3, fig. 9).

Occurrence. Asbian-Brigantian of Tarim, Ireland, Spain, Morocco and Algeria. Ladeïninsky-Kurmakovsky of Urals. Rare in the Serpukhovian of Algeria. Brigantian of Southwestern Spain. Latest Asbian-early Brigantian of Northern England. Latest Asbian-Brigantian of Montagne Noire.

Roquesselsia radians G. Termier, Termier and Vachard, 1977 emend. herein
Pl. 27, figs. 6-16.

? 1973 *Anthracoporella baschkirica* n. sp. Kulik in Einor, p. 42-43, pl. 2 , figs. 6-7, pl. 4, figs. 8-9.
1973 Codiacean alga - Ivanova, pl. 10, fig. 4.
v. 1977 *Roquesselsia radians* n. gen. n. sp. G. Termier, Termier and Vachard, p. 160-161, pl. 7, figs. 1, 3, 5-8.
v. 1977a *Roquesselsia radians* Termier and Vachard (sic) - Vachard, p. 374, tabl. 1 (no illustration).
1977 *Epistacheoides chantoni* (sic, in fact *chantonae*) n. sp. Mamet and Roux, p. 228, pl. 4, fig. 15, pl. 5, figs. 11-16.
1983 *Roquesselsia radians* = *Epistacheoides chantoni* - Mamet and Roux, p. 85 (no illustration).
1985 *Epistacheoides chantoni* Mamet and Roux - Roux, p. 602 (no illustration).
1988a *Anthracoporella insolita* n. sp. Ivanova, p. 13, pl. 4, figs. 1-3.
1990 *Anthracoporella insolita* (Ivanova) - Bogush et al., tabl. 1 p. 10, p. 114, pl. 13, figs. 12-14.
1990 *Anthracoporella* aff. *baschkirica* Kulik - Bogush et al., tabl. 1 p. 10, p. 114-115, pl. 14, figs. 1-2.
p. 1996 *Anthracoporellopsis machaevii* Maslov - Skompski, p. 225-227, pl. 12, figs. 1-6 (non pl. 11, figs. 1-9 = true *Anthracoporellopsis*).
1995 *Epistacheoides chantoni* Mamet and Roux - Sánchez-Chico et al., p. 78, pl. 5, figs. 4-5.
1995 *Epistacheoides connorensis* Mamet and Rudloff - Sánchez-Chico et al., p. 78, pl. 3, figs. 7-9, pl. 5, figs. 10-13.
1996 *Epistacheoides chantoni* (Mamet and Roux) - Sebbar and Mamet, fig. 5. 14 (no illustration).
1999 *Epistacheoides chantoni* (Mamet and Roux) - Sebbar and Mamet, fig. 3. 24 (no illustration).
2002a *Epistacheoides* sp. - Aretz, fig. 7. 6.
2002a *Roquesselsia radians* Termier et al. - Aretz, fig. 7. 7.
2004 *Epistacheoides chantoni* Mamet and Roux - Brenckle, pl. 7, figs. 12-16.

2004 *Roquesselsia radians* - Cózar, text-fig. 3 p. 371, text-fig. 4 p. 372 (no illustration).
?2004 *Roquesselsia radians* - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 8 p. 48 (no illustration).
v. 2005 *Roquesselsia* sp. - Saïd, p. 175, p. 176 (no illustration).
?2005d *Anthracoporellopsis scabrosa* (Vachard) - Cózar and Somerville, fig. 5. 9 (or another species of Roquesselsia, but nothing to see with *Evlania scabrosa* Vachard).
2005d *Roquesselsia radians* Mamet and Roux - Cózar and Somerville, text-fig. 3 p. 101, fig. 6. 10.

Description. Length = 1.690-2600 mm, average outer diameter = 0.450-0.750 mm, inner diameter = 0.070-0.140-0.325 mm, thickness of the cortical zone = 0.140-0.340 mm, width of lateral cells = 0.005-0.025 mm, thickness of cell wall = 0.007-0.025 mm.

Remarks. The holotype of *E. chantonae* can correspond to another species; nevertheless, the material of Brenckle (2004) is exactly similar to *R. radians*.
Occurrence. As for the genus. Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293A, DV332C, DV332E, DV332', DV332'B with the holotype, DV332'B.2, DV848, DV.FB 22); Castelsec (MA10-?, MA10.3, MA10.6, MA10.7.1, MA10.8.2, MA10.17, MA10.50, MA11.VI, MA.TOP.10.III); Roquemaillère (ML764, ?DV134E); Les Pascales (DV601B); Les Mentaresses (DV328'A, DV330B); Roc de Murviel (MA7 (3 specimens), MA33.1 (6 specimens), MA33.2 (6 specimens), MA33.3 (12 specimens), MA87 (3 specimens), MA330.4 (1 specimen), MA330.10 (2 specimens)).

Genus *Dromastacheoides* Vachard in Perret and Vachard, 1977

Type species. *Dromastacheoides wilsoni* Vachard in Perret and Vachard, 1977.

Synonyms. *Epistacheoides* (auctorum pars), *Pseudokomia* sensu Bless et al., 1976, pl. 12, fig. 20; *Aoujgalia* (auct. pars); *Ungdarella* (auct.pars).

Diagnosis. Encusting aoujgaliale. Internal skeletal network irregular, external layer more regular composed with radial T-shaped elements, limiting more quadrate cells. Irregular outline of the thallus. Wall, yellowish, hyaline, granular.
Occurrence. Middle Viséan of Afghanistan. Late Viséan of Iran and Morocco. Houthem borehole (the Netherlands). Late Serpukhovian of Pyrenees. Questionable in USA.

Dromastacheoides wilsoni Vachard in Perret and Vachard, 1977
Pl. 28, figs. 1-2.

? 1974 *Ungdarella* sp. 1 - Chuvashov, p. 31, pl. 19, figs. 1-2.
v. 1977 *Dromastacheoides wilsoni* n. gen. n. sp. Vachard in Perret and Vachard, p. 117-119, pl. 6, figs. 1-6.
non 1978b *Dromastacheoides wilsoni* Vachard in Perret and Vachard, = *Epistacheoides nephroformis* Petryk and Mamet - Mamet and Roux, p. 81 (no illustration).
? 1978b *Epistacheoides nephroformis* Petryk and Mamet - Mamet and Roux, pl. 6, figs. 22-12.
non 1983 *Dromastacheoides wilsoni* Vachard in Perret and Vachard = *Epistacheoides nephroformis* Petryk and Mamet - Mamet and Roux, p. 84 (no illustration).
1994 *Pseudostacheoides* sp. - Mamet, pl. 1, figs. 23-24.

Description. Length of thallus = 0.890-5.120 mm, diameter of thallus = 0.375-0.850x0.250-0.350 mm, width of cells in the internal part = 0.040-0.140 mm; cellular wall thickness in central part = 0.020-0.040 mm; thickness of peripheric part = 0.080 mm; thickness of the peripheric skeletal elements = 0.010-0.045 mm.
Occurrence. Questionable in the Viséan/Serpukhovian boundary of Tennessee (USA). ?Late Pennsylvanian-Artinskian of Urals. Early Permian of Bolivia. Late Serpukhovian of Ardengost: MFP.AH18H, AH20E, MFP.CAS14.3.

Family Stacheiaceae Loeblich and Tappan, 1961
nomen translat. Chuvashov et al., 1987 emend. herein

Diagnosis. Aoujgaliales showing many rows of quadratic cells with uniseriate growth, partly overlapping.

Synonym. Ptychocladiidae Elias 1950 emend. H. Termier et al., 1977 (pars).

Composition. *Stacheia* Brady, 1876; *Fourstonella* Cummings 1955a (= *Amorfia* Rácz, 1964); *Conilalia* Vachard in Massa and Vachard, 1979; *Eflugelia* Vachard in Massa and Vachard, 1979 and *Chuvashovia* Vachard, 1980.

Remarks. I think that *Ptychocladia* Ulrich and Bassler, 1904 differs from an aoujgaliale. As in the case of *Pseudoendothyra ornata* or *Omphalotis circumplicata*, no evidences are given to justify the opposite opinions.

Occurrence. Middle Viséan-middle Permian, Palaeotethyan.

Genus *Stacheia* Brady, 1876

Type species. *Stacheia marginulinoides* Brady, 1876.
Diagnosis. Thallus attached, with uniseriate growth of cell rows. Cells higher than wide with distal and proximal, curvated borders, and lateral borders rectilinear.
Remarks. Morphologically different of an alga, this genus is more similar to a lagenin foraminifer or to a pharetronid sponge.
Occurrence. Late Viséan-Serpukhovian Palaeotethyan until Maritime Provinces of Canada (with rare localities in Arkansas and ?Idaho, USA and Australia). Lower Bashkrian of Algeria and Donets Basin. Late Bashkirian of Thailand (Vachard, 1990, p. 94). Moscovian of Libya, the Canadian Arctic Islands and Spain (Massa and Vachard, 1979; Mamet, 2002; and Vachard, unpublished data, respectively).

Stacheia marginulinoides Brady, 1876
Pl. 28, fig. 3.

1876 *Stacheia marginulinoides* n. gen. n. sp. Brady, p. 112-114, pl. 7, figs. 16-21.
1876 *Stacheia pupoides* n. gen. n. sp. Brady, p. 115, pl. 8, figs. 17-27.
1956 *Stacheia* aff. *pupoides* Brady - Brazhnikova, p. 49-50, pl. 2, fig. 7.
1964 *Stacheia marginulinoides* Brady - Loeblich and Tappan, p. C330, fig. 246. 1a, 1b, 2 in text p. 331.
v. 1977 *Stacheia marginulinoides* Brady - Vachard in Perret and Vachard, p. 113, pl. 5, fig. 1.
v. 1977a *Stacheia marginulinoides* Brady - Vachard, p. 374, tabl. 1 (no illustration).
1977 *Stacheia marginulinoides* Brady - Mamet and Roux, p. 221, pl. 1, figs. 3-4, pl. 5, figs. 1-2 (with synonymy).
1977a *Stacheia marginulinoides* Brady - Brenckle, pl. 1, fig. 2 (microphotograph of the drawing of Brady, 1876, pl. 7, fig. 21).
1977a *Stacheia pupoides* Brady - Brenckle, pl. 1, figs. 3-5 (microphotographs of the drawing of Brady, 1876, pl. 8, figs. 26, 18-19, 27, respectively).
1977b *Stacheia marginulinoides* Brady - Brenckle, pl. 4, fig. 8.
1979 *Stacheia* cf. *marginulinoides* Brady - Bensaïd et al., pl. 16, fig. 5.
1979 *Stacheia marginulinoides* Brady - Massa and Vachard, pl. 8, figs. 6, 8.
1983 *Stacheia marginulinoides* Brady - Mamet and Roux, p. 81-82, pl. 8, fig. 16 (with synonymy).
1983 *Stacheia marginulinoides* Brady - Berchenko in Aizenverg et al., pl. 82, fig. 5.
1985 *Cuneiphycus texana* Brady - Mamet and Pinard, pl. 2, figs. 14, 15.
1986 *Stacheia marginulinoides* Brady - Skompski, p. 270, pl. 14, fig. 1.
1987 *Stacheia marginulinoides* Brady - Mamet et al., p. 45, pl. 23, figs. 1-2 (with 7 references in synonymy).
1990 *Stacheia marginulinoides* Brady - Bogush et al., tabl. 1 p. 11 (no illustration).
1991 *Stacheia marginulinoides* Brady - Ouarache et al., pl. 1, fig. 18.
1992 *Stacheia marginulinoides* Brady - Vachard and Berkhli, pl. 2, fig. 16, pl. 3, fig. 8, pl. 4, fig. 17.
1995 *Stacheia marginulinoides* Brady - Sánchez-Chico et al., p. 75-76, pl. 6, fig. 1.

? 1996 *Stacheia marginulinoides* Brady - Sebbar and Mamet, text-fig. 5. 42 (no illustration).
v. 1996 *Stacheia marginulinoides* Brady - Vachard and Maslo, text-fig. 2 p. 361 (no illustration).
1996 *Stacheia* - Madi et al., pl. 22, fig. 7.
? 1999 *Stacheia marginulinoides* Brady - Sebbar and Mamet, pl. 1, fig. 10 (cells too low).
v. 1999 *Stacheia marginulinoides* Brady - Berkhli, p. 104, 106 (no illustration).
1999 *Stacheia marginulinoides* Brady - Sebbar and Mamet, text-fig. 3. 67 (no illustration).
2000 *Stacheia marginulinoides* Brady - Sebbar, pl. 1, fig. 6.
p. 2002 *Stacheia marginulinoides* Brady - Mamet, p. 501, pl. 6, fig. 7 (with controversial synonymy).
v. 2002a *Stacheia marginulinoides* Brady - Berkhli et al., p. 193 (no illustration).
v. 2002b *Stacheia marginulinoides* Brady - Berkhli et al., p. 138 (no illustration).
v. 2003 *Stacheia marginulinoides* Brady - Berkhli and Vachard, p. 10 (no illustration).
?2004 *Stacheia marginulinoides* Brady - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 6 p. 47, text-fig. 8 p. 48, text-fig. 9 p. 49 (no illustration).
?2004 *Stacheia marginulinoides* Brady - Cózar, text-fig. 4 p. 372 (no illustration).
2004 *Stacheia* - Flügel, pl. 108, fig. 10 (from Madi et al., 1996).
2004 *Stacheia marginulinoides* Brady - Mamet and Villa, p. 169, fig. 14i (with 5 references in synonymy).
2005a *Stacheia* aff. *marginulinoides* Brady - Cózar, text-fig. 4 p. 409, fig. 6. 8.
?2005d *Stacheia marginulinoides* Brady - Cózar and Somerville, text-fig. 3 p. 101, fig. 6. 2 (passing to *Conilalia*).

Description. Length of thallus = 0.900-1350 mm, diameter of thallus = 0.400-0.520 mm, height of cells = 0.070-0.100 mm, width of cells = 0.020-0.045 mm, thickness of cell walls = 0.005-0.007 mm, number of cell rows = 6-8, number of cells per row = up to 20.

Occurrence. Viséan-Moscovian of shelves from Palaeotethys, Ural, Arctic and North-America Oceans (Mamet, 2002; Mamet and Villa, 2004). The FAD seems to be early Asbian in age (deduced from Berkhli, 1999, p. 104). Questionable in Verkhoyansk (Siberia) and Australia. Lower Bashkrian of Algeria and Donets Basin. Only one specimen in Montagne Noire: Roque Redonde (RR56). Very rare in the late Serpukhovian of Ardengost: MFP.CAS47B.

Genus *Fourstonella* Cummings 1955a

Type species. *Stacheia fusiformis* Brady, 1876.
Synonym. *Amorfia* Rácz, 1964.
Diagnosis. Thallus attached, fusiform to lemmon-shaped, occasionally with irregular protuberances. Cells rectangular disposed in superimposed uniseriate, elongates rows. Wall calcitic yellowish. The thallus is often completely recrystallized and yellowish with ghost of the cellular rows.
Remarks. Contrary to the opinions of several authors (e. g., Groves, 1986; Mamet and Villa, 2004), *Efluegelia* Vachard in Massa and Vachard 1979 is not synonym of *Fourstonella* (see Vachard et al., 1989, text-fig. 3), although the first true *Efluegelia* appear in the early Serpukhovian (Cózar and Rodríguez, 2004, fig. 9. 16) and coexist with true *Fourstonella*. Even in small fragments both genera can be easily determinate, because the cells of *Efluegelia* are all filled with micrite (indicating a porous skeleton) (see for example Mamet, 2006, pl. 5, figs. 1-5) while those of *Fourstonella* are free of filling indicating a less porous to close wall.
Occurrence. Middle Viséan to Moscovian, Western Palaeotethys (Newfoundland Shelf, England, Germany, Poland, Austria, Ukraine, Southern France, Southwestern Spain, Morocco, Algeria, Libya, Iran, ?Siberia, rare in Canadian Arctic, questionable in Tarim (North China), ?Bolivia, Morrowan-Atokan of Idaho (Groves, 1986).

Fourstonella fusiformis (Brady, 1876)
Pl. 28, figs. 4-6.

1876 *Stacheia fusiformis* n. sp. Brady, p. 114, pl. 8, figs. 12-16.
1955a *Fourstonella fusiformis* (Brady) n. comb. Cummings, p. 7, fig. 5 F-G.
1956 *Stacheia fusiformis* Brady - Brazhnikova, p. 50, pl. 2, fig. 9, pl. 10, fig. 9.
1967 *Stacheia* sp. - Conil and Paproth, pl. 4, fig. 3.
1967 *Fourstonella fusiformis* (Brady) - Eickhoff, p. 37-38, pl. 3, fig. 5, pl. 4, figs. 6-8 (with synonymy: 3 references).
1977 *Fourstonella fusiformis* (Brady) - Perret and Vachard, p. 30, pl. 5, fig. 3 (with synonymy).
1977 *Fourstonella fusiformis* (Brady) - Mamet and Roux, p. 222-223, pl. 2, fig. 4 (with synonymy).
1978 *Fourstonella fusiformis* (Brady) - Jansa et al., p. 1434, 1436, pl. 1, fig. 21.
p. 1978 *Komia abundans* Korde - Lys et al., pl. 3, fig. 18 (non fig. 17 = *Efluegelia johnsoni*; these two figures illustrate clearly the differences between *Efluegelia* and *Fourstonella*).
1985 *Fourstonella fusiformis* (Brady) - Roux, p. 602 (non illustration).
1986 *Fourstonella fusiformis* (Brady) - Skompski, p. 269, pl. 15, figs. 1-5.
1987 *Fourstonella* sp. - Mamet et al., p. 45, pl. 23, fig. 3.
1987 *Fourstonella* sp. - Delvolvé and Perret, pl. 2, fig. 21.
? 1988 *Fourstonella fusiformis* (Brady) - Ivanova and Bogush, pl. 18, fig. 14 (or *Stacheoides*?).
1988a *Fourstonella fusiformis* (Brady) - Ivanova, p. 7 (no illustration).
? 1989 *Fourstonella fusiformis* (Brady) - Skompski et al., pl. 2, fig. 3 (perhaps *F. irregularis*).
? 1990 *Fourstonella fusiformis* (Brady) – Bogush et al., p. 126-127, pl. 26, figs. 8-9, pl. 27, figs. 1-2 (or *Stacheoides*?).
1990 *Fourstonella fusiformis* (Brady) - Bogush et al., tabl. 1 p. 11, p. 126, pl. 26, figs. 8?, 9, pl. 27, figs. 1?-2? (with 4 references in synonymy).
1991 *Fourstonella* sp. - Mamet, pl. 3, fig. h.
1993 *Fourstonella* sp. - Perret, pl. F11, fig. 21.
non 1994 *Fourstonella fusiformis* (Brady) - Mamet, pl. 3, fig. 1 (*Efluegelia* or *Chuvashovia*).
non 1995 *Fourstonella fusiformis* (Brady) - Sánchez-Chico et al., p. 76, pl. 3, figs. 10-11, pl. 4, figs. 9-10 (no 19 as indicated) (= a species of *Efluegelia*).
2000 *Fourstonella fusulinaeformis* Brady (sic) - Sebbar et al. , n° 38 text-fig. 7 p. 214, 215.
2004 *Fourstonella* sp. - Cózar and Somerville, text-fig. 9 p. 49 (pars), fig. 13. 13.
non 2004 *Fourstonella fusiformis* (Brady) - Mamet and Villa, p. 166, fig. 14 e (= ? *Chuvashovia parajohnsoni* Kabanov and Vachard, submitted) (with 14 references in synonymy).
2004 *Fourstonella* sp. - Cózar and Somerville, text-fig. 9 p. 49, fig. 13. 13.
non 2004 *Fourstonella fusiformis* (Brady) - Piecha et al. pl. 1, fig. 13 (= *Mametella*).
v. 2005 *Fourstonella fusiformis* (Brady) - Saïd, p. 176, p. 185, fig. X. 1. 15.
non 2005a *Fourstonella fusiformis* (Brady) - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 6.6 (probably *Mametella regularis*).
2005a *Fourstonella* sp. - Cózar, text fig. 4 p. 409, fig. 5.10.
2005d *Fourstonella irregularis* Mamet and Roux - Cózar and Somerville, text-fig. 3 p. 101, fig. 6. 3.
2005d *Fourstonella fusiformis* (Brady) - Cózar and Somerville, text-fig. 3 p. 101, fig. 6. 4.
? 2005 *Fourstonella* sp. - Sanz-Lopez et al., pl. 6, fig. 11, pl. 7, fig. 4 ? (or *F. irregularis*).

Description. Length of thallus = 1.160-2.200 mm; Diameter of thallus = 0.500-0.700 mm, Diameter of emplacement of support = 0.140-0.160 mm, number of cell rows = 10-20, height of cells = 0.015-0.025 mm, width of cells = 0.015-0.035 mm, cell wall thickness = 0.005-0.010 mm.

Occurence. Late Viséan-late Serpukhovian: Newfoundland Shelf, England, Ireland, Germany, Ukraine (Galitsie-Volyn), Southern France, Morocco, Algeria. Middle Viséan, Kurmakovsky, late Serpukhovian of Urals. Early Moscovian of Eastern Alborz (Iran). Brigantian of Roque Redonde (RR81). Late Serpukhovian of Pyrenees: see Perret and Vachard (1977); MFP.AH20 (= DV778C), MFP.AH20A (this study). Bashkirian of Pyrenees.

Fourstonella irregularis Mamet and Roux, 1977
Pl. 28, figs. 7-10.

1977 *Fourstonella irregularis* n. sp. Mamet and Roux, p. 223, pl. 2, figs. 5-7.
1979 *Fourstonella irregularis* Mamet and Roux - Massa and Vachard, pl. 8, fig. 2, pl. 9, fig. 6.
1984 *Fourstonella irregularis* Mamet and Roux - Vachard and Massa, pl. 2, fig. 5.
? 1985 *Fourstonella* sp. Mamet and Roux - Skipp, Baesemann and Brenckle, pl. 7, figs. 11, 15-16.
1985 *Fourstonella irregularis* Mamet and Roux - Roux, p. 602 (no illustration).
? 1986 *Fourstonella johnsoni* (Flügel) - Groves, text-fig. 4 p. 479, text-fig. 5 p. 480, p. 488, fig. 8. 3-7, 8 ? (8 could be an *Eflugelia*).
1986 *Eflugelia johnsoni* Mamet and Roux - Skompski, p. 268-269, text-fig. 6 p. 269, pl. 10, figs. 1-2.
non 1986 *Fourstonella irregularis* Mamet and Roux - Skompski, p. 269 (synonymized with *F. fusiformis*).
v. 1987 *Fourstonella* sp. - Delvolvé et al., pl. 1, fig. 15.
non 1988 *Fourstonella irregularis* Mamet and Roux - Ivanova and Bogush, p. 48 (pars) pl. 20, figs. 1-3.
non 1988 *Fourstonella* cf. *irregularis* Mamet and Roux - Ivanova and Bogush, pl. 20, fig. 10.
non 1990 *Fourstonella irregularis* Mamet and Roux - Bogush et al., p. 127, pl. 27, figs. 6-7 (with 3 references in synonymy) (= *Mametella*).
?1994 *Ungdarella* sp. - Mamet, pl. 3, fig. 4-5.
1996 *Fourstonella irregularis* Mamet and Roux - Sebbar and Mamet, text-fig. 5. 19 (no illustration).
1996 *Fourstonella* sp. - Skompski, pl. 16, figs. 7-8.
1999 *Fourstonella irregularis* Mamet and Roux - Sebbar and Mamet, text-fig. 3. 30, pl. 1, fig. 11.
v. 2002 *Fourstonella irregularis* Mamet and Roux - Krainer and Vachard, p. 14, pl. 3, figs. 2-3 (with synonymy).
? 2004 *Fourstonella* sp. Mamet and Roux - Brenckle, pl. 7, fig. 2.
v. 2005 *Fourstonella irregularis* Mamet and Roux - Saïd, p. 185 (no illustration).
non 2005d *Fourstonella irregularis* Mamet and Roux - Cózar and Somerville, text-fig. 3 p. 101, fig. 6. 3 (= *F. fusiformis*).

Description. Length of thallus = 0.600-1.400 mm, Diameter of thallus = 0.400- 0.600 mm, Diameter of emplacement of support = 0.040-0.100 mm, number of cell rows: app. 8-10, number of cells per row: app. 50-100, height of cells = 0.050-0.075 mm, width of cells = 0.020-0.040 mm, cell wall thickness = 0.015-0.030 mm.
Occurrence. The holotype originates from Montagne Noire ("Ro39/26 (62), Mamet 2112, Cabrières"). Late Viséan-Early Moscovian of Montagne Noire, Western French Pyrenees, Morocco, Algeria, Libya, Poland, Austria and Urals. Brigantian of Montagne Noire: Castelsec (?MA10.9); Roquemaillère (DV139A); Roc du Cayla (DV82C); Japhet (DV126B, DV126D, DV619A, DV619B); Vailhan-Roque de Loup (DV248B); Les Mentaresses (DV328'C).

Genus *Chuvashovia* Vachard, 1980

Type species. *Chuvashovia densifolia* Vachard, 1980.
Diagnosis. Test attached. Cellular network similar to *Fourstonella* or *Efluegelia*. The number of cellular row is elevated, and the shape of the thallus is more foliate. Wall yellowish; often entirely recrystallized.
Remarks. The first Mississippian specimens were illustrated by Cózar and Rodríguez (2004, fig. 9. 17).
Occurrence. Early Serpukhovian of Southwestern Spain; Middle Permian of Afghanistan, Sumatra and Oman.

Chuvashovia? sp.
Pl. 28, figs. 11-12.

? 2004 *Chuvashovia densifolia* Vachard - Cózar and Rodríguez, fig. 9. 17.

Description. Length of thallus = up to 4.600 mm; Diameter of thallus = up to 0.800 mm, Diameter of emplacement of support = 0.150 mm, number of cell rows: app. 10, height of cells = 0.060 mm, cell wall thickness = 0.020 mm.

Occurrence. Early Serpukhovian of Southwestern Spain. Brigantian of Montagne Noire: Roc du Cayla (DV82C, 2 specimens), Tiberet (ML.FSL.TIB). Late Serpukhovian of Ardengost area: MFP. AH.81.1.

Family Ungdarellaceae Maslov, 1956b
Tribe Ungdarelleae Chuvashov in Chuvashov et al., 1987

Diagnosis. Aoujgaliales varying in organization from crustose, laminar, with rare erected rows of cells, to cylindrical and branched eventually initially attached. The endoskeleton is composed of continuous rows of cells, more or less arranged in concentric laminae growing upward or laterally, and perforated transverse pillars perpendicular to each lamina acting as communication between the cells. Wall calcitic, yellowish, hyaline.

Composition. One tribe: Ungdarelleae Chuvashov in Chuvashov et al., 1987. *Ungdarella* Maslov, 1956a; *Ungdarellita* Mamet and Villa, 2004.

Occurrence. Late Viséan (late Asbian) to latest Permian (Changhsingian). The LAD is located at the base of the late Asbian (biozones MFZ14, Cfm6, Cf6γ or Cf6γ1: Vachard, 1989a; Gallagher, 1996; Cózar and Somerville, 2004, text-fig. 12). Cosmopolite up to the early Permian; after that, Palaeo- and Neotethyan.

Genus *Ungdarella* Maslov, (1950) 1956a

Type species. *Ungdarella uralica* Maslov (1950) 1956a.

Diagnosis. Thallus cylindrical and branched. Sometimes there is an initial stage, attached, similar to *Stacheoides*, followed by an erected stage (see Madi et al., 1996, pl. 22, fig. 5; Vachard and Krainer, 2001a, pl. 5, fig. 7). The endoskeleton is composed of conical to paraboloid concentric laminae growing upward and perforated pillars perpendicular to each lamina (see Vachard, 1980, fig. 74). A medium perforation within the pillar acts as communication between the chamberlets ("cells" of the authors). Wall calcitic, yellowish, hyaline.

Remarks. For the year of description of this genus see Mamet and Rudloff, 1972 (p. 90-91), Mamet and Roux (1983, p. 86) or Mamet (2002, p. 500). *Ungdarella* is generally interpreted as a red alga, with a hypothallus and a perithallus (Mamet, 1991), but this interpretation does not correspond with our observations (see also Cózar and Somerville, 2005b, p. 74). The skeletal network of *Ungdarella* is generally sharply recrystallized, but when it is well preserved, it appears as perforated and sometimes filled with micrite (see Bensaïd et al., 1979, pl. 16, figs. 4, 6; Vachard and Fadli, 1991, pl. 1, fig. 15; Sebbar and Mamet, 1996, pl. 3, fig. 9; Madi et al., 1996, pl. 22, fig. 5), and differs of the completely close cells of red algae. Systems of attachment were illustrated by Nguyen Duc Tien (1979, pl. 28, fig. 6; 1989b, pl. 34, fig. 5); Madi et al. (1996, pl. 22, fig. 5), Proust et al. (1996, pl. 1, fig. 2, pl. 2, figs. 10-11), Vachard and Krainer (2001a, pl. 5, fig. 7), Flügel (2004, pl. 108, fig. 8), and Karim et al. (2005, fig. 3L). A thallus directly attached to a coral was illustrated by Saïd (2005, fig. X. 1. 11).

Occurrence. Late Viséan (late Asbian) to latest Permian (Changhsingian). The FAD is located at the base of the late Asbian (biozones MFZ14, Cfm6, Cf6γ or Cf6γ1: Vachard, 1989a; Gallagher, 1996; Gallagher and Somerville, 1997; Cózar and Somerville, 2004, text-fig. 12; 2005b, text-fig. 3). The references in the middle Viséan of Urals (Bogush et al., 1990) are probably due to misinterpreted *Stacheoides*. Cosmopolite up to the early Permian; after that, Palaeo- and Neotethyan.

Ungdarella uralica Maslov, (1950) 1956a

Pl. 29, figs. 1-15.

1950 *Ungdarella uralica* n. sp. Maslov, p. 75-78, fig. 1.
1956a *Ungdarella uralica* n. sp. Maslov, p. 73, pl. 21 figs. 2-3, pl. 23, figs. 1-4; text-figs. 18a-b, 19.
1962 *Ungdarella uralica* Maslov - Maslov, p. 97 (French translation), text-fig. 97A-C.
1962 *Ungdarella conservata* Korde - Maslov, p. 98 (French translation), text-fig. 98.
1966 *Ungdarella uralica* Maslov - Chanton, p. 407, text-fig. 1A, C p. 406, tabl. 3 p. 409, pl. 8, fig. 3.
1966 *Ungdarella conservata* Korde - Chanton, p. 407, text-fig. 1B p. 406, tabl. 3 p. 408.
1966 *Ungdarella uralica* Maslov - Flügel, p. 14-16, pl. 1, figs. 1-2.
1972 *Ungdarella uralica* Maslov - Homann, p. 155-156, 158, tabl. 6 p. 157, pl. 1, fig. 4 (with 17 references in synonymy).
1972 *Ungdarella uralica* Maslov - Mamet and Rudloff, p. 91, pl. 9, figs. 1-5 (with synonymy).
1973 *Ungdarella uralica* Maslov - Maslov, pl. 21, fig. 3.
v. 1974b *Ungdarella conservata* Maslov - Vachard, p. 185, pl. 5, fig. 5, pl. 6, figs. 1-2, pl. 8, figs. 12-14 (with synonymy).
1976 *Ungdarella conservata* Kordé - Emberger, p. 117 (no illustration) (with 4 references in synonymy).
1976 *Ungdarella deceanglorum* Elliott - Emberger, p. 117 (no illustration).
1976 *Ungdarella uralica* Maslov - Emberger, p. 119 (no illustration) (with 21 references in synonymy).
v. 1977 *Ungdarella uralica* Maslov - Perret and Vachard, p. 120-121, pl. 5, fig. 4 (with detailed synonymy).
v 1977a *Ungdarella uralica* Maslov - Vachard, p. 374, tabl. 1 (no illustration).
v 1977b *Ungdarella* cf. *conservata* Kordé - Vachard, p. 165, pl. 8, figs. 21-22.
v. 1979 *Ungdarella uralica* Maslov - Bensaïd et al., pl. 16, fig. 4.
1979 *Ungdarella uralica* Maslov - Nguyen Duc Tien, pl. 28, figs. 5-7.
1979 *Ungdarella uralica* Maslov - Zagorodnyuk, p. 11, pl. 3, fig. 3.
1980 *Ungdarella uralica* Maslov - Flügel and Flügel-Kahler, p. 161-162, pl. 8, fig. 4 (with 6 references in synonymy).
1980 *Ungdarella uralica* Maslov - Buchroithner et al., p. 26, pl. 26, fig. 1.
v. 1981 *Ungdarella* ex gr. *uralica* Maslov - Vachard and Montenat, p. 65-66, pl. 11, figs. 1, 3.
v. 1982 *Ungdarella uralica* Maslov - Fontaine et al., p. 52 (no illustration).
1982 *Ungdarella uralica* Maslov - Flügel, pl. 29, fig. 4.
1983 *Ungdarella uralica* Maslov - Mamet and Roux, p. 85-86, pl. 8, figs. 7-10 (with synonymy).
non 1985 *Ungdarella uralica* Maslov - Mamet and Pinard, pl. 1, fig. 19 (probably other genus), pl. 3, fig. 1 (= *Foliophycus*).
1986a *Ungdarella uralica* Maslov - Nguyen Duc Tien, pl. 10, fig. 1.
p. 1986b *Ungdarella uralica* Maslov - Nguyen Duc Tien, pl. 15, figs. 7-8 (pl. 14, fig. 1B is questionable).
1987 *Ungdarella uralica* Maslov - Mamet et al., p. 52, pl. 25, figs. 6-14, pl. 26, figs. 8-10, pl. 27, figs. 1, 9-11 (with 20 references in synonymy).
1988a *Ungdarella uralica* Maslov - Ivanova, p. 7 (no illustration).
1988 *Ungdarella uralica* Maslov - Kulagina, p. 26 (no illustration).
1989 *Ungdarella* ex gr. *uralica* Maslov - Köylüoglu and Altiner, pl. 1, fig. 10.
1989b *Ungdarella uralica* Maslov - Nguyen Duc Tien, pl. 34, figs. 4-5.
? 1990 *Ungdarella uralica* Maslov - Bogush et al., tabl. 1 p. 11, p. 124, pl. 24, figs. 1-2, pl. 25, figs. 1-5 (with 8 references in synonymy).
1990 *Ungdarella uralica* Maslov - Sebbar, pl. 1, fig. 3.
v. 1990 *Ungdarella* sp. - Caridroit et al., p. 340, 342 (no illustration).
1991 *Ungdarella uralica* Maslov - Mamet, pl. 3, fig. R.
v. 1991b *Ungdarella uralica* Maslov - Vachard et al., pl. 1, fig. 10.
v. 1991c *Ungdarella uralica* Maslov - Vachard et al., p. 677, pl. 1, fig. 25.
v. 1992 *Ungdarella uralica* Maslov - Vachard and Berkhli, pl. 1, fig. 21, pl. 3, figs. 13-14, pl. 4, fig. 14.
1992 *Ungdarella* (*U*) - Horbury, fig. 6D, fig. 7C.
? 1995 *Ungdarella uralica* Maslov - Pajic and Filipovic, pl. 50, fig. 2.
v. 1996 *Ungdarella uralica* Maslov - Proust et al., p. 346, text-fig. 4 p. 345, pl. 1, figs. 2-3, pl. 2, figs. 10-11.
1996 *Ungdarella uralica* Maslov - Sebbar and Mamet, pl. 3, fig. 9.
v. 1996 *Ungdarella uralica* Maslov - Vachard and Maslo, text-fig. 3 p. 367 (no illustration).
v. 1996 *Ungdarella* ex gr. *uralica* Maslov - Vachard and Montenat, pl. 3, fig. 9.
1998 *Ungdarella uralica* Maslov - Sebbar, pl. 2, fig. 6.
v. 1999 *Ungdarella uralica* Maslov - Berkhli, p. 105, 108, 109, 111, 112, 113, 114, pl. 3, fig. 8.
2000 *Ungdarella uralica* Maslov - Sebbar et al. , n° 40 text-fig. 7 p. 214, 215.
2000 *Ungdarella uralica* Maslov - Sebbar, pl. 1, figs. 3-4.
2000 *Ungdarella uralica* Maslov - Mamet and Stemmerik, fig. 7. A-D.

v. 2001a *Ungdarella* ex gr. *uralica* Maslov - Vachard and Krainer, pl. 5, fig. 7.
2001 *Ungdarella* sp. - Minwegen, pl. 6, fig. 6.
2002 *Ungdarella uralica* Maslov - Mamet, p. 500, pl. 6, fig. 2 (with synonymy).
2002 *Ungdarella uralica* Maslov - Shcherbakova and Shcherbakov, p. 307, 308, 312, 313, 314 (no illustration).
v. 2002a *Ungdarella uralica* Maslov - Berkhli et al., p. 193 (no illustration).
v. 2002b *Ungdarella uralica* Maslov - Berkhli et al., p. 135, 139 (no illustration).
v. 2002 *Ungdarella uralica* Maslov - Izart et al., p. 121, 135 (no illustration).
2003 *Ungdarella* sp. - Mamet and Misik, fig. 3. 4.
v. 2003 *Ungdarella uralica* Maslov - Berkhli and Vachard, p. 10 (no illustration).
v. 2003 *Ungdarella uralica* Maslov - Fontaine et al., pl. 6, figs. 7-8.
2003 *Ungdarella uralica* Maslov - Khodjanyazova and Mamet, pl. 5, figs. 6-7.
2003 *Ungdarella* sp. - Della Porta, fig. 4.5.A, pl. 4.1, figs. 6, 8, pl. 4.2, figs. 1, 3, 6-8.
v. 2004 *Ungdarella uralica* Maslov -Vachard and Aretz, p. 658, fig. 8. 8.
? 2004 *Ungdarella uralica* Maslov - Cózar, p. 373, text-fig. 3 p. 371, text-fig. 4 p. 372 (no illustration).
? 2004 *Ungdarella uralica* Maslov - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 8 p. 48, text-fig. 15 p. 61 (no illustration).
2004 *Ungdarella* - Flügel, pl. 56, fig. 7, pl. 108, figs. 7-8.
2004 *Ungdarella uralica* Maslov - Mamet and Villa, p. 169-170, fig. 14 J (with 24 references in synonymy).
v. 2005 *Ungdarella uralica* Maslov - Karim et al., fig. 3L.
2005a *Ungdarella uralica* Maslov - Cózar and Somerville, text-fig. 4 p. 5, text-fig. 5 p. 7, text-fig. 6 p. 8, text-fig. 8 p. 11(no illustration).
v. 2005 *Ungdarella uralica* Maslov - Saïd, p. 175, p. 180, fig. X. 1. 4, 11.
2005b *Ungdarella uralica* Maslov - Cózar and Somerville, pl. 2, fig. 8.
v. 2005 *Ungdarella uralica* Maslov - Fontaine et al., p. 41, 44 (no illustration).
2005a *Ungdarella uralica* Maslov - Cózar, text-fig. 4 p. 409, fig. 6. 4.
2005d *Ungdarella uralica* Maslov - Cózar and Somerville, text-fig. 3 p. 101, fig. 6. 1.
2006 *Ungdarella uralica* Maslov - Mamet, p. 343, pl. 5, figs. 6-8 (with 24 references in synonymy).
2006b *Ungdarella uralica* Maslov - Herbig, pl. 2, fig. 1.
? 2006 *Ungdarella* spp. (sic) - Gallagher et al., fig. 13. 3.

Description. Because of the scalariform central cellular row, the species corresponds to the morphotype *U. conservata* Kordé, 1951 (see Vachard, 1977b). Length = 2.700 mm. Outer diameter = 0.500-1.400 mm. Axis diameter ("hypothallus") = 0.150/0.250 mm. Skeletal elements = 0.050 x 0.050 mm.

Occurrence. As for the genus. Material very abundant in the latest Asbian-latest Brigantian of Montagne Noire (especially common in the earliest Brigantian): Sommet 224-Valuzières (DV600B); Lenses of the road, near Roquessels (DV293C, DV293E, DV293H, DV332F, DV848.2, DV.FB18); Castelsec (MA10-?, MA10.2.II.2, MA10.6, MA10.7, MA10.8, MA10.8.2, MA10.9 (abundant), MA10.10, MA10.14, MA.10.14.2, MA10.17, MA10.23, MA10.I, MA10.II, MA10.IV.100, MA.Heidi, MA11-III, MA11.11a); Roquemaillère (DV137A, DV137B, DV137C, DV137D, DV137E, DV137F, DV137G); Roc du Cayla (DV84B); Japhet (DV126D);Vailhan-Roc de Castel (MA.RC1); Olistolithe à l'Ouest de west of Péret (MA.PE5); Les Boutinelles (MA25.9B, MA25.19 (altered)); 500m from Vailhan (DV.ML788); Vailhan-Château (DV246E, DV246F, DV246G, DV246H), Vailhan-Roque de Loup (DV315); Les Pascales (DV601A, DV 601B, DV601D, DV601E); Roc de Murviel (MA5, MA13, MA44, MA47, MA53, MA61, MA73.2, MA83, MA330-3); Les Batailles (DV611C); Les Mentaresses (DV329C); Jeantels (DV690B); Mounio (DV431B); very rare in the early Serpukhovian: only one section in La Serre (GIK 1835 of Vachard and Aretz, 2004), and late Serpukhovian of Ardengost (MFP.AH20'F, AH.B/81.9).

Family Calcifoliaceae G. Termier, Termier and Vachard, 1977 nomen translat. Vachard and Cózar (submitted) (pro Calcifoliidae), emend. herein

Diagnosis. Colonies encrusting, laminar to erect ramose, petaloid, pseudophylloid, or phylloid. Skeleton strongly mineralized, calcitic, lamellar to petaloid. Central part reserved to the organic component, narrow and hardly fossilized. The calcified part is composed of a yellowish to dark calcite; diverse types of filaments can occur, filled with microsparite, micrite or iron oxides. Skeleton calcitic yellowish or dark, lamellar to petaloid. The space occupied by the organic living matter was probably very narrow. Internal, thin, tubular structures poorly understand (pivots or filaments).

Composition. Two tribes: (1) Fascielleae Shuysky, 1999 emend. Vachard, Somerville and Cózar, 2004a (pro family); (2) Calcifolieae Shuysky in Chuvashov et al., 1987 emend. Vachard and Cózar, 2005.
Occurrence. Middle Viséan-early Bashkirian, Palaeotethyan (*Fasciella* is cosmopolite; the Calcifoliaceae are limited to the western and central Palaeotethys).

Tribe Fascielleae Shuysky, 1999 nomen translat.
Vachard, Somerville and Cózar, 2004a (pro family)

Diagnosis. Laminar Calcifoliaceae eventually followed by phylloid to moniliform lateral expansions. Skeleton calcitic yellowish. The space occupied by the organic living matter was probably very narrow. Internal, thin, tubular structures poorly understand (pivots).

Composition. 2 genera: *Fasciella* Ivanova, 1973, *Praedonezella* Kulik, 1973.

Occurrence. Middle Viséan to Moscovian, cosmopolite.

Genus *Fasciella* Ivanova, 1973
Type species. *Fasciella kizilia* Ivanova, 1973.
Synonym. *Shartymophycus* Kulik, in the sense of Mamet and Roux, 1975b.
Diagnosis. Elongate, sometimes ramose, concentric carbonate crusts surrounding a cylindrical axis or pivot. Crusts separated by very narrow micritic intervals. Hyaline yellowish crusts; microsparitized whitish pivot.

Composition. *Fasciella kizilia* (= *Shartymophycus fusus* Kulik, 1973 = *Fasciella ivanovae* Saltovskaya, 1984a = *F. ramosa* Saltovskaya, 1984a; according to Mamet, 1991, 2002 = ? *Shartymophycus multiplex* Kulik, 1973), *Fasciella crustosa* Vachard, Somerville and Cózar, 2004a, *Fasciella scalaeformis* Vachard, Somerville and Cózar, 2004a.

Remarks. The typical specimens seem to encrust a short cylindrical microsparitic axis (bacillar substrate, spicule, central siphon?). Some specimens show a large uncalcified axis (Mamet and Roux, 1977, pl. 14, fig. 7; Mamet and Pinard, 1985, pl. 2, fig. 13, 17; Vachard et al., 1991a, pl. 1, fig. 1) or a scalariform axis (Vachard and Aretz, 2004; Vachard et al., 2004a). The most ramose species is *Fasciella ramosa* Saltovskaya, 1984a, but its generic assignment might be questionable. The calcareous skeleton is directly exposed during the life of this alga as evidenced by “interstratified” *Eotuberitina* (e. g., Ivanova, 1975, pl. 1, fig. 11).

Occurrence. Middle Moliniacian, formerly early Viséan "V1b" (Vachard et al., 1991b). Rather common since the late Moliniacian ("V2a") (Vachard, 1977a, tabl. 1) to Bashkirian (Ivanova, 1973; Vachard et al., 1991b, Sebbar, 2000). Acme in the late Asbian-Brigantian. ?Early Moscovian (Sebbar and Mamet, 1999). ?Late Atokan (Groves, 1984). Cosmopolite (see Mamet, 1991).

Fasciella kizilia Ivanova, 1973

Pl. 30, figs. 1-9, Pl. 43, fig.16.

1973 *Fasciella kizilia* n. sp. Ivanova, p. 39, pl. 21, fig. 2, pl. 27, fig. 1-6, pl. 34, fig. 18.
1975 no legend - Ivanova, pl. 1, fig. 11.
1976 *Fasciella kizilia* Ivanova - Bless et al., pl. 12, figs. 21-22.
v. 1977a *Fasciella kizilia* Ivanova - Vachard, p. 374, tabl. 1 (no illustration).
2002 *Fasciella kizilia* Ivanova - Mamet, p. 501-502, pl. 7, fig. 9 (with synonymy).
Add:
1988a *Fasciella kizilia* Ivanova - Ivanova, p. 7 (no illustration).
v. 1991b *Fasciella kizilia* Ivanova - Vachard et al., pl. 1, fig. 11.
1997 *Fasciella kizilia* Ivanova - Gallagher and Somerville, text-fig. 6 p. 321, text-fig. 7a-c p. 323, text-fig. 8 p. 325, fig. 9z.
v. 1999 *Fasciella kizilia* Ivanova - Berkhli, p. 106, 111 (no illustration).
2000 *Fasciella kizilia* Ivanova - Sebbar, text-fig. 17-18, 21-22, p. 73.
2002 *Fasciella kizilia* Ivanova - Shcherbakova and Shcherbakov, p. 308, 312 (no illustration).
v. 2002a *Fasciella kizilia* Ivanova - Berkhli et al., p. 193 (no illustration).
v. 2002b *Fasciella kizilia* Ivanova - Berkhli et al., p. 139 (no illustration).
v. 2002 *Fasciella* cf. *kizilia* Ivanova - Krainer and Vachard, p. 14, pl. 2, fig. 2 ?, pl. 3, figs. 4, 6 ?, 10 (with synonymy).
2003 *Fasciella kizilia* Ivanova - Groves et al., p. 385-387, fig. 6. 6-8.
v. 2004 *Fasciella kizilia* Ivanova - Vachard and Aretz, p. 658-659, fig. 8. 11.
v. 2004a *Fasciella kizilia* Ivanova - Vachard, Somerville and Cózar, p. 264-265, pl. 1, figs. 2, 4 (with synonymy).
2004 *Fasciella kizilia* Ivanova - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 8 p. 48, text-fig. 9 p. 49, text-fig. 15 p. 61 (no illustration).
2004 *Fasciella kizilia* Ivanova - Cózar, text-fig. 3 p. 371, text-fig. 4 p. 372 (no illustration).
2004 *Fasciella* - Flügel, pl. 108, fig. 5 (from Madi et al., 1996).
v. 2005 *Fasciella* sp. - Saïd, p. 176, p. 178, p. 179, p. 181, p. 185, p. 187 (no illlustration).
v. 2005 *Fasciella kizilia* Ivanova - Saïd, p. 179, p. 185, p. 187 (no illlustration).
2005a *Fasciella kizilia* Ivanova - Cózar, text-fig. 3 p. 408, text fig. 4 p. 409, fig. 6. 12.
2005 *Fasciella* sp. - Sanz et al., fig. 7. 5.
2006 *Fasciella kizilia* Ivanova - Mamet, p. 344, pl. 5, fig. 9 (with 6 additional references to Mamet, 2002, in synonymy).
2006 *Fasciella* sp. - Sanz-Lopez et al., pl. 6, fig. 19.
2006b *Fasciella kizilia* Ivanova - Herbig, pl. 2, fig. 4.

Description. Total length up to 4.00 mm; width = 0.20-0.75 mm; thickness of skeletal elements = 0.05-0.10 mm. Thickness of the sparitized axis = 0.05-0.10 mm. Inner cavity (substrate) = 0.40 mm.

Remarks. From Montagne Noire, Vachard et al. (2004a) illustrated a specimen of the Lenses of the road, near Roquessels (pl. 1, fig. 2, sample DV293C) and Saint-Rome (pl. 1, fig. 4, sample DV130A).

Occurrence. As for the genus. Common in Montagne Noire from latest Asbian to latest Brigantian: Lenses of the road, near Roquessels (DV293, DV293C, DV293.2B, DV314D); Sommet 224-Valuzières (DV600B); Japhet (?DV126F, DV127A, DV127B, DV127E, DV128A, DV128B, DV620); Castelsec (MA10.I.2, MA11.2: with bifurcated pivot); Roquemaillère (ML764; ?ML.UM.ROQ: perhaps other species; DV137B); Roc du Cayla (MA12.3, DV82D); Roque Redonde (RR45, RR49, RR50, RR51, RR55, RR66, RR75, RR76, RR85, RR86); Les Pascales (MA.PA3, MA.PA7, MA.PA13); Les Boutinelles (MA.BOU.25.1A, MA.BOU.25.3, MA.BOU25.9, MA.BOU25.16); 500 m de Vailhan (ML788); Vailhan-Château (DV246G)); Tiberet (ML.FSL.TIB); Laurens (ML.UM.LAU'.T); Les Pascales (DV601A, DV601B, DV601D: various ecophenes); Les Batailles (?DV609.3); Les Mentaresses (DV687A); Saint Rome (DV130A, DV132C); Jeantels (DV690B). Roc de Murviel (MA32, MA33.0). Rare in the early Serpukhovian from La Serre (GIK 1801, GIK 1806, GIK 1832 and in this study MA.LSI.Top.2048; ML1054) and in the late Serpukhovian of the Ardengost area (?MFP.AH.B/81.9, MFP.CAS14.3).

Fasciella crustosa Vachard, Somerville and Cózar, 2004a
Pl. 30, figs. 10-18.

2004a *Fasciella crustosa* n. sp. Vachard, Somerville and Cózar, p. 266, 268, pl. 1, figs. 1, 3, 5-8 (with 14 references in synonymy).
2004 von unbekanntem Organismus inkrustiert - Piecha et al. pl. 1, fig. 8.
2005b *Fasciella crustosa* Vachard, Somerville and Cózar - Cózar and Somerville, text-fig. 3 p. 76, p. 81, text-fig. 6 p. 84, p. 87, pl. 2, fig. 7.
2005a *Fasciella crustosa* Vachard, Somerville and Cózar - Cózar, text-fig. 3 p. 408, text fig. 4 p. 409, fig. 7. 2.
2005d *Fasciella crustosa* Vachard, Somerville and Cózar - Cózar and Somerville, fig. 5. 4.
?2005 Diagenetically altered *Fasciella* strands on a brachiopod valve - Mamet and Zhu, fig. 5B.
? 2005 *Claracrusta* sp. - Sanz-Lopez et al., pl. 8, fig. 3.
? 2005 *Fasciella* sp. - Sanz-Lopez et al., pl. 8, fig. 6.
2006 *Fasciella crustosa* Vachard, Somerville and Cózar - Vachard and Cózar, pl. 1, figs. 1-5, 8.

Description. Large crusts with numerous laminae encrusting large substrates.
Occurrence. This form, common in the late Asbian-early Serpukhovian of northwestern England, late Asbian of Germany, early Serpukhovian of Southwestern Spain, and in the early Brigantian of Ireland, is very rare in the Brigantian of Montagne Noire: Roquemaillère (DV133E), Roque Redonde (RR1, RR5, RR54, RR55, RR66, RR73, RR74) and Les Boutinelles (MA25.16B). It is possibly present in Tarim, Northern China (Mamet and Zhu, 2005).

Fasciella scalaeformis Vachard, Somerville and Cózar, 2004a
Pl. 30, figs. 19-20.

2004a *Fasciella* scalaeformis n. sp. Vachard, Somerville and Cózar, p. 270, pl. 2, figs. 1-9 (with synonymy).

Description. The pivot is scalariform.
Remarks. From Montagne Noire, Vachard et al. (2004a) illustrated a specimen of Mounio (pl. 2, fig. 9, sample DV431E).
Occurrence. Late Asbian-early Brigantian of Northern England. Very rare in the late Brigantian of Montagne Noire: Mounio (DV431A, DV431E). The material of Castelsec evoked by Vachard et al. (2004a, p. 270) cannot be confirmed in this study.

Genus *Praedonezella* Kulik, 1973

Type species. *Praedonezella cespeformis* Kulik, 1973.
Synonyms. *Donezella* Maslov, 1929 (pars).

Diagnosis. Short, erected and segmented skeletal elements, more or less regrouped in a nodular colony. This skeletal elements have the shape of tetrahedrons more or less deformed. The branches of these tetrahedrons show a yellowish calcite wall. Internally they are occupied by a sparitic white short and fat filaments. The site of the filament is occasionally empty but the hollows do not communicate with the exterior. Hence, there are no chambers, and the organization differs from that of *Donezella*. Yellowish calcite wall internally empty and with hollows not communicated with the exterior. After diagenesis, the colony appears as a ramified yellowish skeleton, with the open spaces filled with micrite; i.e. a spongy aspect.

Composition. *Praedonezella cespeformis*; *P. cespeformis* sensu Bogush et al., 1990; *P. primitiva* Vachard et al., 2004a; *P. catenuliformis* Ivanova in Bogush et al., 1990; *P.* sp. sensu Sanz-López *et al*., 2006 (fig. 7.4).

Remarks. *Praedonezella* was created as a Rhodophycean Gigartinale (Kulik, 1973), and successively transferred to the Pharetronida Calcifoliida (Perret and Vachard, 1977), to the Paleosiphonocladales Beresellaceae (Chuvashov et al., 1987), to the Siphonocladales

Palaeoberesellaceae (Bogush et al., 1990), to the algae sensu lato (Vachard et al., 1991b), or to the Fascielliae, due to the encrusting initial part (Vachard et al., 2004a). It is probably one of the most discussed assignment in the literature. True *Donezella* appear in the early Bashkirian, at the base of Krasnopolyansky (Vachard and Maslo, 1996, text-fig. 1 p. 359); hence *Praedonezella* can appear biostratigraphically as an ancestor of *Donezella*, but morphologically, according to Vachard in Perret and Vachard, 1977, Vachard et al., 2004a, and Vachard and Cózar (submitted), we admit a relation with the Calcifoliidae sensu lato.

Occurrence. Brigantian-late Bashkirian: Southern France (Montagne Noire, Pyrénées), Northern Spain, Southwestern Spain, ?Algeria, Austria, Greece, Donbass, Turkey, Southern Urals, Kazakhstan, Afghanistan (Hindu Kush), Malaysia, Thailand, Japan (see Vachard et al., 2004a, p. 271). Doubtful in the late Midian of Hazro (Turkey) (Gaillot, 2006).

Praedonezella primitiva Vachard, Somerville and Cózar, 2004a
Pl. 31, figs. 1-6.

v. 1974b *Hikorocodium* (?) sp. - Vachard, p. 186, pl. 6, fig. 1.
1981 Donezellid bafflestone - Mamet and Martínez, pl. 1, fig. 5.
v. 2004a *Praedonezella primitiva* n. sp. Vachard, Somerville and Cózar, p. 271-272, pl. 3, figs. 4-5.
v. 2005 *Praedonezella primitiva* Vachard, Somerville and Cózar - Saïd, p. 181 (no illustration).
v. 2006 *Praedonezella primitiva* Vachard, Somerville and Cózar - Vachard and Cózar, pl. 1, figs. 6-7, 9.

Description. Thallus is nodular, hemispherical or rounded elongate. Skeletal elements are filiform, tetrahedric, smooth and inflated at the extremities, densely packed, randomly disposed, and rounded in transverse section. No internal cavities are visible. The open spaces of the colonies are occupied by micrite. General dimensions of thallus = 1.600-3.000 mm. Length of skeletal elements = 0.100-0.150 mm. Width of skeletal elements = 0.015-0.020 mm.

Remarks. The holotype was described from Tourière (Vachard et al., 2004a, pl. 3, fig. 4, sample DV341A), and a paratype illustrated from Les Pascales (ibidem, pl. 3, fig. 5, sample DV601A).

Occurrence. Attributed to a “zone 13 or younger”, i. e. Holkerian or early Asbian; after the re-examination of Cózar and Rodríguez (1999b, P. Cózar, unpublished data), these outcrops were attributed to zones 14 to 16 (Holkerian to Brigantian). Material illustrated by Mamet and Martínez (1981) seems to be Asbian in age. Late Asbian-early Brigantian from the Guadiato Basin in Southern Spain. Brigantian-early Serpukhovian of central and Eastern Morocco. Brigantian or early Serpukhovian from Austria. Brigantian-early Serpukhovian from Montagne Noire: Castelsec (MA10-?, MA10.2.3, MA10.6; MA11.9.3, MA11.5.2); Roquemaillère (DV139C); Roc du Cayla (?DV462C); Japhet (DV126B, DV126E, DV857.3); Roque Redonde (RR1, RR3, RR52, RR88); Serre de Péret MA.SP4, MA.SP24, MA.SP31, MA.SP32); La Serre (?MA.LSI.top.2048); Les Pascales (DV601A, DV601B); Roc de Murviel (MA2, MA21- ?, MA39,MA66, MA73.2, MA83)

Praedonezella cespeformis Kulik, 1973 emend. Perret and Vachard, 1977
Pl. 31, figs. 7-8.

1973 *Praedonezella cespeformis* n. sp. Kulik, p. 47-48, pl. 3, figs. 5-6.
v. 1977 *Praedonezella cespeformis* Kulik - Perret and Vachard, p. 131-133, pl. 8, figs. 1-5, pl. 9, figs. 1-4, pl. 10, figs. 1-2 (with synonymy).
v. 1977a *Praedonezella cespeformis* Kulik - Vachard, p. 374, tabl. 1 (no illustration).
1990 *Praedonezella cespeformis* Kulik - Bogush et al., p. 83, pl. 5, figs. 5-7.

v. 1991b *Praedonezella cespeformis* Kulik - Vachard et al., p. 254, pl. 1, fig. 13.
v. 1998 *Praedonezella cespeformis* Kulik - Delvolvé et al., p. 365 (no ilustration).
p. 2002 *"Praedonezella" cespeformis* Kulik - Mamet, p. 496, pl. 1, fig. 4 (with questionable synonymy).
2002 *Praedonezella cespeformis* Kulik - Shcherbakova and Shcherbakov, p. 312 (no ilustration).
2003 *Praedonezella cespeformis* Kulik - Brenckle and Milkina, pl. 6, figs. 11, 15.
? v. 2003 *Praedonezella carbonica* Kulik (sic) - Fontaine et al., pl. 9, fig. 5, 11-12 (or new species).
v. 2004 *Praedonezella* ex gr. *cespeformis* Kulik - Vachard and Aretz, p. 659, fig. 12. 1-6 (with synonymy).
v. 2004a *Praedonezella* ex gr. *cespeformis* Kulik - Vachard et al., p. 272, 274, pl. 3, figs. 1-3.
? 2005 *Praedonezella* sp. - Sanz-Lopez et al., pl. 8, fig. 9.
? 2006 *Praedonezella cespiformis* (sic) Kulik - Cózar et al., p. 276 (no illustration).
? 2006 *Praedonezella* sp. - Sanz et al., fig. 7.4.

Description: Thallus or colonies of thallus of centimetric-size composed of undulating, anastomosed cylindrical skeletal elements. The colonies are invaded by micrite, with some effects of shelter-porosity. Diameter of the whole microfossil = 45.000-25.000 x 40.000-20.000 mm. Length of skeletal elements = 1.000-2.000 mm. Width of skeletal elements = 0.080-0.160 mm (more triangular elements attain 0. 60 mm, but could correspond to tangential sections). Open spaces = (0.400, compacted?)-0.800-1.000 mm.
Remarks: Some skeletal elements seem to be larger (up to 0.600 mm) (GIK 1805, 1807, 1809, 1858). They are tentatively considered as representatives of the same species.

Occurrence. Serpukhovian of Urals, Kazakhstan, ?Thailand, and Japan.?Brigantian of Southwestern Spain. Twenty seven specimens in the early Serpukhovian of La Serre (Vachard and Aretz, 2004: GIK 1803, GIK 1804, GIK 1805, GIK 1807, GIK1808, GIK 1809, GIK 1817, GIK 1823, GIK 1825, GIK 1826, GIK 1832, GIK 1834, GIK1836, GIK1837, GIK 1846, GIK 1858). Abundant material in the late Serpukhovian of Ardengost area (Perret and Vachard, 1977); MFP.AH18H, AH18I, AH20B, ?AH.B/81.9 (this study). Serpukkhovian of Arize Massif (Pyrenees).

Tribe Calcifolieae Shuysky in Chuvashov et al., 1987, orth. mut. pro Calcifoliae; emend. Vachard and Cózar, 2005

Diagnosis. Petaloid, pseudophylloid, or phylloid Calcifoliaceae.

Composition. 3 genera. *Frustulata* Saltovskaya, 1984a sensu Vachard and Cózar, 2005 (= *Pseudodonezella* Mamet and Herbig, 1990, invalid due to the misinterpretation of its type-species = ?*Iberiaella* Racz, 1984), *Falsocalcifolium* Vachard and Cózar, 2005; *Calcifolium* Shvetsov and Birina, 1935.

Discussion: Pseudophylloid was introduced by Vachard and Cózar (2005) for a short laminar thallic structure in which horizontal development of the petaloid thallus is well developed, more than vertical growth of the thallus. Filament is adopted from Mamet (1991) for the indeterminate endoskeletal internal structures, to those diverse interpretations have been suggested in the literature: laterals (siphons), spicules, microperforations (Maslov, 1956a, Perret and Vachard, 1977, Sebbar and Mamet, 1996). See possible interpretations in Vachard and Cózar (2005).

Occurrence. Late Viséan-Earliest Bashkirian. Palaeotethys and Urals.

Genus *Frustulata* Saltovskaya, 1984a sensu Vachard and Cózar, 2005

Type species. *Frustulata asiatica* Saltovskaya, 1984a

Synonym. *Pseudodonezella* Mamet and Herbig, 1990 (see Vachard and Maslo, 1996; and Cózar and Vachard, 2006).

Diagnosis. Elongate, irregular calcareous plates (petaloids), regularly ramified or anastomosed and acute apical extremity. Internal part of the wall uncalcified, dissolved and/or labyrinthic with pseudosepta. Ampulliform cavities exist in some cases (fertile specimens?). The "pores" described by several authors might correspond to the filaments of the other Calcifoliaceae. Wall hyaline yellowish calcitic, cavities filled with micrite.

Remarks. A part of the type-material of *Iberiaella* (holotype, fig. 3a and fig. 3c) looks like *Frustulata*, but the multilayered tubes differentiate it. The other specimens (fig. 3b, e-f) are similar to *Claracrusta* (= *Berestovia*) (fig. 3b, e-f). Sebbar and Mamet (1999, fig. 3. 99) and Sebbar (2000, fig. 22) denominate a taxon: "*Berestovia*? or *Iberiaella*? sp.". As indicated by Vachard and Maslo, 1996, *Praedonezella tenuissima* Berchenko, 1982 belongs to the genus *Masloviporidium* because (a) it is not a *Praedonezella*, (b) it was designated as type species of *Masloviporidium* (nevertheless, *Masloviporidium* auctorum is generally synonym of *Cuneiphycus*), and (c) the "*Pseudodonezella*" are not present in the Donets Basin. As indicated by Vachard and Maslo, 1996, concerning the type species of *Pseudodonezella*, i.e., *Praedonezella tenuissima* Berchenko, 1982 the following facts must be noticied: (a) this latter species is not a *Praedonezella* nor a *Frustulata* (= *Pseudodonezella*) (b) it is probably synonym of *Donezella delicata* Berchenko, 1982 was designated as type species of *Masloviporidium* (nevertheless, the "*Masloviporidium*" auctorum is generally synonym of *Cuneiphycus*, or only distinct of this genus by the small stolons in the wall), and because (c) the "*Pseudodonezella*"-*Frustulata* were never quoted in the Donets Basin. In our material of Ardengost (Pyrenees), many petals of *Calcifolium okense* appear devoid of filaments, and are difficult to distinguish from *Frustulata*. If the genus of Saltovskaya was a stage of *Calcifolium* without filaments (ontogenetically or diagenetically lost), *Frustulata* sensu Vachard and Cózar, 2005, 2006 and submitted (i.e., in the sense adopted herein) is an unpublished genus to denominate.

Composition. *F. asiatica*; *Frustulata hispanica* nom. nov. (= *Pseudodonezella tenuissima* Berchenko, 1982 sensu Mamet and Herbig, 1990 non Berchenko, 1982); *F. meridionalis* n. sp.; *Dvinella* sensu Ramírez del Pozo (1971, pl. 2, fig. 3, pl. 4, figs. 2, 4-5); "Donezellidé indéterminé" sensu Massa and Vachard (1979, pl. 9, fig. 5); *Calcifolium okense* sensu Delvolvé et al. (1994, p. 187 (pars)); *Praedonezella* sp. sensu Pajic and Filipovic (1995, pl. 45, fig. 1); *Pseudodonezella* sp. sensu Delvolvé et al. (1998, p. 366); "*Frustulata* cf. *asiatica*" sensu Krainer and Vachard, 2002 (p. 15, pl. 3, figs. 1, 5); *Frustulata* cf. *asiatica* sensu Vachard et al. (2003a, p. 656); *Praedonezella*? sp. sensu Vachard et al. (2004a, p. 274, pl. 3, fig. 12); *Frustulata* ex gr. *asiatica* sensu Cózar (2005a, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 7. 3-4); *F*. sp. 5 herein

Comparison. *Frustulata* differs from *Falsocalcifolium* and *Calcifolium* in the total absence of filaments, from *Fasciella* in being not encrusting and from *Praedonezella* in the poorly individualized cells.

Occurrence. Undifferentiated Viséan from Tadzhikistan, Yakarchin suite, Zeravshano-Gissar area (Saltovskaya, 1984a). Late Viséan (Ladeïnsky-Kurmakovsky; updated as early Serpukhovian, Pendleian, by Hecker, 2002, tabl. 3)-late Serpukhovian (Zapaltiubinsky) from the Southern Urals (Bogush et al., 1990; Ivanova and Bogush, 1992). Late Serpukhovian from Pyrenees (Delvolvé et al., 1994, 1998). Brigantian-early Serpukhovian from Montagne Noire (Southern France) (Roquemaillère ML 764, Castelsec, MA10 et MA10-23, and La Serre GIK 1807, GIK 1858; collections M. Legrand-Blain, and M. Aretz). Brigantian/Pendleian-late Serpukhovian from Austria (Krainer and Vachard, 2002: Nötsch area; and unpublished data:

collection Amler, samples PR 116-1, 4, 5, 7, PR 120 a1, PR 125-1, K 7-1). Late Viséan-late Serpukhovian from Southern Spain (Betic Cordillera, Balearic Islands, Guadiato area) and Northern Morocco (Rif Mountains) (Buchroithner et al., 1980; Herbig and Mamet, 1985; Flügel and Herbig, 1988; Mamet and Herbig, 1990). Brigantian of central Morocco (Saïd, 2005). Late Brigantian in Ireland. Late Serpukhovian-earliest Bashkirian (zone 19) from Algeria (Sebbar and Mamet, 1999; Sebbar, 2000). Latest Brigantian of Turkey (Pille et al., submitted-b). Late Serpukhovian of NW China (Vachard et al., 2003; Mamet and Zhu, 2005). Bashkirian *Pseudodonezella* are documented in Algeria by Sebbar and Mamet (1999, fig. 3) and Sebbar (2000, fig. 21). In the Baskhirian of Northern Spain, the taxon is possibly represented by *Iberiaella*. The youngest forms are probably the early Moscovian "indeterminate donezellids" from Libya (Massa and Vachard, 1979), but only poorly preserved sections are available.

Frustulata hispanica nom. nov.

? 1971 *Dvinella* - Ramírez del Pozo, pl. 2, fig. 3, pl. 4, figs. 2, 4-5.
? v. 1979 "Donezellidé indéterminé" - Massa and Vachard, pl. 9, fig. 5 (or *Iberiaella*).
? p. 1980 *Donezella lutugini* Maslov? - Buchroithner et al., p. 25-26, pl. 2, fig. 5, pl. 5, figs. 7?, 8?, 9? (all are assigned to *Pseudodonezella* by Mamet and Herbig, 1990).
1988 *Pseudodonezella tenuissima* (Berchenko) - Flügel and Herbig, pl. 45, fig. 1 (nomen nudum).
1990 *Pseudodonezella tenuissima* (Berchenko) - Mamet and Herbig, p. 202-203, pl. 1, figs. 1-7, pl. 2, figs. 1-18.
v. 1994 *Frustulata asiatica* (= *Pseudodonezella tenuissima*) - Delvolvé et al., p. 191, 193 (no illustration).
v. p. 1994 *Calcifolium okense* - Delvolvé et al., p. 187 (pars) (not fig. 2.5 = *Falsocalcifolium punctatum*, see hereafter).
? 1995 *Praedonezella* sp. - Pajic and Filipovic, pl. 45, fig. 1.
v. 1998 *Pseudodonezella* sp. - Delvolvé et al., p. 366 (no illustration).
2000 *Pseudodonezella tenuissima* - Sebbar, pl. 6, figs. 1-3.
v. 2002 *Frustulata* cf. *asiatica* Saltovskaya - Krainer and Vachard, p. 15, pl. 3, figs. 1, 5.
v. 2004a *Frustulata* cf. *asiatica* Saltovskaya -Vachard et al., p. 656 (no illustration).
v. p. 2004a *Praedonezella*? sp. - Vachard et al., p. 274, pl. 3, fig. 12 (non fig. 11 = other species).
2005a *Frustulata* ex gr. *asiatica* Saltovskaya - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 7. 3-4.
2005 *Pseudodonezella tenuissima* - Sebbar, pl. 6, figs. 1-3.

Etymology. Latin *hispanicus,* spanish because of the type locality located in Spain.

Locus typicus. Diezma (Southern Spain; see Mamet and Herbig, 1990, fig. 1).

Stratum typicum. Marbella Formation (Brigantian).

Holotype. Pl. 1, fig. 4 of Mamet and Herbig, 1990 (designated by these authors as the "type of the species" (indicating a previous writing considering the species as unpublished), but not the type species of *Praedonezella tenuissima*; and indeed, the most typical specimen).

Type material. Not indicated (apparently abundant).

Diagnosis. *Frustulata* characterized by undulated, flexuous petals and contacts with embases.

Description. Total dimensions of colonies = up to 3.000 x 10.000 mm. Petaloid length = 1.000-2.000 mm. Width = 0.060-0.100 mm. See detailed description in Mamet and Herbig (1990) under the name "*Pseudodonezella tenuissima*".

Repository of the types. Collection of Montreal University (Canada) Number 551/26.

Comparison. It differs from *Frustulata asiatica* in undulated, flexuous petals, from *Frustulata meridionalis* n. sp. in the connections more frequent and not parallel growth, and from *Frustulata reticulata* n. sp. in the less numerous contacts and flexuous and short shape of petaloids.

Occurrence: Late Viséan- Serpukhovian, ?Bashkirian in SW Spain, Southern France and Algeria.

Frustulata meridionalis n. sp.
Pl. 32, figs. 1-4.

v. 2004a *Frustulata* cf. *asiatica* Saltovskaya -Vachard et al., p. 656 (no illustration).
v. p. 2004a *Praedonezella*? sp. - Vachard et al., p. 274, pl. 3, fig. 12 (non fig. 11 = other species, but undetermined, see below *Frustulata* sp. 5).
2005 *Frustulata* ex gr. *asiatica* Saltovskaya - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 7. 3-4.

Etymology. Latine *meridionalis,* Southern because of the location of in Southern France.

Locus typicus. Castelsec (Hérault, France).
Stratum typicum. Asbian/Brigantian boundary (SF2).

Holotype. Pl. 32, fig. 1.

Type material. Circa 200 specimens.

Diagnosis. Large phylloid to petaloid *Frustulata*, with parallel skeletal elements and with very rare embase and internal cavities.

Description. Total dimensions of tests = 3.000-10.000 mm. (Petaloid length = 1.0-3.0 mm (hotoltype = 2.000 mm). Width = 0.100-0.300 mm (holotype 0.300 mm). See detailed description in Mamet and Herbig (1990) for "*Pseudodonezella tenuissima*".

Repository of the types. Collection of Palaeontology, University of Lille (France).

Comparison. Differs from *Frustulata asiatica* in parallel petals with very rare embase and contacts, it differs from *Frustulata hispanica* in the absence of internal cavities and retilinear longitudinal sections.

Occurrence. Late Viséan-Serpukhovian in Southern France and SW Spain. Brigantian of Montagne Noire: Castelsec (MA10.2.3, MA10.7); Japhet (DV 126B); Serre de Péret (MA.SP24); Roc du Cayla (MA12.2, MA12.23, MA12.25, MA12.26, DV83A, DV83B, DV463); Roquemaillère (?ML764, ML.UM.ROQ: 8 specimens, DV133C, DV133D, DV133E, DV136A, DV138A, DV138B); Roque Redonde (RR49, RR52, RR53, RR62, RR66?, RR71, RR72, RR76, RR77, RR79, RR87); Vailhan-Château (?DV246H, DV247B).

Frustulata sp. 5
Pl. 32, figs. 5-8, Pl. 33, figs. 1-3.

v. p. 2004a *Praedonezella*? sp. - Vachard et al., p. 274, pl. 3, fig. 11 (non fig. 12)
Type material. 20 specimens.

Material. 25 specimens.

Diagnosis. *Frustulata* with petaloid apparently striated, maybe announcing the filaments of a *Falsocalcifolium*.

Remarks. More striated skeletal elements than the other *Frustulata*, are present in the material of La Serre of Vachard and Aretz (2004) (GIK 1807). They are relatively similar to some morphotypes of *Falsocalcifolium punctatum* illustrated by Cózar and Vachard (2004a, figs. 3D, 6C, 7D). They appear, at least morphologically, transitional between the two genera.

Occurrence. ?Brigantian of sommet 224-Valuzières: DV681. Brigantian of Castelsec (MA10.II); Roquemaillère (ML764, DV134D); Roque Redonde (RR72, RR76, RR87); Vailhan-Roque de Loup (DV327B); Les Pascales (?DV601A, DV601C, DV601D); Les

Mentaresses (DV328'B, ?DV687A); Roc de Murviel (?MA330.9). Boundary Viséan/Serpukhovian of La Serre-vignoble (?MA.LS. Feldweg.40, MA.LS.Feldrand. 58) and La Serre de Péret (MA.SP24); late Serpukhovian of Ardengost area (MFP.HKRL6).

Genus *Falsocalcifolium* Vachard and Cózar, 2005

Type species. *Calcifolium punctatum* Maslov, 1956a.

Diagnosis. Irregular ramified petaloid fan-shaped skeletal elements consisting of cups ranging in form from platose to erect and exhibiting a plane of symmetry. In an encrusting mode bushes form that include irregular dichotomous tuning-fork shaped internal structures, more or less subdivided, and occupying the total thickness of the skeletal element. Filaments are randomly arranged throughout the wall, except in the encrusting specimens, where they are more or less sub-parallel to the encrustation. The filaments are filled with microspar or diagenetic iron oxides. Wall fibrose hyaline, yellowish, sometimes dark-coloured.

Remarks. In this genus, some specimens appear almost black (e.g. Burgess, 1965; Mamet and Roux, 1975b), whereas others (e.g., Vachard, 1996; Sebbar, 1998; Sebbar and Mamet, 1999) are a light yellow.

Occurrence. Late early Brigantian (from the Smiddy and Gayle limestones)-Pendleian (Great Limestone) of Northern England (Cózar and Somerville, 2004, 2005b) and Southwestern Spain (Cózar, 2005; Cózar et al., 2006). Mid early Brigantian-latest Brigantian of Ireland (Cózar and Somerville, 2004, 2005a, 2005b). Probably, Brigantian-Serpukhovian in Scotland, Poland (Burgess, 1965; Hallett, 1970; Skompski, 1981, 1996; Skompski et al., 1989) and Southwestern Spain (Guadiato area, Cózar and Rodríguez, 2004; Cózar, 2004). In the Moscow Basin, it ranges from the late Aleksinsky to the Venevsky (Maslov, 1956a; Bertrand, 1972; Ivanova, 1973), i. e. an interval of time equivalent to the Brigantian (Hecker, 2002). Serpukhovian of Donbass (limestones C_4 to D_5) (Aizenverg et al., 1983, tabl. p. 36-37); early Serpukhovian in Libya, Iran (Eastern Alborz), and Southern France (Massa and Vachard, 1979; Vachard and Massa, 1984; Vachard et al., 1991b; Vachard, 1996); Brigantian-late Serpukhovian in Algeria: Béchar, Reggane and Illizi, near the Libyan border (Mamet, 1972; Massa and Vachard, 1979; Sebbar and Mamet, 1996, 1999; Sebbar, 1998). Pendleian in Eastern Turkey (Altiner, 1981) and Brigantian in Western Turkey (see Pille et al. submitted-b, and previous location in Argyriadis et al., 1976; Vachard and Argyriadis, 2002). Another evidence of this provincialism is the absence of *F. punctatum* in the Southern Urals (Ivanova, 1973).

Falsocalcifolium punctatum (Maslov, 1956a)

Pl. 33, figs. 4-5.

1956a *Calcifolium punctatum* n. sp. Maslov, p. 64-65, text-fig. 8, pl. 8, fig. 2, pl. 9, fig. 1, pl. 10, fig. 2.
1972 *Calcifolium punctatum* Maslov - Mamet, p. 3 (no illustration).
1972 *Calcifolium* sp. - Bertrand, pl. 1, fig. 1.
1981 *Calcifolium punctatum* Maslov - Skompski, p. 171-172, text-fig. 4 e-j (with synonymy).
v. 1991b *Calcifolium okense* Shvetsov and Birina - Vachard et al., pl. 1, figs. 14-15.
1986 *Calcifolium punctatum* Maslov - Skompski, p. 258 (no illustration).
1989 *Calcifolium punctatum* Maslov - Skompski et al., pl. 1, figs. 3-4.
1996 *Calcifolium punctatum* Maslov - Vachard, pl. 1, fig. 6.
v. 2004b *Calcifolium*? *punctatum* Maslov - Cózar and Vachard, p. 353-362, text-figs. 3-8.
2004 *Calcifolium*? *punctatum* Maslov - Cózar, text-fig. 4 p. 372, p. 373, pl. 1, figs. 5, 9.
2004 *Calcifolium*? *punctatum* Maslov - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 5 p. 46, text-fig. 6 p. 47, text-fig. 8 p. 48, text-fig. 9 p. 49, text-fig. 15 p. 61, fig. 13. 8, 16-18.
2004 *Calcifolium*? *punctatum* Maslov - Cózar and Vachard, p. 353-362, figs 3-8.
2005a *Calcifolium*? *punctatum* Maslov - Cózar and Somerville, text-fig. 16 p. 25, fig. 14. 7.
2005b *Calcifolium*? *punctatum* Maslov - Cózar and Somerville, text-fig. 3 p. 76, p. 81, text-fig. 5C p. 80, text-fig. 6 p. 84, p. 86, p. 87, p. 89, p. 90, pl. 2, figs. 10-11.
v. 2005 *Falsocalcifolium punctatum* (Maslov) - Vachard and Cózar, p. 809-811, fig. 4. 1-10, fig. 5. 1-3 (with 37 references in synonymy).

2005a *Falsocalcifolium punctatum* (Maslov) - Cózar, text-fig. 3 p. 408, text fig. 4 p. 409, fig. 7. 1.
2005d *Falsocalcifolium punctatum* (Maslov) emend. Vachard and Cózar - Cózar and Somerville, fig. 5. 2.
2006 *Falsocalcifolium punctatum* (Maslov) - Cózar et al., p. 276 (no illustration).
2006 *Falsocalcifolium punctatum* (Maslov) - Sanz et al., fig. 7. 9-10.

Description. Dimensions are not constant, excepted those of the filaments: diameter = 0.010 mm; angle = 30°.

Occurrence. As for the genus. Brigantian-early Serpukhovian of Montagne Noire: Castelsec ?MA10.II); Roquemaillère (?ML764, DV134D); Roque Redonde (RR54, RR56); Vailhan-Roque de Loup (DV327B); Les Pascales (?DV601A, DV601C, DV601D); Les Mentaresses (DV328'B, ?DV687A); Roc de Murviel (?MA330.9); La Serre (MA.LS.Feldweg.39, MA.LS. Feldrand.58).

Falsocalcifolium? *castelsequensis* n. sp.
Pl. 33, figs. 6-13.

Etymology. From Castelsec (Hérault, France).

Locus typicus. Castelsec.

Stratum typicum. Boundary Asbian-Brigantian.

Diagnosis. Questionable *Falsocalcifolium* with a network of filaments looking like *Calcifolium*.
Description. *Falsocalcifolium*? *castelsequensis* n. sp. differs from *F. punctatum* (Maslov, 1956a) emend. Vachard and Cózar, 2005, in the regularly arranged filaments, parallel to each other. By the network of filaments as such as indicated here Pl. 33, fig. 8, *F.*? *castelsequensis* exhibits some characters of the genus *Calcifolium* Shvetsov and Birina, 1935; that explains my doubts upon the generic assignment.
Holotype. Sample MA.10-9. Pl. 33, fig. 7.

Type material. 15 specimens (see below).

Repository of the types. Collection of Palaeontology of Lille.

Occurrence. Latest Asbian-latest Brigantian: Sommet 224-Valuzières (DV600C: 1 specimen); Castelsec (MA10.8: 1 specimen, MA10.8.1: 1 specimen, MA10.9: 3 specimens, MA10.12: 5 specimens, MA10.I: 1 specimen, MA10.IV.100 2 specimens, MA10.IV. SUP: 1 specimen); Roque Redonde (RR53: 6 specimens); Les Mentaresses (?DV329C); La Serre (? MA.LS.Feldwedg.10).

Genus *Calcifolium* Shvetsov and Birina, 1935

Type species. *Calcifolium okense* Shvetsov and Birina, 1935.
Diagnosis. Petals or cups of yellowish calcite, often dark, composed of tiny fibres. Apical extremity acute, and generally in the plane of symmetry. Anastomosed petals of calcite, with their bases slightly widened ("embase"). Petals sometimes conical or parallel growth (confused with sections of a wide siphon). The filaments are dichotomous, and are arranged in a single layer near one face of the petal. In transverse section most of these filaments are round, but some are quadrate. In longitudinal section, they exhibit a series of dichotomous ramifications, and that have the form of a tuning fork or an ortonellacean structure. They are generally white, and clearly visible in the darker petal.

Remarks. See the summary of the discussions to the attribution of *Calcifolium* in Cózar and Somerville (2005b), and Vachard and Cózar (2005).

Occurrence. Latest Viséan to early Bashkirian. Western and central Palaeotethys. The FAD is controversial: e. g., Aleksinsky in Russia (Maslov, 1956a, pl. 9, figs. 2-3, 5), Mikhailovsky (see Maslov, 1956a, pl. 9, fig. 4; Bertrand, 1972, pl. 3, fig. 10), Gubashkinsky-Kurmakovsky of Urals (Ivanova, 1988a), Protvinsky-Bogdanovsky of Urals (Kulagina, 1988, p. 26; Kulagina and Pazukhin, 1988, p. 41); latest Brigantian of England and Ireland (Cózar and Somerville, 2004, text-fig. 12; 2005b, text-fig. 3); "Zone 16 (or slightly younger)" of Tarim, northwestern China (Mamet and Zhu, 2005); early Serpukhovian of Southwestern Spain (Cózar, 2005a) and Kazakhstan (Brenckle and Milkina, 2003); late Serpukhovian of Southwestern Spain; early Serpukhovian of Illizi Basin (Algeria). *Calcifolium* sensu stricto is entirely absent of our material of Montagne Noire, and very abundant locally in the late Serpukhovian of Pyrenees.

Calcifolium okense Shvetsov and Birina, 1935
Pl. 34, figs. 1-10.

1935 *Calcifolium okense* n. sp. Shvetsov and Birina, p. 20-21, pl. 4, figs. 11-12, 14-15 (non fig. 10 = *F. punctatum*).
1956a *Calcifolium okense* Shvetsov and Birina - Maslov, p. 63-64 (French translation), pl. 8, figs. 1, 3-7, pl. 9, figs. 2-5; pl. 10, figs. 1, 3-5; text-figs. 7a-b, 9a-d.
v. 1971 Codiacées (c) - Perret, pl. 1, figs. 1, 3.
1972 *Calcifolium okense* Shvetsov and Birina - Mamet, p. 6 (no illustration).
1972 *Calcifolium* sp. - Bertrand, pl. 3, fig. 10.
v. 1975 *Calcifolium okense* Shvetsov and Birina - Perret and Vachard, p. 2649-2651, text-fig. p. 2650.
v. 1977 *Calcifolium okense* Shvetsov and Birina - Perret and Vachard, p. 136-137, pl. 10, figs. 3-4, 6 (with synonymy).
v 1977a *Calcifolium okense* Shvetsov and Birina - Vachard, p. 374, tabl. 1 (no illustration).
v. 1979 *Calcifolium okense* Shvetsov and Birina - Bensaïd et al., pl. 16, figs. 3, 7.
1979 *Calcifolium okense* Shvetsov and Birina - Zagorodnyuk, p. 6-7, pl. 1, fig. 3.
1981 *Calcifolium okense* (Shvetsov and Birina) emend. - Skompski, p. 168-169, text-figs. 3 a-b, 4 a-d, 6 a-f (with synonymy).
1986 *Calcifolium okense* (Shvetsov and Birina) emend. Skompski - Skompski, p. 258 (no illstration).
1988 *Calcifolium okense* Shwet. et Bir. - Kulagina and Pazukhin, p. 41 (no illustration).
1988a *Calcifolium okense* Shvetsov and Birina - Ivanova, p. 6 (no illustration).
1989 *Calcifolium okense* Shvetsov and Birina - Skompski et al., pl. 1, figs. 1-2.
1990 *Calcifolium okense* Shvetsov and Birina - Bogush et al., p. 82-83, pl. 5, figs. 1-4.
1991 *Calcifolium okense* Shvetsov and Birina - Mamet, pl. 2j.
v. non 1991b *Calcifolium okense* Shvetsov and Birina - Vachard et al., pl. 1, figs. 14-15 (= *Falsocalcifolium punctatum*).
v. 1993a Algues - Perret, pl. 1, fig. 1.
1996 *Calcifolium okense* Shvetsov and Birina - Sebbar and Mamet, text-fig. 5. 12 (no illustration).
2002 *Calcifolium okense* Shvetsov and Birina - Shcherbakova and Shcherbakov, p. 307, 308, 312 (no illustration).
2003 *Calcifolium okense* Shvetsov and Birina - Brenckle and Milkina, pl. 4, fig. 13.
2004 *Calcifolium okense* Shvetsov and Birina - Cózar and Rodríguez, fig. 9. 13.
2004 *Calcifolium okense* Shvetsov and Birina - Cózar and Somerville, text-fig. 5 p. 46, text-fig. 6 p. 47, text-fig. 15 p. 61, fig. 13. 19-20.
2005 *Calcifolium okense* Shvetsov and Birina - Vachard and Cózar, p. 812-813, fig. 6. 1-15, fig. 7. 1-8 (with 53 references in synonymy).
2005b *Calcifolium okense* Shvetsov and Birina - Cózar and Somerville, text-fig. 3 p. 76, p. 81, text-fig. 5E p. 80, text-fig. 6 p. 84, p. 86-87, p. 90, pl. 2, figs. 12-13.
2005a *Calcifolium okense* Shvetsov and Birina - Cózar, text-fig. 3 p. 408, text-fig. 4 p. 409, fig. 7. 9.
2005 *Calcifolium okense* Shvetsov and Birina - Mamet and Zhu, fig. 5D.
2006 *Calcifolium okense* Shvetsov and Birina - Cózar et al., p.276 (no illustration).
v. 2006 *Calcifolium okense* Shvetsov and Birina - Vachard and Cózar, pl. 2, figs. 5-17.

Description. Thallus petaloid to pseudophylloid, erect, anastomosed, having the aspect of undulating ribbons. Petals maybe anastomosed, with a short "embase". Near a face, a series of internal structures is cut axially. Tangentially, they appear as a set of radiating dichotomous cavities, convergent at their base. The wall is yellowish or dark. The interval between two branchs of the tuning fork-like filament is constant: 20-30 microns (Mamet and Roux, 1977).

Occurrence. As for the genus. Late Serpukhovian of Ardengost area: Areng MFP.AH18B, AH18E, AH18F, AH18H, AH18I, AH20 (= DV778C), AH20A, AH20E (ferruginized filaments); Serre de Castets MFP.CAS10, CAS14.3.

5. Calcisphaerales

Kingdom ?Algae
Order Calcisphaerales Williamson, 1881 nomen translat. herein

Diagnosis. Spherical bodies without conspicuous apertures. Spherical central cavity. Wall calcitic, more or less complex, micritic to hyaline.
Composition. Two families: Calcisphaeraceae Williamson, 1881 nomen translat. herein and Asterosphaeraceae n. fam.
Remarks. The assignment and the nomenclature of the calcispheres is hardly discussed (Vachard, 1974b, 1977b; Conil et al., 1980; Mamet, 1991, 2002; Flügel, 2004, p. 452-453; Versteegh et al., in press).
Occurrence. Devonian-Moscovian. Permian. ?Jurassic. Cretaceous (cosmopolite, but with a biogeography very different according to the genera).

Family Calcisphaeraceae Williamson, 1881 nomen translat. herein (pro Calcisphaeridae)

Diagnosis. Spherical bodies without apertures but sometimes finely perforated. Spherical central cavity. Wall uni-, bi or trilayered, micritic to hyaline.

Remarks. Groups of *Pachysphaerina* mentioned in the literature are doubtful and never observed by the authors.

Composition. *Calcisphaera* Williamson 1881 emend. Vachard, 1977b (= *Palaeocancellus* Derville, 1952 always used by Mamet, 2006), *Pachysphaerina* Conil and Lys in Conil et al., 1969; *Polyderma* Derville, 1950, *Quasipolyderma* Conil and Lys, 1964, *Pachythurammina* Vachard, 1977b.

Occurrence. Devonian-Pennsylvanian. Rare in Permian, cosmopolite.

Genus *Pachysphaerina* Conil and Lys in Conil et al., 1969
Type species. *Archaesphaera*? *pachysphaerica* Pronina, 1963.
Synonyms. *Pachysphaera* Conil and Lys, 1964 (preoccupied), *Calcisphaera* sensu Mamet (e.g., Mamet, 1970, 1991, 2002, 2006), ?*Granulosphaera* Derville, 1931 (e.g. Brown and Pohl, 1973); *Archaesphaera*? sensu Pronina, 1963.
Diagnosis. Spherical bodies with a thick microgranular wall finely perforated. Ring-like clusters of individual pachyspherines are mentioned (Mamet, 1973, pl. 3, fig. 4; 1998, fig. 3T), but difficult to interpretate. No apertures except the perforations (see Malakhova, 1975b, pl. 5, figs. 21-22, 24).

Remarks. See the discussions *Calcisphaera* versus *Pachysphaerina* in Vachard, 1974b, 1977b; Armstrong and Mamet, 1977; Conil et al., 1980 and Mamet, 1991. The

Pachysphaerina are an abundant component of the carbonate agglutinate of several Mississippian foraminifers: Palaeotextulariidae, *Forschia*, etc. (Reitlinger, 1950, pl. 1, figs. 5, 8).

Occurrence. ?Late Tournaisian of Precaspian Depression, Belgium, Germany, Idaho (USA) and Alberta (Canada). Viséan-Bashkirian; cosmopolite. Rare in the Moscovian in some agglutinates of foraminifers, for example *Haplophragmina* spp. The Permian representatives (Vdovenko et al., 1993) are questionable and correspond more exactly to transverse sections of tubular calcivertellid Miliolina or small *Tubiphytes* Maslov, 1956.

Pachyspherina pachysphaerica (Pronina, 1963)
Pl. 34, figs. 11-13.

1963 *Archaesphaera*? *pachisphaerica* n. sp. Pronina, p. 125-126, pl. 1, figs. 14-15.
1963 *Pachysphaera dervillei* Conil and Lys - Conil, pl. 1, fig. 1 (nom. nud.).
1964 *Pachysphaera dervillei* n. sp. Conil and Lys, p. 43, pl. 6, figs. 59-64.
1967 *Pachysphaera dervillei* Conil and Lys) Conil and Paproth, p. 60, 62, 65, 68, 70, 71, 75, 79 (no illustration).
1968 *Pachysphaerina pachysphaeroides* (sic) Pronina (sic) - Conil and Lys, p. 501, pl. 3, fig. 40 (with synonymy).
1970 *Calcisphaera laevis* Williamson - Mamet, n° 12 of text-fig. 3 p. 4-5, pl. 12, fig. 2, pl. 18, fig. 3.
1970 *Calcisphaera pachysphaerica* (Pronina) - Mamet, n° 13 of text-fig. 3 p. 4-5, pl. 4, fig. 1.
1970 *Calcisphaera laevis* Williamson - Petryk et al., n° 4 of text-fig. 4 p. 92 (no illustration).
1970 *Calcisphaera pachysphaerica* (Pronina) - Petryk et al., n° 31 of text-fig. 4 p. 92 (no illustration).
1971 *Calcisphaera laevis* Williamson - Mamet et al., p. 25, 26, 27, 28, 29, 30 (no illustration).
1971 *Calcisphaera pachysphaerica* (Pronina) - Mamet et al., p. 25, 26, 27, 28, 29 (no illustration).
1972 *Calcisphaera pachysphaerica* (Pronina) - Mamet, p. 3 (no illustration).
1973 *Calcisphaera laevis* Williamson - Browne and Pohl, pl. 22, fig. 7 (from Williamson, 1880).
p. 1973 *Calcisphaera* - Browne and Pohl, p. 191-192, pl. 22, fig. 5-7 (non fig. 4 = tuberitinid).
v. 1974b *Pachysphaerina pachysphaerica* (Pronina) - Vachard, p. 199-200, pl. 4, fig. 3, 6, pl. 9, figs. 3-4 (with synonymy).
1975b *Pachysphaera dervillei* Conil and Lys - Malakhova, p. 81, pl. 5, figs. 20-25.
1976 *Calcisphaera laevis* Williamson - Sando et al., p. 469, 470 (no illustration).
1976 *Calcisphaera pachysphaerica* (Pronina) - Sando et al., p. 469, 470 (no illustration).
v 1977a *Pachysphaerina pachysphaerica* (Pronina) - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977 *Pachysphaerina pachysphaerica* (Pronina) - Perret and Vachard, p. 137 (no illustration).
1977 *Pachysphaerina pachysphaerica* (Pronina) - Paproth et al., p. 69, 72, 73, 76 (no illustration).
v. 1977b *Pachysphaerina pachysphaerica* (Pronina) - Vachard, p. 163, pl. 8, fig. 10.
1979 *Pachysphaera dervillei* Conil and Lys - Mansourian, p. 55-56, pl. 1, figs. 4-6.
v. 1981 *Pachysphaerina pachysphaerica* (Pronina) - Fontaine and Vachard, p. 15 (no illustration).
1982b *Calcisphaera* sp. - Brenckle et al., p. 79-80, pl. 8, figs. 1-7 (with synonymy).
v. 1982 *Pachysphaerina pachysphaerica* (Pronina) - Fontaine et al, p. 48, 52 (no illustration).
1983 *Calcisphaera laevis* Williamson - Groves, p. 30, pl. 10, figs. 12-13.
v. 1983 *Pachysphaerina pachysphaerica* (Pronina) - Fontaine et al, p. 14, pl. 1, fig. 9.
1983 *Pachysphaerina pachysphaerica* (Pronina) - Conil and Paproth, tabl. 1 p. 34 (no illustration).
1985 *Calcisphaera laevis* Williamson - Mamet and Pinard, pl. 1, fig. 11.
1985 *Calcisphaera pachysphaerica* (Pronina) - Mamet and Pinard, pl. 1, fig. 12.
1985 *Calcisphaera* spp. - Adachi, p. 64, pl. 8, fig. 23.
1985 *Calcisphaera* sp. - Skipp et al., pl. 3, fig. 24.
1991 *Pachysphaera dervillei* Conil and Lys - Mansourian, p. 55-56, pl. 1, figs. 4-6.
v. 1991c *Pachysphaerina pachysphaerica* (Pronina) - Vachard et al., p. 677 (no illustration).
v. 1992 *Pachysphaerina pachysphaerica* (Pronina) - Vachard and Berkhli, pl. 1, figs. 4, 10, pl. 3, fig. 6.
1994 *Calcisphaera laevis* Williamson - Herbig and Mamet, text-fig. 4 p. 101, pl. 11, fig. 7.
1994 *Calcisphaera pachysphaerica* (Pronina) - Herbig and Mamet, text-fig. 4 p. 101, pl. 11, fig. 7.
v. 1996 *Pachysphaerina pachysphaerica* (Pronina) - Proust et al., p. 347 (no illustration).
1998 Disarticulated sphere - Mamet, fig. 3U.
v. 1999 *Pachysphaerina pachysphaerica* Pronina (sic without parentheses) - Fontaine et al., p. 464 (no illustration).
2000a *Calcisphaera laevis* Williamson - Cózar and Rodríguez, p. 110, fig. 4C.
2000a *Calcisphaera pachysphaerica* (Pronina) - Cózar and Rodríguez, p. 110, fig. 4D.

2002 *Calcisphaera laevis* Williamson - Van amerom et al., pl. 3, fig. 1-3.
non 2002 *Calcisphaera pachysphaerica* (Pronina) - Van amerom et al., pl. 3, fig. 4 (= *Pachysphaerina polydermoides*).
?2003 *Pachysphaerina pachysphaerica* (Pronina) - Kulagina et al., text-fig. 5 p. 178 (no illustration).
2003 *Calcisphaera laevis* Williamson - Mamet, pl. 1, figs. 15-17.
2003 *Calcisphaera pachysphaerica* (Pronina) - Mamet, pl. 1, figs. 18-20.
? 2006 *Calcisphaera laevis* Williamson - Mamet, pl. 2, fig. 25 (with 28 references in synonymy) (perhaps also a transverse section of *Earlandia elegans*).
2006 *Calcisphaera pachysphaerica* (Pronina) - Mamet, pl. 2, fig. 26 (the number is lacking in the plate) (with 29 references in synonymy).

Description. All classes of sizes are visible from the small specimens included in the agglutinate of, for instance, *Haplophragmella*, to relatively big specimens in some bioclastic packstones. Consequently "*C.*" *laevis* and "*C.*" *pachysphaerica* sensu Cózar and Rodríguez (2000a) are synonyms**.** Here, D = 0.060-0.230 mm, d = 0.020-0.130 mm, wall thickness = 0.020-0.080 mm.
Occurrence. As for the genus. Latest Asbian-Brigantian of Montagne Noire: sommet 224-Valuzières (DV600A, DV600E with obvious tubules through the wall); Castelsec (MA10.3 MA10.7.2, MA10.12, MA10.II, MA11.8; Roquemaillère (DV133C, DV134E); Vailhan-Château (DV245B, DV246B); Les Mentaresses (DV328'C); Roc de Murviel (MA76, MA83). Late Serpukhovian of Ardengost area: MFP.AH18.

Pachysphaerina polydermoides (Conil and Lys, 1964)
Pl. 34, figs. 14-15.

1964 *Pachysphaera polydermoides* n. sp. Conil and Lys, p. 43, pl. 6, fig 67-68.
v. 1974b *Pachysphaerina polydermoides* (Conil and Lys) - Vachard, p. 200-201, pl. 9, fig. 2.
v 1977a *Pachysphaerina polydermoides* (Conil and Lys) - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977b *Pachysphaerina polydermoides* (Conil and Lys) - Vachard, p. 163, pl. 8, fig. 1.
2000a *Calcisphaera polydermoides* (Conil and Lys) - Cózar and Rodríguez, p. 110, figs. 4E-F.
2002 *Calcisphaera pachysphaerica* (Pronina) - Van amerom et al., pl. 3, fig. 4.

Description. D = 0.175-0.200 mm, d = 0.095-0.120 mm, wall thickness = 0.030-0.045 mm.
Occurrence. Late Holkerian, early Asbian and early Serpukhovian of Southwestern Spain. Late Viséan of Germany. Latest Asbian-Asbian/Brigantian boundary of Montagne Noire: Lenses of the road, near Roquessels (DV314D); Roquemaillère (DV134D).

Genus *Pachythurammina* Vachard, 1977b
Type species. *Pachythurammina sarcosphaera* Vachard, 1977b.
Diagnosis. *Pachysphaerina* with radiate protuberances.
Remarks. This genus very rare in Montagne Noire is unknown in other outcrops. It corresponds probably some teratogenis specimens of *Pachysphaerina*.
Occurrence. Early Viséan of Band-e Bayan area (central Afghanistan). Latest Asbian of Montagne Noire (Southern France).

Pachythurammina sarcosphaera Vachard, 1977b
Pl. 34, figs. 16-17.

v. 1974b *Parathurammina*? sp. 1 - Vachard, p. 214, pl. 10, fig. 11.
v 1977a *Pachythurammina sarcosphaera* Vachard - Vachard, p. 374, tabl. 1 (no illustration) (nomen nudum).
v. 1977b *Pachythurammina sarcosphaera* n. gen. n. sp. Vachard, p. 164, pl. 8, fig. 5 (with 1 reerence in synonymy).
v. 1996 *Pachysphaerina*? sp. - Vachard and Montenat, pl. 4, fig. 10.

Description. Overall diameter = 0.165-0.500 mm, central body = 0.135-0.320 mm, inner diameter of central body = 0.075-0.210 mm; wall thickness = 0.030-0.075 mm; length of protuberances = 0.030-0.120 mm.
Occurrence. As for the genus. In Montagne Noire: assemblage SF1 (latest Asbian): Lenses of the road, near Roquessels (DV293C, DV293G, DV332F); sommet 224-Valuzières (DV600A).

Family Asterosphaeraceae n. fam.

Diagnosis. Spherical internal cavities surrounded by walls more or less complex. Wall generally hyaline.

Composition. *Asterosphaera* Reitlinger, 1957; *Radiosphaera* Reitlinger, 1957; *Asterosphaerella* Villain, 1975.

Remarks. Altough easily to identify, *Asterosphaera* is misinterpreted by Browne and Pohl (1973, p. 190-191, pl. 22, fig. 1, 3), probably due to its absence in North America (see after: Tuberitinidae).

Occurrrence. Misinterpreted in the Ordovician. Devonian-Mississippian. Lazarus effects in Permian (Carcione et al., 2004; Vachard et al., 2005), and in Late Cretaceous (Villain, 1975); cosmopolite (*Radiosphaera*) or Palaeo-Tethyan (*Asterosphaera*).

Genus *Radiosphaera* Reitlinger, 1957

Type species. *Radiosphaera basilica* Reitlinger, 1957.
Synonym. *Radiosphaerina* (see for example, Petryk et al., 1970, n° 17 of text-fig. 4 p. 92; Sando et al., 1976, p. 469, 470).
Diagnosis. Hollow spheres. Bilayered wall with a thin internal micritic layer and a thick pseudofibrous outer layer formed by radial, tapering, more or less prismatic, acute protuberances. Grape-like clusters of individual radiospheres are mentioned. No aperture is seen (Stanton, 1967; Mamet and Rudloff, 1972; Brenckle, 1973; Mamet, 1991).
Remarks. The taxonomy is imprecise (see Mamet, 2006, p. 329-330), but as the true assignment is unknown it seems to be impossible to revise this taxon. Some radiosphaeraceans of the literature corresponds in fact to diagenetic recrystallizations of tuberitinids (see Browne and Pohl, 1973, pl. 1, figs. 1-2 as "?*Asterosphaera*"; Vachard and Tellez Giron, 1986; Mamet, 1994, pl. 3, figs. 22-26: *Radiosphaera* au stade "*Neoarchaesphaera*", and Mamet, 1996a, pl. 3, figs. 21-25).
Occurrence. Misinterpreted in the Ordovician. Devonian-Viséan, cosmopolite. Early Serpukhovian in SE Canada (Mamet, 1970, n° 53 of text-fig. 3 p. 4-5, p. 13). Moscovian of Bolivia. Lazarus effect in the late Permian (Vachard et al., 2005; Gaillot, 2006).

Radiosphaera ponderosa Reitlinger, 1960
Pl. 34, figs. 18-26.

1960 *Radiosphaera ponderosa* n. sp. Reitlinger, p. 147, pl. 1, figs. 9-12.
1964 *Radiosphaera ponderosa* Reitlinger - Conil and Lys, p. 46, pl. 6, figs. 74-75.
v. 1974b *Radiosphaera basilica* Reitlinger - Vachard, p. 203, pl. 9, figs. 9, 11.
v. 1977a *Radiosphaera basilica* Reitlinger - Vachard, p. 374, tabl. 1 (no illustration).
v. 1977b *Radiosphaera basilica* Reitlinger - Vachard, p. 163, pl. 8, fig. 4.
v. 1982 *Radiosphaera* sp. - Fontaine et al, p. 48 (no illustration).
1985 *Radiosphaera* spp. - Adachi, p. 80, pl. 8, figs. 8-11 (with synonymy).
1991 *Radiosphaera ponderosa* Reitlinger - Mansourian, p. 56, pl. 1, figs. 7-8.
1994 *Radiosphaera basilica* Reitlinger - Mamet, pl. 1, fig. 21.

non 1995 "*Radiosphaera*" aff. *"R." ponderosa* Reitlinger - Mamet and Shalaby, pl. 5, figs. 3-6 (sponge spicules?).
2002 *Calcisphaera sol* (Pronina) - Van amerom et al., pl. 3, fig. 5.
2006 "*Radiosphaera" basilica* Reitlinger - Mamet, pl. 2, fig. 24 (with 15 references in synonymy).

Description. Spherical internal cavity. Wall rather thick with prominent radial thickennings. Total outer diameter = 0.120-0.300 mm, inner diameter of central cavity = 0.120 mm, wall thickness = 0.020-0.090 mm.

Remarks. Due to the variability of these species and many transitional morphotypes, *R. ponderosa* and *R. basilica* are considered here as synonyms.

Occurrence. Latest Asbian-latest Brigantian of Montagne Noire: Lenses of the road, near Roquessels; (?DV293.2.C); Roquemaillère (DV134); Vailhan-Château (DV246D); Vailhan-Roque de Loup (DV248A); Roque Redonde (RR54, RR62, RR74, RR75, RR86); Les Mentaresses (DV330B); Roc de Murviel (MA73). Late Serpukhovian of Ardengost Formation: MFPAH18C, ?MFP.AH18E.

6. Microproblematica (Unknown Kingdom)

Genus *Draffania* Cummings, 1957

Type species. *Draffania biloba* Cummings, 1957.

Diagnosis. Microproblematicum flask-shaped to piriform, with two chambers and an apical long neck. Outer and inner surfaces are smooth. A salebrid septum located in the symmetry plane separates the chambers. An areal, terminal single aperture at the extremity of the neck. Wall hyaline, yellow, lamellar with perforations? (or pseudopunctations?).

Remarks. The systematic assignment was discussed by Cummings, 1957; Vachard et al., 1993b; Somerville and Cózar, 2006). Because of the lamellar wall, *Draffania* is probably a piece of Lophophorata; either brachiopods (as well as the Salebridae; see Vachard et al., 1993; that is implicitely confirmed by Groves and Beason, 2006, pl. 1, figs. 23, 25, 32, which designated under the name "salebrid central tubes" some spines of brachiopods Reticularioidea (see also Vachard and Tellez-Giron, 1978)) or bryozoans (Somerville and Cózar, 2006).

Occurrence. Early Viséan of Ireland (Somerville et al., 1992). V1a of Afghanistan. Asbian/Brigantian of central Morocco. Latest Viséan of Reggan Basin (Algeria). Late Holkerian-early Asbian of Southwestern Spain. Latest early Asbian-earliest Serpukhovian of Ireland. Latest Brigantian of South China. Holkerian-Brigantian of England (Holkerian-early Serpukhovian of Northern England). Early Asbian of Libya. Asbian/Brigantian boundary in Montagne Noire.

Draffania aff. *biloba* Cummings, 1957
Pl. 71, figs. 10-12.

1972 *Draffania biloba* Cummings - Mamet, p. 3 (no illustration).
v. p. 1974b *Draffania* sp. - Vachard, p. 379, pl. 2 8, fig. 2 only (non fig. 3 = *Polysphaerinella*).
v. 1977a *Draffania* sp. - Vachard, p. 374, tabl. 1 (no illlustration).
v. 1977b *Draffania* sp. - Vachard, p. 165, pl. 8, fig. 24.
1989 *Draffania biloba* Cummings - Fewtrell et al., p. 46, pl. 3. 5, fig. 8.
v. 1991 *Draffania biloba* Cummings - Ouarache et al., p. 50, pl. 2, figs. 2-3.
v. 1991c *Draffania* cf. *quasibloba* Fomina - Vachard et al., p. 677, pl. 1, figs. 30-31.
1992 *Draffania quasibiloba* Vachard, 1980 (sic: the author is Fomina) - Somerville et al., tabl. 3 p. 211, fig. 5C.

v. 1993b *Draffania quasibloba* Fomina - Vachard et al., pl. 3, fig. 10.
1996 *Draffania biloba* Cummings - Gallagher, text-fig. 2 p. 242 (no illustration).
1996 *Draffania quasibloba* Fomina - Vachard and Montenat, text-fig. 4 p. 469, pl. 1, fig. 15.
1997 *Draffania biloba* Cummings - Gallagher and Somerville, text-fig. 4 p. 318, text-fig. 7b-c p. 323, text-fig. 8 p. 325 (no illustration).
v. 1999 *Draffania biloba* Cummings - Berkhli, p. 111, pl. 2, fig. 4.
? 1999b *Draffania biloba* Cummings - Cózar and Rodríguez, pl. 2, fig. 11.
? 2000a *Draffania biloba* Cummings - Cózar and Rodríguez, p. 113, fig. 4N.
? 2004 *Draffania biloba* Cummings - Cózar and Somerville, text-fig. 5 p. 46 (pars), text-fig. 6 p. 47 (pars), text-fig. 8 p. 48 (pars), text-fig. 9 p. 49 (pars) (no illustration).
2006 *Draffania biloba* Cummings - Somerville and Cózar, figs. 1 A-C, 2 C-F, 3 H.

Description. An incomplete unique specimen, relatively small-sized.

Occurrence. Mamet (1969) indicates several discoveries in Montagne Noire. Our two specimens come from Roquemaillère (DV134C) and Roque Redonde (RR50).

7. Foraminifers.

Phylum Foraminifera d'Orbigny, 1826

(nom. correct. d'Eichwald, 1830 pro order Foraminifères)

(see Vdovenko et al., 1993)

nomen translat. Cavelier-Smith, 2002 (ex class in Lee, 1990)

Class Fusulinata Wedekind, 1937 nomen translat. Gaillot and Vachard, 2007

Remarks. The classification adopted here is presented in the part 1.

Occurrence. Rare in the Silurian and early Devonian. Common since the late Devonian to the late Permian. Some genera are eventually mentioned in the Mesozoic (e. g., Arnaud-Vanneau, 1980; Salaj et al., 1983; Loeblich and Tappan, 1984; Altiner, 1991 and Bassoullet et al., 2001).

7.1. Parathuramminoids

Order Parathuramminida Bykova in Bykova and Polenova, 1955
nomen translat. Mikhalevich, 1980
Superfamily Parathuramminoidea Bykova in Bykova and Polenova, 1955
nomen translat. Fursenko in Rauzer-Chernousova and Fursenko, 1959 (ex family)
Family Parathuramminidae Bykova in Bykova and Polenova, 1955

Genus *Hemithurammina* Mamet, 1973

Type species. *Webbina fimbriata* Howchin, 1888.
Diagnosis. Attached parathuramminid with a basal attachment disk and an hemispherical single chamber. Numerous radiate protuberances, thin and cylindrical. Apertures at the extremities of the protuberances. Wall microgranular, black, homogenous.
Remarks. Recrystallisations of the wall have been described by Conil and Lys (1964). They were never observed in our material.
Occurrence. Late Viséan (quoted larger ranges are probably due to confusions with *Parathurammina*/*Suleimanovella*). Western Palaeotethys from Northern France to Turkey.

Hemithurammina fimbriata (Howchin, 1888) emend. Mamet, 1973
Pl. 35, figs. 1-13.

1888 *Webbina fimbriata* n. sp. Howchin, p. 538-539, pl. 8, figs. 8-9.
1964 *Eotuberitina firmata* n. sp. Conil and Lys, p. 35, pl. 4, figs. 34a-b.
1973 *Hemithurammina fimbriata* (Howchin) n. gen. - Mamet, p. 116, 118, 120, pl. 3, figs. 14-17, text-fig. 2.
v. p. 1974b *Parathurammina suleimanovi* Lipina - Vachard, p. 213-214, pl. 10, fig. 8 (non fig. 9 = true *P. suleimanovi*).
1976 *Parathurammina suleimanovi* Lipina - Crousilles et al., pl. 10, fig. 6.
v. 1977 *Hemithurammina fimbriata* (Howchin) - Vachard, p. 374, tabl. 1 (no illlustration).
v. 1977 *Hemithurammina* sp. - Perret and Vachard, p. 137, pl. 38, fig. 7.
v. 1977b *Hemithurammina fimbriata* (Howchin) emend. Mamet - Vachard p. 163, pl. 8, fig. 8.
1981 *Hemithurammina fimbriata* (Howchin) - Altiner, pl. 1, figs. 26-29.
1987 *Hemithurammina fimbriata* (Howchin) - Loeblich and Tappan, p. 197, pl. 212, figs. 13-14.
1989 *Archaesphaera firmata* (Conil and Lys) - Fewtrell et al., pl. 3.1, fig. 4.
1993 *Hemithurammina fimbriata* (Howchin) - Vdovenko et al., pl. 5, figs. 2a-b.
2000a *Hemithurammina fimbriata* (Howchin) - Cózar and Rodríguez, p. 112, figs. 4J-K.
? 2002 *Parathurammina spinosa* (Williamson) - Van amerom et al., pl. 3, fig. 5.
2004 *Parathurammina* sp. - Brenckle, pl. 5, fig. 27.
v. 2005 *Hemithurammina* sp. - Saïd, p. 185, fig. X. 1. 13 (attached on a *Saccamminopsis*).

Description. Overall diameter = 0.180-0.300 mm; inner height = 0.130-0.175 mm; inner width = 0.064-0.300 mm; number of protuberances: 6-7; length of protuberances = 0.030-0.100 mm; thickness of the wall around the chamber = 0.030-0.045 mm; aperture diameter = 0.006 mm.

Occurrence. "Zone 15" of Northern France. "V3bγ" of Belgium. Late Courceyan-Asbian of England. Late Viséan of Turkey and Tarim. Late Holkerian-early Asbian in Southwestern Spain. Latest Asbian-latest Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293A, DV293C, DV293F, DV293G, DV293H, DV293I); Roque Redonde (RR49, RR53, RR75, RR76, RR77, RR79, RR81, RR85, RR87, RR88); Vailhan-Roque de Loup (DV314A, DV325); Les Pascales (DV601A); Saint Rome (DV132C). Late Serpukhovian of Ardengost area (RC8563, MFP.Per1B, MFP14D, F, MFP.AH17B, MFP.AH18F, MFP.BAB1A).

Genus *Sogdianina* Saltovskaya, 1973

Type species. *Sogdianina angulata* Saltovskaya, 1973.

Diagnosis. Test attached, unilocular, first chamber spherical, circumcrusted by a thick wall, bilayered, thin dark, micritic, inner layer around the chamber; outer wall, grey, polygonal, membraceous-like reinforced by radial thin dark micritic stringers. Aperture not observed.

Remarks. This genus is very similar to *Uralinella* Bykova, 1952, but differs in the organization of the outer wall.

Occurrence. Viséan-Serpukhovian of Tadzhikistan. Discovered in the Brigantian of Montagne Noire.

Sogdianina angulata Saltovskaya, 1973
Pl. 35, figs. 14-18.

1973 *Sogdianina angulata* n. sp. Saltovskaya, p. 68, pl. 1, figs. 1-9
1974 *Sogdianina angulata* Saltovskaya - Saltovskaya, p. 78-79, pl. 3, figs. 1-15.
1987 *Sogdianina angulata* Saltovskaya - Loeblich and Tappan, pl. 210, figs. 8-11.

1993 *Sogdianina angulata* Saltovskaya - Sabirov in Vdovenko et al., p. 37, pl. 7, figs. 13-15.

Description. Overall diameter of test = 0.123-0.315 mm (holotype = 0.274); diameter of the inner chamber = 0.082-0.123 mm (holotype = 0.123); width of stringers = 0.095-0.178 mm (holotype = 0, 164 mm); number of stringers: 7-15 (holotype: 9).

Occurrence. As for the genus. Discovered in the Brigantian of Montagne Noire (Roque Redonde: RR75: 9 specimens).

7.2. Tuberitinoids

Superfamily Tuberitinoidea Mikhlukho-Maklay, 1958 nomen translat. here (ex family)
Family Tuberitinidae Miklukho-Maklay, 1958

Remarks. The Tuberitinidae with *Eotuberitina*, *Tuberitina* and *Diphosphaerina* are considered as a homogenous family, but other phylogenetic trends, correlated with the different type of wall, exist in (a) Tubeporininae Zadorozhny, 1987 sensu Vdovenko et al., 1993, (b) *Tubesphaera,* (c) *Polysphaerinella*, (d) *Altjusella*, considered here as representatives of indeterminate families. In fact, the genera like *Eotuberitina* (attached) and *Diplosphaerina* (free, with a polar sphere) can correspond of two stages of a cycle of life (Conil et al., 1977a); this character, associated with the absence of true foraminiferal apertures, can indicate another group of Protozoa or Protophyta.

Genus *Eotuberitina* Miklukho-Maklay, 1958

Type species. *Eotuberitina reitlingerae* Miklukho-Maklay, 1958.

Diagnosis. Small Tuberitinidae with a flat to convex basal disc and a thin microgranular wall. Groups of specimens (2-3) exist but are rare.

Remarks. Diagenetic recrystallizations of Eotuberitina can be confused with radiospheres (Browne and Pohl, 1973, pl. 1, figs. 1, 3).

Occurrence. Silurian-latest Permian (Vdovenko et al., 1993; Lin et al., 1990; Vachard pers. comm.), cosmopolite (for North America, see Brenckle et al., 1982b).

Eotuberitina reitlingerae Miklukho-Maklay, 1958
Pl. 35, figs. 19-28.

1958 *Eotuberitina reitlingerae* n. gen. n. sp. Miklukho-Maklay, p. 134 (nomen novum pro *Tuberitina maljavkini* Mikhailov sensu Reitlinger, 1950, p. 88, pl. 19, fig. 2).
1964 *Eotuberitina reitlingerae* Miklukho-Maklay - Conil and Lys, p. 34, pl. 4, figs. 27-32.
?1966 *Archaesphaera barbata* n. sp. Conil and Lys, p. B208-B209, pl. 1, figs. 3-6.
1967 *Eotuberitina reitlingerae* Miklukho-Maklay - Conil and Paproth, p. 61, 62, 64, 68, 70, 71, 75, pl. 4, fig. 1.
v. p. 1973b *Eotuberitina reitlingerae* Miklukho-Maklay - Perret, p. 203, pl. 1, figs. 1 (pars), 2?, 3, 6? only, not figs. 1 (pars), 4-5, 7 (= *Diplosphaerina inaequalis*) (with synonymy).
v. ? 1973b *Eotuberitina* sp. - Perret, p. 294, pl. 1, figs. 8-11 (or *Diplosphaerina*).
1973 *Eotuberitina reitlingerae* Miklukho-Maklay - Bozorgnia, p. 46, pl. 3, fig. 11 (with synonymy).
v. 1974b *Eotuberitina reitlingerae* Miklukho-Maklay - Vachard, p. 219-220, pl. 9, figs. 13-15 (with synonymy).
1975 no legend - Ivanova, pl. 1, figs. 3-11.
1977 *Eotuberitina reitlingerae* Mikluko-Maklai (sic) - Armstrong and Mamet, p. 23-24, pl. 26, fig. 13 (with synonymy).
v. p. 1977a *Archaesphaera* (= *Eotuberitina* = *Diplosphaerina*) ex gr. *inaequalis* (Derville) - Vachard, p. 374, tabl. 1 (no illlustration).
v. 1977 *Diplosphaerina* sp. - Perret and Vachard, p. 138, pl. 9, fig. 2.
1979 *Eotuberitina reitlingerae* Miklukho-Maklay - Mansourian, p. 55, pl. 1, figs. 1-3.
p. 1980 *Diplospharerina inaequalis* (Derville) - Rich, p. 73, pl. 1, figs. 9, 13, pl. 4, figs. 4, 7.
1981 *Eotuberitina reitlingerae* Miklukho-Maklay - Altiner, pl. 1, fig. 28.
1982b *Diplospharerina inaequalis* (Derville) - Brenckle et al., p. 52, pl. 1, figs. 7-9 (= stade *Eotuberitina*).

1983 *Diplosphararina inaequalis* (Derville) - Groves, p. 9-10, pl. 1, figs. 2, 4 (= stade *Eotuberitina*).
1985 *Eotuberitina reitlingerae* Miklukho-Maklay - Adachi, p. 86-87, pl. 9, figs. 20-21.
p. 1985 *Eotuberitina* spp. - Adachi, p. 87, pl. 9, figs. 22-23 (non figs. 24-25 = other Tuberitinidae).
1989 *Archaesphaera reitlingerae* (M. Maklai) - Fewtrell et al., pl. 3.1, fig. 3.
1989a *Eotuberitina reitlingerae* Miklukho-Maklay - Nguyen Duc Tien, pl. 10, fig. 7.
1990 *Eotuberitina reitlingerae* Miklukho-Maklay - Lin et al., p. 129, pl. 4, figs. 19-20 (with synonymy).
v. 1991 *Diplosphaerina inaequalis* (Derville) au stade *Eotuberitina reitlingerae* M.-Maclay - Vachard and Tahiri, pl. 5, fig. 4.
1993 *Eotuberitina reitlingerae* Miklukho-Maklay - Ueno and Nakazawa, p. 8, figs. 3. 1-3 (with 26 references in synonymy).
1993 *Eotuberitina reitlingerae* Miklukho-Maklay - Ueno and Sakagami, fig. 2.2.
1993 *Tuberitina* sp. - Ueno and Sakagami, fig. 2.3.
1993 *Eotuberitina reitlingerae* Miklukho-Maklay - Ueno and Igo, fig. 3. 5.
p. 1994 *Diplosphaerina* à divers stades tubétitinés - Mamet, pl. 3, figs. 12-15, 20.
v. 1996 *Diplosphaerina* ex gr. *inaequalis* (Derville) (…) stades tubétitinés - Proust et al., p. 347 (no illustration).
v. 1997 *Eotuberitina reitlingerae* Miklukho-Maklay - Fontaine et al., p. 7 (no illustration).
v. 1999 *Diplosphaerina inaequalis* (Derville) - Berkhli, p. 103 (no illustration).
2002 *Diplosphaerina inaequalis* (Derville) - Van amerom et al., pl. 3, fig. 7.
v. 2003 *Diplosphaerina inaequalis* (Derville) - Fontaine et al., pl. 7, fig. 6.
v. 2003b *Eotuberitina reitlingerae* Miklukho-Maklay - Krainer et al., pl. 1, figs. 8, 18, 27, 30.
v. 2005 *Eotuberitina* sp. - Saïd, p. 182, p. 184, p. 186, p. 188, p. 189, fig. X. 1. 13 (attached on a *Saccamminopsis*).
v. 2005 *Eotuberitina reitlingerae* Miklukho-Maklay - Saïd, p. 180, p. 186, p. 189 (no illustration).
v. 2005 *Eotuberitina reitlingerae* Miklukho-Maklay - Sanz-Lopez et al., pl. 7, figs. 6.

Description. Diameter = 0.070-0.170 mm; height = 0.055-0.140 mm; wall thickness = 0.005-0.010 mm.

Occurrence. As for the genus. Montagne Noire, Brigantian (assemblages SF2 to SF4): Les Boutinelles (MA.BOU.25.5); Roquemaillère (ML764, ML.UM.ROQ, DV134'A); Roque Redonde (RR47, RR49, RR55, RR63, RR66, RR75, RR80); Roque Redonde (RR54, RR61: @ (= stage) *E. "barbata"*) (Pl. 35, fig. 28); Tiberet (ML.FSL.TIB); Les Mentaresses (DV328'B: @ (= stage) *E. "barbata"*) (Pl. 35, fig. 27); Saint Rome (DV130A); Les Pascales (DV601B); Roc de Murviel (MA34, MA40). Late Serpukhovian of Ardengost area: Col de Frechet, Grange de Peyrissé, Bois de Gertous, Areng (MFP.AH2, 14) (Perret, 1973b), MFP.CAS13': this study.

Genus *Diplosphaerina* Derville, 1952

Type species. *Diplosphaera inaequalis* (Derville, 1931).

Synonyms. *Eotuberitina* (pars), *Archaesphaera* (pars, e. g. Conil et al., 1977a).

Diagnosis. Small Tuberitinidae with two spheres, one small polar, and a larger one. Wall thin microgranular.

Occurrence. Devonian-Pennsylvanian (Vdovenko et al., 1993), cosmopolite.

Diplosphaerina inaequalis (Derville, 1931)

Pl. 35, figs. 29-35.

1931 *Diplosphaera inaequalis* n. sp. Derville, p. 141-142, pl. 18, figs. 77-80.
1952 *Diplosphaerina inaequalis* (Derville) - Derville, p. 236-237.
1964 *Diplosphaerina inaequalis* (Derville) - Conil and Lys, p. 47-48, pl. 6, figs. 77-81.
1970 *Diplosphaerina inaequalis* (Derville) - Mamet, n° 18 of text-fig. 3 p. 4-5, p. 10, pl. 4, fig. 6.
v. p. 1973b *Eotuberitina reitlingerae* Miklukho-Maklay - Perret, p. 203, pl. 1, figs. 1 (pars), 2 ?, 4-5, 6 ?, 7 only, not figs. 1 (pars), 3 (= *Eotuberitina reitlingerae*).
v. ? 1973b *Eotuberitina* sp. - Perret, p. 294, pl. 1, figs. 8-11.
1973 *Diplosphaerina inaequalis* (Derville) - Mamet, p. 104, pl. 3, figs. 26-27.

1973 *Diplosphaerina inaequalis* (Derville) - Bozorgnia, p. 45-46, pl. 3, figs. 12.
1973 *Diplosphaerina inaequalis* (Derville) - Browne and Pohl, pl. 22, fig. 8 (holotype of Derville).
p. 1973 *Diplosphaerina* (Derville) - Browne and Pohl, p. 193-195, pl. 22, figs. 8-12, pl. 23, figs. 1-3, 8 (and/or *Eotuberitina/Tuberitina*).
v. 1974b *Diplosphaerina inaequalis* (Derville) - Vachard, p. 216-217, pl. 9, fig. 12 (with synonymy).
1975 no legend - Ivanova, pl. 1, figs. 1-2.
1977 *Archaesphaera* ex gr. *inaequalis* (Derville) - Paproth et al., p. 76, 77 (no illustration).
1977a *Archaesphaera inaequalis* (Derville) - Conil et al., p. 211, text-fig. 1 p. 211, pl. 1, fig. 7.
v. p. 1977a *Archaesphaera* (= *Eotuberitina* = *Diplosphaerina*) ex gr. *inaequalis* (Derville) - Vachard, p. 374, tabl. 1 (no illlustration).
v. 1977b *Diplosphaerina inaequalis* (Derville) - Vachard, p. 164, pl. 8, fig. 12.
1980 *Diplosphaerina inaequalis* (Derville) - Rich, p. 13-14, pl. 1, figs. 7, 9-15, 18, pl. 4, figs. 4, 7-9 (with detailed synonymy including that of *Eotuberitina reitlingerae*).
1981 *Diplosphaerina inaequalis* (Derville) - Altiner, pl. 1, figs. 13-15.
v. 1981 *Diplosphaerina* ex gr. *inaequalis* (Derville) - Fontaine and Vachard, p. 15 (no illustration).
1982 *Diplosphaerina inaequalis* (Derville) - Rich, pl. 1, figs. 2-3, 4?, 5.
1982b *Diplosphaerina inaequalis* (Derville) - Brenckle et al, p. 52, pl. 1, figs. 7-9 (= stage *Eotuberitina*).
v. 1982 *Diplosphaerina inaequalis* (Derville) - Fontaine et al., p. 48, 52 (no illustration).
non 1983 *Diplosphaerina inaequalis* (Derville) - Groves, p. 9-10, pl. 1, fig. 8 (= *Eotuberitina* or *Tuberitina*).
1983 *Diplosphaerina inaequalis* (Derville) - Aizenverg et al., pl. 1, figs. 2, 4.
v. 1983 *Diplosphaerina* ex gr. *inaequalis* (Derville) - Fontaine et al., p. 14, pl. 1, fig. 8.
1983 *Diplosphaerina inaequalis* (Derville) - Conil and Paproth, p. 29 (no illustration).
p. 1984 *Diplosphaerina inaequalis* (Derville) - Herbig, pl. 7, fig. 5?, 6-7 (non 8-9 = *Eotuberitina*, nec 10-11 = *Tuberitina*).
1985 *Neotuberitina* spp. - Adachi, p. 87, pl. 9, figs. 26-27.
1985 *Diplosphaerina inaequalis* (Derville) - Skipp et al., pl. 2, figs. 18-19.
1989 *Archaesphaera inaequalis* (Derville) - Fewtrell et al., pl. 3.1, fig. 2.
1989a *Diplosphaerina inaequalis* (Derville) - Nguyen Duc Tien, pl. 10, fig. 9.
v. 1991c *Diplosphaerina inaequalis* (Derville) - Vachard et al., p. 677 (no illustration).
v. 1992 *Diplosphaerina* ex gr. *inaequalis* (Derville) - Berkhli and Vachard, pl. 1, figs. 5, 7.
1993 *Diplosphaerina* sp. - Ueno and Igo, fig. 3. 8.
1993 *Neotuberitina* sp. - Ueno and Nakazawa, fig. 3. 12-15.
v. 1993b *Diplosphaerina inaequalis* (Derville) - Vachard et al., pl. 1, fig. 6.
p. 1994 *Diplosphaerina* à divers stades tubétitinés - Mamet, pl. 3, figs. 16-19.
v. 1996 *Diplosphaerina* ex gr. *inaequalis* (Derville) - Vachard and Montenat, text-fig. 4 p. 469, pl. 4, fig. 4.
v. 1996 *Diplosphaerina* ex gr. *inaequalis* (Derville) (…) stades diplosphériques - Proust et al., p. 347 (no illustration).
v. 1999 *Diplosphaerina inaequalis* (Derville) - Fontaine et al., p. 464 (no illustration).
p. 2000a *Diplosphaerina inaequalis* (Derville) emend. Browne and Pohl - Cózar and Rodríguez, p. 112-113, fig. 4H (non fig. 4I = *Eotuberitina*).
v. 2001a *Diplosphaerina inaequalis* (Derville) - Vachard and Krainer, pl. 1, fig. 2.
2002 *Diplosphaerina inaequalis* (Derville) - Van amerom et al., pl. 3, fig. 8.
v. 2002b *Diplosphaerina inaequalis* (Derville) - Berkhli et al., p. 138 (no illustration).
v. non 2003 *Diplosphaerina inaequalis* (Derville) - Fontaine et al., pl. 7, fig. 6 (= *Eotuberitina*).
2004 *Diplosphaerina inaequalis* (Derville) - Brenckle, pl. 5, fig. 17.
v. 2005 *Diplosphaerina* sp. - Saïd, p. 180, 184, 186, 187, 188, 191 (no illustration).
2005b *Diplosphaerina inaequalis* (Derville) emend. Conil et al. - Cózar, text-fig. 3A p. 63.

Description. Diameter of polar sphere = 0.040-0.200 mm; diameter of large sphere = 0.100-0.240 mm; wall thickness = 0.005-0.012 mm.
Occurrence. All the Viséan in Belgium, England, Northern and Southern France, Germany, Afghanistan, Thailand and Turkey. Asbian-early Serpukhovian of Windsor Group (SE Canada). Brigantian of Montagne Noire: Roquemaillère (DV133C, DV134E, DV134'A); Roque Redonde (RR53, RR57); Vailhan-Château (DV245A, DV246B); Serre de Péret (MA.SP13). Late Serpukhovian of Ardengost area: N.E. Montagne d'Areng (MFP.AH2, 14, 17) (Perret, 1973b); MFP.Mar3B (this study).

Genus *Tuberitina* Galloway and Harlton, 1928

Type species. Tuberitina bulbacea Galloway and Harlton, 1928.

Diagnosis. Tuberitinidae with relatively large, ampullar chamber, often colonial. Wall rather thick, microgranular, sometimes perforated.

Occurrence. Late Mississippian (probably Brigantian)-Permian (Vachard, pers. comm.), cosmopolite.

Tuberitina bulbacea Galloway and Harlton, 1928

Pl. 36, figs. 1-13.

1928 *Tuberitina bulbacea* n. gen. n. sp. Galloway and Harlton, p. 346-347, pl. 45, fig. 8a-d.
1970 *Tuberitina bulbacea* Galloway and Harlton - Rich, p. 1060-1061, pl. 143, figs. 1-15 (with synonymy).
1972 *Tuberitina bulbacea* Galloway and Harlton - Toomey, p. 287-288, pl. 1, figs. 1-3.
v. 1974b *Tuberitina bulbacea* Galloway and Harlton - Vachard, p. 220-221, pl. 9, fig. 18 (with synonymy).
1975 *Tuberitina bulbacea* Galloway and Harlton - Mikhno and Balakin, p. 26, pl. 2, fig. 4.
v. p. 1977 *Tuberitina bulbacea* Galloway and Harlton - Vachard, p. 374, tabl. 1 (no illlustration).
1977 *Tuberitina* sp. - Toomey et al., fig. 8. O.
1978 *Tuberitina* ex gr. *bulbacea* Galloway and Harlton - Sosipatrova, pl. 6, fig. 23.
1984 *Diplosphaerina inaequalis* Derville (sic: no parentheses) (Stadium *Tuberitina collosa* Reitlinger) (re-sic) - Herbig, pl. 6, fig. 2.
1984 Stadium *Tuberitina collosa* Reitlinger - Herbig, pl. 7, fig. 10-11.
1985 *Tuberitina bulbacea* Galloway and Harlton - Adachi, p. 87-88, pl. 10, figs. 1-2 (with synonymy).
1985 *Diplosphaerina* spp. - Adachi, p. 86, pl. 9, figs. 18-19.
1991 *Tuberitina bulbacea* Galloway and Harlton - Vachard and Beckary, p. 325, pl. 2, figs. 11-14, pl. 4, fig. 33.
1992 *Tuberitina* - Krainer, pl. 6, fig. 7.
1993 *Tuberitina bulbacea* Galloway and Harlton - Ueno and Igo, fig. 3. 4.
1993 *Tuberitina* sp. - Ueno and Nakazawa, fig. 3. 11.
1994 *Tuberitina* ex gr. *bulbacea* Galloway and Harlton - Ueno et al., fig. 3. 1-2.
1996 *Tuberitina bulbacea* Galloway and Harlton - Ueno et al., fig. 2. 7.
v. 2001a *Tuberitina bulbacea* Galloway and Harlton - Vachard and Krainer, pl. 1, fig. 3.

Description. Height of chamber = 0.150-0.460 mm; maximal diameter of chamber = 0.100-0.350 mm; wall thickness = 0.010-0.030 mm.

Remarks. The diplospherical tests are difficult to separate from *Diplosphaerina*; a good example seems to exist in Roque Redonde (RR72) (Pl. 36, fig. 13).

Occurrence. Early Viséan of Uzbekistan. Pennsylvanian of the USA, Spitsbergen and Palaeotethys. Brigantian of Montagne Noire: Roquemaillère (DV14G, DV135A, ML.UM.ROQ); Roc du Cayla (DV466B); Roque Redonde (RR52, RR55, RR57, RR58, RR59, RR63?, RR65, RR71, RR72, RR75, RR77, RR78, RR88); Les Boutinelles (?MA25.16); Serre de Péret (MA.SP31); Les Mentaresses (DV329A); Roc de Murviel (MA.33.102, MA.33.103, DV253.A).

Family (ies) indeterminate

Genus *Tubesphaera* Vachard, 1994a

Type species. Tubesphaera cognata Vachard, 1994a.

Diagnosis. Morphology similar to *Eotuberitina*. Wall distinct, bilayered: inner layer, thin, microgranular, outer layer pseudofibrous.

Occurrence. Late Viséan of Southern Spain (dated «zone 14 or slightly younger», but probably latest Asbian or Brigantian: Vachard, pers. comm.).

Tubesphaera cognata Vachard, 1994a

Pl. 36, figs. 14-19.

v. 1974b *Sphaeroporella conchatiformis* (Malakhova and Chuvashov) - Vachard, p. 191-192, pl. 9, fig. 20.
v. 1977 n. gen. aff. *Tubeporina* - Vachard, p. 374, tabl. 1 (no illlustration).

p. 1981 *Polyderma reitlingerae* Hallet - Mamet and Martínez, pl. 2, fig. 7 (non fig. 8 = *Palaeocancellus*).
1994a *Tubesphaera cognata* n. gen. n. sp. Vachard, p. 65-66, text-fig. 8, pl. 8, figs. 1-3 (with synonymy).

Description. Diameter = 0.150-0.250 mm; height = 0.180-0.320 mm; wall thickness = 0.030-0.045 mm.
Occurrence. As for the genus. Montagne Noire: Brigantian (assemblages SF2 to SF4) of Castelsec (MA11.7); Vailhan-Château (DV245B, DV246B); Les Mentaresses (DV 328B, DV329B, DV329D, DV330A, DV330B); Tourière (DV341A with the holotype; DV341B); Roc de Murviel (DV250C).

Genus *Polysphaerinella* Mamet, 1973

Type species. *Eotuberitina bulla* Conil and Lys, 1968.
Diagnosis. Form similar to *Eotuberitina* (sometimes to *Diplosphaerina*), but very much larger and with a different wall, i.e., bilayered, with the inner layer, thin, microgranular, and the outer layer irregular, rugose, and pseudofibrous. One or two polar spheres, never «6 to 8», as indicated by Mamet (1973) or Cózar and Rodriguez (2000a).
Occurrence. Viséan-Serpukhovian, Western Europe, North Africa and Newfoundland (Vachard, pers. comm.).

Polysphaerinella bulla (Conil and Lys, 1968) emend. Mamet, 1973
Pl. 36, figs. 20-27.

1931 *Cytosphaera cancellata* (Williamson) - Derville, p. 139-140, pl. 18, figs. 76, 79, 81.
1968 *Eotuberitina bulla* n. sp. Conil and Lys, p. 500-501, pl. 1, figs. 8-11.
1973 *Polysphaerinella bulla* (Conil and Lys) - Mamet, p. 108, pl. 3, figs. 1-3.
v. 1977 *Polysphaerinella bulla* (Conil and Lys) - Vachard, p. 374, tabl. 1 (no illlustration).
1977 *Archaesphaera bulla* - Conil et al., p. 211, text-fig. 1 p. 211, p. 213 (no illustration).
1977 *Polysphaerinella bulla* (Conil and Lys) - Perret and Vachard, p. 138-139, pl. 10, fig. 10.
v. 1977b *Polysphaerinella bulla* (Conil and Lys) - Vachard, p. 163, pl. 8, fig. 6.
1978 *Polysphaerinella bulla* (Conil and Lys) - Jansa et al., p. 1436, pl. 2, fig. 12.
1981 *Polysphaerinella bulla* (Conil and Lys) - Mamet and Martínez, pl. 3, fig. 5.
1981 *Polysphaerinella bulla* (Conil and Lys) - Altiner, pl. 1, fig. 18.
v. 1991 *Polysphaerinella bulla* (Conil and Lys) emend. Mamet - Vachard and Tahiri, pl. 3, fig. 6.
1993 *Polysphaerinella bulla* (Conil and Lys) - Sabirov in Vdovenko et al., p. 38, pl. 8, fig. 5 a-b.
1999b *Polysphaerinella bulla* (Conil and Lys) - Cózar and Rodríguez, pl. 2, figs. 12.
2000a *Polysphaerinella bulla (*Conil and Lys) emend. Mamet - Cózar and Rodríguez, p. 113, fig. 40.
2005 *Polysphaerinella bulla* (Conil and Lys) - Sanz-Lopez et al., pl. 7, figs. 8.

Description. Diameter = 0.540-0.740 mm; wall thickness (inner layer) = 0.006-0.012 mm; (outer layer) = 0.060-0.140 mm.

Occurrence. As for the genus. FAD in the "V1bβ" of Belgium (near Freyr Castle, RC3163 and DV955). Holkerian of Northern and Western France. Late Viséan of England, Morocco, Algeria. Late Holkierian-early Asbian of Southwestern Spain. Latest Asbian- early Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293A, DV293C); Roquemaillère (DV134, DV137C); Japhet (DV350A); Roque Redonde (RR3). Late Serpukhovian (probable LAD) of Ardengost area: MFP.AH18B, D, F, H; AH20F; CAS47B; Bar/4C; RC8551.

7.3. Caligelloids

Order Pseudoammodiscida Conil and Lys, 1970
nomen translat. Gaillot and Vachard, 2007
Superfamily Caligelloidea nomen translat. here (ex family)
Family Caligellidae Reitlinger in Rauzer-Chernousova and Fursenko, 1959
emend. Vachard and Cózar, 2004b

Description (see Vachard and Cózar, 2004b). Permanent cysts of elongate chitinaceous naked foraminifera secreting a microgranular chimney. The shape is more or less cylindrical, polygonal or irregular. No proloculus but occasionally a fundamental, i.e. a firstly trapped, bioeroded and dissolved foraminifer test, followed by a secreted microgranular to granular (Caligellidae), sometimes "agglutinated" (Insolentithecidae) chimney. The growth is partly or completely infaunal. Rare pseudoapertures are visible in the wall. Some septa, perforated or not, occur within the flue. Wall microgranular, sometimes granular, bilayered with a pseudofibrous layer, or calcareous "agglutinated".

Remarks. The Caligellidae with *Caligella, Baituganella* and *Ademassa* are considered as a homogenous family, but another phylogenetic trend, very different, exists with the Insolentithethinae considered here as a family.

Occurrence. Cosmopolite from the Late Silurian (Ludlovian) to the Early Pennsylvanian, the Caligellidae are rare since the Serpukhovian: Ukraine (Aizenverg et al., 1983), Southern Spain (Cózar and Rodríguez, 2000a) and Qinghai, China (Vachard et al., 2003). The youngest forms are figured in the earliest Bashkirian of Southern Urals (as *Haplophragmina* (?) sp. sensu Sinitsyna and Sinitsyn, 1987, pl. 1, figs. 1-2). The more advanced representatives of the Caligelloidea survive, with *Insolentitheca* Vachard in Bensaid et al. (1979), from the late Serpukhovian to the Orenburgian (latest Carboniferous), earliest Permian and maybe late Permian (Gaillot, pers. comm.).

Genus *Caligella* Antropov, 1950

Type species. *Caligella borovskensis* Antropov, 1950.

Synonyms. *Paracaligella* Lipina, 1955 (auctorum, pars); *Earlandinella*? sensu Conil and Lys, 1964; ?*Earlandinella* sensu Conil and Lys, 1964.

Diagnosis. Elongate, small and rather regular Caligellidae, without proloculus nor aperture, but with curvated pseudosepta (or diaphragms?). Wall dark, microgranular.

Occurrence. Late Silurian to late Serpukhovian, probably cosmopolite (see Vachard, 1994a, p. 42)

Caligella sp.
Pl. 37, figs. 1-3.

Description. Length = 0.500-1.000 mm; width = 0.170-0.280 mm; wall thickness = 0.005-0.020 mm. This taxon is very rare, but it seems to be distinct of oblique sections in thinner Baituganella because of the thin, dark wall.

Occurrence. Latest Asbian- early Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293F, DV293I); Roc de Murviel (MA82).

Genus *Baituganella* Lipina, 1955

Type species. *Baituganella chernyshinensis* Lipina, 1955.

Synonyms. *Paracaligella*? sensu Skipp, 1969, ?*Irregularina* sensu Rich, 1982.

Diagnosis. Test irregular probably endofaunal, without really individualized aperture nor proloculus. Wall brownish, granular and unilayered.

Occurrence. Devonian (rare), Tournaisian-earliest Bashkirian, Southern Urals, Kazakhstan, Tien Chan, Siberia, Russian Platform, Donbass (Poyarkov, 1969), England, Ireland, Montagne Noire, Spain, Poland, Egypt, Turkey, Belgium, Arizona, Georgia?, Canada?.

Baituganella anomalis (Vdovenko, 1962)
Pl. 37, figs. 4-12.

1962 *Ammobaculites*? *anomalis* n. sp. Vdovenko, p. 41, pl. 3, figs. 1-3.
1973 *Baituganella anomalis* (Vdovenko) - Brazhnikova and Vdovenko, p. 111, pl. 2, fig. 24.
p. 1977 *Baituganella anomalis* (Vdovenko) - Vdovenko, pl. 5.1, figs. 5 (non fig. 6; see Vdovenko, 2001).
1987 *Haplophragmina*? sp. - Sinytsina and Sinytsin, pl. 1, figs. 1-2.
2001 *Baituganella anomalis* (Vdovenko) - Vdovenko, tabl. 1 p. 168, pl. 1, fig. 1.

Description. This species is elongate, with numerous undulations of the test. Length = 0.660-1.400 mm, width = 0.200-0.400 mm, thickness of wall = 0.040-0.080 mm.

Occurrence. Serpukhovian of central Kazakhstan. Earliest Bashkirian of Southern Urals. Early-late Viséan ($C_1^ve_2$-C_1^vg) of Donbass. Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293E, DV293.2B); Castelsec (MA10.7.2); Roquemaillère (DV139A); Roc du Cayla (?DV84B); Roque Redonde (RR56, RR59); Tiberet (?ML.FSL.TIB); Vailhan-Roque de Loup (DV314A); Roc de Murviel (MA7, MA50 (4 specimens), ?MA60).

Genus *Ademassa* Vachard in Vachard, Massa and Strank, 1993b

Type species. *Ademassa inuncta* Vachard in Vachard, Massa and Strank, 1993b.
Synonym. *Irregularina* sensu Adachi, 1985.
Diagnosis. Morphology relatively similar to *Baituganella*. Wall bilayered: outer layer granular, brownish; inner layer pseudofibrous, hyaline, yellow.
Occurrence. Late Asbian-Brigantian of Ireland, Libya, Morocco, Montagne Noire and Thailand. Serpukhovian of Algeria, Turkey and Japan (Vachard, 1994a). Questionable in the early Bashkirian of Algeria (Sebbar, 2000).

Ademassa inuncta Vachard in Vachard, Massa and Strank, 1993b
Pl. 37, figs. 13-17.

1993b *Ademassa inuncta* n. gen. n. sp.Vachard in Vachard, Massa and Strank, p. 174, 176, pl. 2, figs. 13-16 (with synonymy).
1994a *Ademassa inuncta* Vachard - Vachard, p. 68, pl. 8, figs. 4-5 (with synonymy).
2004b *Ademassa inuncta* Vachard - Vachard and Cózar, pl. 1, figs. 14-15.

Description. Poor material consistent with the parameters of the species of Libya. Length = 1.080-1.720 mm, width = 0.300-1.140 mm, thickness of wall = 0.050-0.130 mm.

Occurrence. As for the genus. Latest Asbian-earliest Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293A, DV293C, DV293I, DV293.2B); Roquemaillère (DV134D, DV137B, DV137D, DV137F).

Family Insolentithecidae Loeblich and Tappan, 1986
nomen translat. here (ex subfamily)

Remarks. The phylogenetic trend beginning with *Protoinsolentitheca* seems to be suficiently individualized to constitute a family.

Genus *Protoinsolentitheca* Vachard and Cózar, 2004b

Type species. *Protoinsolentitheca fundamenta* Vachard and Cózar, 2004b.

Diagnosis. Insolentithecidae with a bioeroded fundamental (first agglutinated test), followed by a mostly secreted wall, rarely with agglutinated bricks (later agglutinated tests) into the chimney (permanent cyst). The flue (internal part of this cyst) is only composed of an enlargment of the chambers of the fundamental, or caligellid-shaped. Large aperture absent, but small pseudoapertures are observed. Pseudosepta usually present, but always as remains of the previous fundamental septa. Secreted wall microgranular.

Occurrence. Late Viséan from Ireland, Southern France, Morocco, and Alaska. Serpukhovian from Donbass (Ukraine) (see Vachard and Cózar, 2004b).

Protoinsolentitheca fundamenta Vachard and Cózar, 2004b
Pl. 38, figs. 1-11.

v. 2004b *Protoinsolentitheca fundamenta* n. gen. n. sp. Vachard and Cózar, p. 598, pl. 1, figs. 1-7 (with synonymy).

Description. 13 specimens were observed. The fundamentals are generally composed of *Endothyra bowmani* or *Endothyranopsis crassa* and the bricks by *Endothyra* and *Palaeotextularia* sp.

Occurrence. As for the genus. Brigantian in Montagne Noire: Castelsec (MA10.7.2, MA10.8.1); ?Roque Redonde (RR54); 500m E de Vailhan (ML788); Roc de Murviel (MA82, MA83, MA330.3, MA330.11).

Genus *Insolentitheca* Vachard in Bensaid et al., 1979
emend. Vachard and Cózar, 2004b

Type species. *Ammobaculites*? *horridus* forma typica Brazhnikova in Brazhnikova et al., 1967

Diagnosis. Permanent cyst of Insolentithecidae with a relatively large fundamental, followed by a secreted and agglutinated chimney with numerous bricks. Bricks (i. e., internally bioeroded and truncated tests of foraminifers) are linked by a microgranular cement.

Occurrence. Very rare in the late Viséan-early Serpukhovian. Common and cosmopolite from the late Serpukhovian to the late Moscovian (see Vachard and Cózar, 2004b). Up to the Orenburgian (= latest Pennsylvanian).

Insolentitheca ex gr. *horrida* (Brazhnikova in Brazhnikova et al., 1967)
Pl. 38, figs. 12-13.

1967 *Ammobaculites*? *horridus* forma typica n. sp. Brazhnikova in Brazhnikova et al., p. 144-145, pl. 18, fig. 6, pl. 45, figs. 1, 6, pl. 46, figs. 1-3.

1967 *Ammobaculites*? *horridus* forma variabilis n. sp. Brazhnikova in Brazhnikova et al., p. 145, pl. 45, figs. 2-5.

v. 1977 *"Ammobaculites*?" *horridus* Brazhnikova - Perret and Vachard, p. 90 (no illustration).

v. 1979 *Insolentitheca horrida* (Brajnikova) n. gen. - Vachard in Bensaïd et al., p. 201, pl. 15, fig. 3 (with synonymy).

1979 *Ammobaculites* (?) *horridus* Brazhnikova - Wagner et al., pl. 4, fig. 12.
1983 *Haplophragmina* (*Haplophragmoides*) *horridus* Brazhnikova (sic) - Aizenverg et al., p. 12-13, pl. 3, fig. 11, pl. 4, figs. 1-2.
1985 *Fukujia typica typica* Adachi - Adachi, p. 129, pl. 22, fig. 24.
1985 *Fukujia typica* subsp. A - Adachi, p. 129-130, pl. 22, figs. 25-26.
1985 *Fukujia typica* subsp. B - Adachi, p. 130, pl. 22, fig. 27.
1987 *Haplophragmina variabilis* (Brazhnikova) - Sinitsyna and Sinitsyn, pl. 1, fig. 3.
1987 *Haplophragmina horridus* (Brazhnikova) - Sinitsyna and Sinitsyn, pl. 3, fig. 6.
1988 *Haplophragmina* (*Haplophragminoides*) *horridus* Brazhnikova (sic) - Kulagina, p. 26 (no illustration).
1988 *Haplophragmina* (*Haplophragminoides*) *variabilis* Brazhnikova (sic: without parentheses) - Kulagina, p. 26, pl. 3, fig. 7.
1988 Syzygial cysts - Groves, fig. 10. 18-23.
v. 1989 *Insolentitheca horrida* (Brajn. in Brajn. et coll.) - Chalot-Prat and Vachard, fig. 3. 13.
v. 1990 *Insolentitheca horrida* (Brajnikova) - Vachard, p. 94, pl. 2, fig. 5.
v. 1991 *Insolentitheca* ex gr. *horrida* (Brajnikova) - Vachard and Beckary, p. 325-326, pl. 3, figs. 1-2, pl. 4, fig. 25 (with synonymy).
v. 1993 *Insolentitheca horrida* (Brazhnikova) - Perret, p. 455-456, pl. F5, figs. 17-20, pl. F.XII, fig. 8 (with synonymy).
1993 *Insolentitheca horrida* (Brazhnikova) - Mamet et al., pl. 16, fig. 16.
v. 1994a *Insolentitheca horrida* (Brazhnikova) - Vachard, pl. 8, fig. 6.
1994 Fused clusters of foraminifers - Ueno et al., figs. 5.1-8.
v. 1996 *Insolentitheca horrida* (Brazhnikova) - Proust et al., p. 347 (no illustration).
1996 *"Ammobaculites" horridus* Brazhnikova (= syzygial cyst according to Groves) - Reitlinger in Einor, pl. 2, fig. 15.
1996b *Insolentitheca* - Mamet, pl. 1, fig. 47.
1997 Syzygial cysts - Mazuno and Ueno, tabl. 2.
1998 *Insolentitheca horrida* (Brazhnikova) - Pinard and Mamet, p. 133-134, pl. 43, figs. 9-12 (with synonymy).
2001 *Insolentitheca horrida* (Brazhnikova) - Vdovenko, tabl. 1 p. 172.
2001a *Insolentitheca horrida* (Brazhnikova) - Vachard and Krainer, pl. 1, fig. 6.
2002 *Haplophragminoides horridus* (Brazhnikova) - Marfenkova, p. 194, 195 (no illustration).
2002 *Haplophragmina* (*Haplophragmoides*) *horridus* (Brazhnikova) - Ponomareva et al., p. 240 (no illustration).
2002 Syzygial cyst - Wood et al., pl. 7, fig. 25.
v. 2004b *Insolentitheca horrida* (Brazhnikova) - Vachard and Cózar, pl. 2, figs. 1-11.

Description. Six morphotypes are indicated by Vachard and Cózar (2004b) in this very variable species. The specimens of Ardengost correspond mainly to the morphotype *endothyroidea* (Adachi, 1980).
Occurrence. As for the genus. Late Serpukhovian of Ardengost area: Cas27b, Cas32, Cas42 (Perret, 1993); MFP.Mar1.16, MFP.AH20C, MFP. Cas27B, MFP.Cas32, MFP.Cas42, MFP. OS 60.

7.4. Earlandioids

Superfamily ?Earlandioidea Cummings, 1955b
nomen translat. Loeblich and Tappan, 1982 (ex family)
Family Earlandiidae Cummings, 1955b emend. Vachard, 1994a
Genus *Earlandia* Plummer, 1930

Type species. *Earlandia perparva* Plummer, 1930.

Synonyms. *Quasiearlandia* Brazhnikova in Brazhnikova and Vdovenko, 1973 (as subgenus); *Biorbis* Strank, 1983; *Gigasbia* Strank, 1983; *Aeolisaccus* Elliott, 1958 (pars?); *Hyperammina* Brady, 1878 (pars).

Diagnosis. Shell long, straight, tubular, cylindrical or slightly tapering, and undivided. Proloculus spherical more or less prominent, commonly broken. Simple terminal aperture. Wall microgranular, more or less diffrentiated according to the size of the group of species

(dark and indistinct in *E.* ex gr. *elegans*, differenciated in paraboloids of clearer grains in *E.* ex gr. *vulgaris* = *Gigasbia*; brownish and intermediary in *E.* ex gr. *minor* = *Quasiearlandia*). *Aeolisaccus* is an *Earlandia* without preserved proloculus (the Permian species *Aeolisaccus dunningtoni* Elliott, 1958 is probably synonym of *Earlandia elegans* (Rauzer-Chernousova and Reitlinger)); *Biorbis* corresponds to two *Earlandia* ex gr. *minor* in telescoping contact (sensu Fernández López, 2000); "*Hyperammina*", in this case, designates several species of secondary silicified *Earlandia*.

Remarks. The genus is remarkably homogenous and tolerant in Montagne Noire, as in the Pyrenees (Perret, 1993). Only three groups of species are differentiated.

Occurrence. Silurian (Pronina, 1968, Sabirov, 1987)-Cretaceous (e. g., Arnaud-Vanneau, 1980; Altiner, 1991), cosmopolite.

Earlandia ex gr. *elegans* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova and Fursenko, 1937)
Pl. 39, figs. 1-9.

1936 *Hyperammina elegans* n. sp. Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al., p. 203 (no illustration, nomen nudum).
1937 *Hyperammina elegans* n. sp. Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova and Fursenko, p. 256-257, fig. 191.
1948 *Hyperammina minima* n. sp. Birina, p. 155-159, pl. 2, figs. 7-8.
1964 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Conil and Lys, p. 53, pl. 7, figs. 98-99.
1964 *Earlandia minima* (Birina) - Conil and Lys, p. 54, pl. 7, figs. 100-101.
1967 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Conil and Paproth, p. 59, 70 (no illustration).
1967 *Earlandia minima* (Birina) - Conil and Paproth, p. 59 (no illustration).
1970 *Earlandia* of the group *E. elegans* (Rauzer-Chernousova and Reitlinger) - Petryk et al., n° 7 of text-fig. 4 p. 92 (no illustration).
1970 *Earlandia* of the group *E. minima* (Birina) - Petryk et al., n° 8 of text-fig. 4 p. 92 (no illustration).
1973 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Bozorgnia, p. 47-48, pl. 3, fig. 15 (with synonymy).
1973 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Brenckle, p. 21, 23, pl. 1, figs. 22-27.
v. 1974b *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Vachard, p. 222-223, pl. 4, fig. 3, pl. 10, fig. 21 (with synonymy).
v. 1977 *Earlandia* ex gr. *elegans* (Rauzer-Chernousova and Reitlinger) - Perret and Vachard, p. 90 (no illustration).
1977 *Earlandia* of the group *E. elegans* (Rauzer-Chernousova and Reitlinger) - Armstrong and Mamet, p. 25-26, pl. 26, figs. 14-16, 20 (with synonymy).
1979 *Earlandia minima* (Birina) - Mansourian, p. 56-57, pl. 1, fig. 9.
1980 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Rich, p. 14-15, pl. 4, figs. 10-12 (with synonymy).
1981 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Strank, pl. 10, fig. 3, pl. 20, fig. 10.
v. 1982 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Fontaine et al., p. 48 (no illustration).
1982b *Earlandia* of the group *E. elegans* (Rauzer-Chernousova and Reitlinger) - Brenckle et al., p. 53, pl. 1, figs. 14-16 (with synonymy).
1982b *Earlandia* of the group *E. minima* (Birina) - Brenckle et al., p. 53, pl. 1, figs. 11-13 (with synonymy).
1982 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Rich, pl. 1, figs. 6, 25.
1982 *Earlandia minima* (Birina) - Rich, pl. 1, figs. 7-8.
v. 1983 *Earlandia* ex gr. *elegans* (Rauzer-Chernousova and Reitlinger) - Fontaine et al., p. 14 (no illustration).
1983 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Conil and Paproth, tabl. 1 p. 34 (no illustration).
1984 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Groves, text-fig. 6 p. 287, text-fig. 7 p. 289, pl. 3, figs. 7-10.
1985 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Adachi, p. 85-86, pl. 9, figs. 11-15 (with synonymy).
1985 *Earlandia* of the group *E. elegans* (Rauzer-Chernousova and Reitlinger) - Skipp et al., pl. 5, figs. 12.
1988 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Groves, fig. 9. 3.
1989 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Fewtrell et al., pl. 3. 2, fig. 19.
? 1989 *Earlandia pulchra* (Cummings) - Fewtrell et al., p. 64, pl. 3. 12, fig. 8.

v. 1989 *Earlandia elegans* (Rauser & Reitl. in Rauser and Fursenko) - Chalot-Prat and Vachard, fig. 3. 14.
1990 *Earlandia minima* (Birina) - Vdovenko et al.,pl. 1, fig. 1., text-fig. 2 p. 31
1991 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Gibshman and Akhmetshina, pl. 1, fig. 2.
v. 1991c *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Vachard et al., p. 677 (no illustration).
1993 *Earlandia* of the group *E. elegans* (Rauzer-Chernousova and Reitlinger) - Mamet et al., pl. 1, figs. 1-2.
1993 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Ueno and Nakazawa, p. 9, fig. 3. 4-8 (with 42 references in synonymy).
1994 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Herbig and Mamet, text-fig. 4 p. 101 (no illustration).
v. 1996 *Earlandia* ex gr. *elegans* (Rauzer-Chernousova and Reitlinger) - Proust et al., p. 347 (no illustration).
1996 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Hance, text-fig. 2 p. 31, text-fig. 3 p. 32, text-fig. 4 p. 33 (no illustration).
1996 *Earlandia minima* (Birina) - Hance, text-fig. 2 p. 31 (no illustration).
1998 *Earlandia* du groupe *E. elegans* (Rauzer-Chernousova and Reitlinger) - Pinard and Mamet, p. 9-10, pl. 1, figs. 1-5 (with synonymy).
1998 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Gallagher, pl. 2, fig. 4.
1999 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Groves and Boardman, pl. 1, fig. 1.
v. 1999 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Berkhli, p. 110 (no illustration).
2000 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Groves, pl. 3, figs. 1-5.
2000b *Earlandia minima* (Birina) - Cózar and Rodríguez, p. 91, pl. 1, fig. 1.
2000b *Earlandia elegans* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) (sic) - Cózar and Rodríguez, p. 91, pl. 1, fig. 2.
? 2002 *Earlandia* of the group *E. elegans* (Rauzer-Chernousova) (sic) - Van amerom et al., pl. 3, fig. 9 (most probably *E. minor*).
2002 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Wood et al., pl. 7, figs. 2-3.
2004 *Earlandia* of the group *E. elegans* (Rauzer-Chernousova and Reitlinger) - Brenckle, pl. 3, fig. 27.
v. 2005 *Earlandia* ex gr. *elegans* (Rauzer-Chernousova and Reitlinger) - Saïd, p. 180, p. 184, p. 186, p. 188 (no illustration).
2005 *Earlandia elegans* (Rauzer-Chernousova and Reitlinger) - Orlov-Labkovsky, p. 23 (no illustration).

Description. Our group of *E. elegans* includes two groups of Armstrong and Mamet (1977) and Pinard and Mamet (1998), the group *E. minima* (Birina, 1948) and the group *E. elegans* whose diameter ranges respectively from 0.025 to 0.045 mm, and from 0.050 to 0.100 mm. I measured: Length = up to 1.000 mm; outer diameter = 0.050-0.110 mm; proloculus diameter = 0.110-0.180 mm; thickness of wall = 0.015-0.020 mm.

Remarks. The type species of *Earlandia*, *E. perparva* Plummer, 1930, is related to the group *E. elegans* (see Browne and Pohl, 1973, p. 197).

Occurrence. Tournaisian-early Permian, cosmopolite (Pinard and Mamet, 1998). Late Permian of Neotethys (Gaillot, 2006). Probable LAD at the base of the MZF1 = Cf1α in Hunan (South China) (see Hance, 1996). Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293B); Castelsec (MA10.7.2); Roquemaillère (DV133B); Roque Redonde (RR54, RR66, RR87); Jeantels (DV690); Roc de Murviel (DV251C); Laurens (ML.FSL.LAU2).

Earlandia ex gr. *minor* (Rauzer-Chernousova, 1948g)
Pl. 39, figs. 10-12.

1948g *Hyperammina vulgaris minor* n. var. Rauzer-Chernousova, p. 239-240, pl. 17, fig. 1.
1964 *Earlandia vulgaris* var. *minor* (Rauzer-Chernousova) - Conil and Lys, p. 53, pl. 7, figs. 96-97.
1967 *Earlandia vulgaris* var. *minor* (Rauzer-Chernousova) - Conil and Paproth, p. 60, 62, 65, 68, 70, 71, 76, 77 (no illustration).
1973 *Earlandia minor* (Rauzer-Chernousova) - Bozorgnia, p. 48, pl. 3, figs. 13-14, pl. 9, fig. 2 (with synonymy).
v. 1974b *Earlandia minor* (Rauzer-Chernoussova) - Vachard, p. 223-224, pl. 10, fig. 20 (with synonymy).
1975a *Earlandia minor* (Rauzer-Chernoussova) - Malakhova, p. 6, pl. 1, figs. 1-2.
1976 *Earlandia minor* (Rauzer-Chernoussova) - Conil and Naum, pl. 4, fig. 59.

1977 *Earlandia* of the group *E. moderata* (Malakhova) - Armstrong and Mamet, p. 26, pl. 26, figs. 17-19 (with synonymy).
1977 *Earlandia* of the group *E. clavatula* (Howchin) - Armstrong and Mamet, p. 26, pl. 19, fig. 19, pl. 20, fig. 12, pl. 26, fig. 21 (with synonymy).
1978 *Earlandia vulgaris minor* (Rauzer-Chernousova) - Lys et al., pl. 1, fig. 26.
1980 *Earlandia* cf. *E. clavatula* (Howchin) - Rich, p. 15-16, pl. 1, fig. 8 (with synonymy).
v. 1981 *Earlandia* ex gr. *minor* (Rauzer-Chernousova) - Fontaine and Vachard, p. 15 (no illustration).
1981 *Earlandia moderata* (Malakhova) - Strank, pl. 7, fig. 22, pl. 19, fig. 4.
1981 *Biorbis duplex* gen. et sp. nov. - Strank, pl. 7, fig. 28, pl. 9, fig. 15, pl. 12, fig. 13 (nomen nudum)..
1982 *Earlandia moderata* (Malakhova) - Rich, pl. 1, figs. 9-10.
1982b *Earlandia* of the group *E. clavatula* (Howchin) - Brenckle et al., p. 53, pl. 1, figs. 19, 25 (with synonymy).
1982b *Earlandia* of the group *E. moderata* (Malakhova) - Brenckle et al., p. 53-54, pl. 1, figs. 17-18, 20 (with synonymy).
1983 *Biorbis duplex* n. gen. n. sp. Strank, p. 442, pl. 55, fig. 8-12.
v. 1983 *Earlandia* ex gr. *minor* (Rauzer-Chernousova) - Fontaine et al., p. 14, pl. 1, fig. 18.
1983 *Earlandia minor* (Rauzer-Chernousova) - Conil and Paproth, tabl. 1 p. 34 (no illustration).
1983 *Earlandia moderata* (Malakhova) - Conil and Paproth, p. 29, tabl.1 p. 34 (no illustration).
1984 *Earlandia moderata* (Malakhova) - Groves, text-fig. 6 p. 287, text-fig. 7 p. 289, pl. 3, fig. 4.
1984 *Earlandia clavatula* (Howchin) - Groves, text-fig. 6 p. 287, pl. 3, figs. 5-6.
1985 *Earlandia vulgaris minor* Rauser (sic without parentheses) - Lys , pl. 1, fig. 4.
1985 *Earlandia moderata* (Malakhova) - Adachi, p. 85, pl. 9, fig. 10 (with synonymy).
1988 *Earlandia moderata* (Malakhova) - Groves, fig. 9. 1.
1988 *Earlandia clavatula* (Howchin) - Groves, fig. 9. 4-5.
1989 *Earlandia minor* (Rauzer-Chernoussova) - Fewtrell et al., pl. 3. 2, fig. 15.
1989 *Biorbis duplex* n. gen. n. sp. Strank - Davies et al., text-fig. 8 p. 39, fig. 9 L.
v. 1991 *Earlandia minor* (Rauzer-Chernoussova) - Vachard and Tahiri, pl. 2, fig. 17, pl. 4, fig. 10, pl. 5, fig. 3.
1993 *Earlandia* of the group *E. clavatula* (Howchin) - Mamet et al., pl. 1, fig. 3.
v. 1993 *Earlandia minor* (Rauzer-Chernoussova) - Vachard et al., pl. 3, fig. 2.
1993 *Earlandia* cf. *moderata* (Malakhova) - Ueno and Nakazawa, p. 9-10, fig. 3. 9 with 14 references in synonymy).
1994 *Earlandia* ex gr. *E. moderata* Malakhova (sic) - Herbig and Mamet, text-fig. 4 p. 101 (no illustration).
1994 *Earlandia* ex gr. *E. clavatula* (Howchin) - Herbig and Mamet, text-fig. 4 p. 101 (no illustration).
v. 1996 *Earlandia* ex gr. *minor* (Rauzer-Chernoussova) - Proust et al., p. 347 (no illustration).
v. 1996 *Earlandia* ex gr. *minor* (Rauzer-Chernoussova) - Vachard and Montenat, text-fig 4 p. 469, pl. 1, fig. 14.
1996 *Earlandia moderata* (Malakhova) - Hance, text-fig. 2 p. 31, text-fig. 4 p. 33 (no illustration).
1996 *Earlandia minor* (Rauzer-Chernoussova) - Hance, text-fig. 2 p. 31 (no illustration).
1996b *Earlandia* of the group *E. elegans* (Rauzer-Chernousova and Reitlinger) - Mamet, pl. 1, fig. 1.
1998 *Earlandia* du groupe *E. moderata* (Malakhova) - Pinard and Mamet, p. 10, pl. 1, figs. 6-7, 9 (with synonymy).
1998 *Earlandia* du groupe *E. clavatula* (Howchin) - Pinard and Mamet, p. 11, pl. 1, fig. 10 (with synonymy).
1998 *Earlandia* du groupe *E. clavatula* (Howchin) - Pinard and Mamet, p. 10-11, pl. 1, figs. 6-7, 9 (with synonymy).
v. 1999 *Earlandia minor* (Rauser) - Berkhli, p. 103, 107, 108, 109, 110, 112, 117, 118 (no illustration).
v. 1999 *Earlandia minor* (Rauser) - Fontaine et al., p. 463, 464 (no illustration).
2000b *Earlandia moderata* (Malakhova) - Cózar and Rodríguez, p. 91, pl. 1, fig. 3.
? 2002 *Earlandia* of the group *E. elegans* (Rauzer-Chernousova) (sic) - Van amerom et al., pl. 3, fig. 9.
2000b *Earlandia clavatula* (Howchin) - Cózar and Rodríguez, p. 92, pl. 1, fig. 5.
v. 2002b *Earlandia minor* (Rauzer-Chernoussova) - Berkhli et al., p. 138 (no illustration).
2003 *Earlandia clavatula* (Howchin) - Groves et al., fig. 5. 16.
2004 *Earlandia* of the group *E. clavatula* (Howchin) - Brenckle, pl. 3, fig. 26.
v. 2005 *Earlandia* ex gr. *minor* (Rauzer-Chernoussova) - Saïd, p. 176, p. 180, p. 182, p. 184, p. 186, p. 188, p. 189, p. 190, p. 192 (no illustration).
v. 2006 *Earlandia* ex gr. *minor* (Rauzer-Chernoussova) - Sanz-Lopez et al. , fig. 8. 7, 13.

Description. Our group *E. minor* corresponds to both groups *E. moderata* (Malakhova, 1954) and *E. clavatula* (Howchin, 1888) of Armstrong and Mamet (1977) and Pinard and Mamet (1998), with a diameter of 0.100 to 0.260 mm. *Biorbis* is 0.25-0.35 mm wide. Length = 0.200-1.400 mm; outer diameter = 0.200-0.250 mm; thickness of wall = 0.020-0.030 mm.

Occurrence. Tournaisian-early Permian (Pinard and Mamet, 1998), probably cosmopolite. Probable FAD in the MFZ1 = Cf1α of Hunan, South China (Hance, 1996). Latest Asbian-early Serpukhovian of Montagne Noire: Lenses of the road, near Roquessels (DV293A); Roque Redonde (RR47); Vailhan-Château (DV247B); Les Boutinelles (MA.BOU25.14); Les Pascales (DV601A, DV601B); Jeantels (DV690); Gare de Laurens (ML789); Roc de Murviel (MA24, MA50). Late Serpukhovian of Ardengost area: MFP.AH.18B, AH18F.

Earlandia ex gr. *vulgaris* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova and Fursenko, 1937)
Pl. 39, figs. 13-15, 22.

1936 *Hyperammina vulgaris* n. sp. Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al., p. 203 (no illustration, nomen nudum).
1937 *Hyperammina vulgaris* n. sp. Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova and Fursenko, p. 256, fig. 190.
1967 *Earlandia vulgaris* var. *vulgaris* (Rauzer-Chernousova and Reitlinger) - Conil and Paproth, p. 60, 62, 65, 68, 70, 71, 75, pl. 4, fig. 1.
1970 *Earlandia* ex gr. *vulgaris* (Rauzer-Chernousova and Reitlinger) - Petryk et al., n° 53 of text-fig. 4 p. 93 (no illustration).
1973 *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger) - Bozorgnia, p. 48-49, pl. 9, fig. 1 (with synonymy).
1973 *Earlandia* sp. - Maslov, pl. 25, fig. 4.
v. 1974b *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger) - Vachard, p. 222-223, pl. 6, fig. 4, pl. 10, fig. 19 (with synonymy).
1975a *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger) - Malakhova, p. 6 (no illustration).
v. 1977 *Earlandia* ex gr. *vulgaris* (Rauzer-Chernousova and Reitlinger) - Perret and Vachard, p. 90 (no illustration).
1977 *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger) - Paproth et al., p. 69, 77 (no illustration).
1977 *Earlandia* of the group *E. vulgaris* (Rauzer-Chernousova and Fursenko) - Armstrong and Mamet, p. 26-27, pl. 1, fig. 7, pl. 13, figs. 2, 6, pl. 14, fig. 5, pl. 20, fig. 5 (with synonymy).
1978 *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger) - Lys et al., pl. 1, fig. 15.
1979 *Earlandia vulgaris* (Rauser & Reitlinger) - Wagner et al., pl. 2, fig. 11, pl. 4, fig. 15 (sic: forma regularis).
1981 *Gigasbia gigas* gen. et sp. nov. Strank, pl. 10, fig. 7 (nomen nudum).
v. 1982 *Earlandia* ex gr. *vulgaris* (Rauzer-Chernousova and Reitlinger) - Fontaine et al., p. 48 (no illustration).
1982b *Earlandia* of the group *E. vulgaris* (Rauzer-Chernousova and Reitlinger) - Brenckle et al., p. 54, pl. 1, figs. 21-24 (with synonymy).
1983 *Gigasbia gigas* n. gen. n. sp. Strank, p. 436, pl. 54, figs. 1-5.
1983 *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger) - Conil and Paproth, tabl. 1 p. 34 (no illustration).
1985 *Earlandia vulgaris vulgaris* (Rauzer-Chernousova and Reitlinger, 1937) (sic) - Lys, pl. 1, fig. 11.
1985 *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger) - Adachi, p. 85, pl. 9, figs. 7-9 (with synonymy).
1989 *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger, 1937) (sic) - Fewtrell et al., pl. 3.1, fig. 1.
1989 *Earlandia* sp. - Fewtrell et al., p. 63, pl. 3. 11, fig. 14 (one of the figurations of *Gigasbia gigas* Strank, 1983).
1989 *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger, 1937) (sic) - Fewtrell et al., pl. 3.1, fig. 1.
v. 1991 *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger) - Vachard and Tahiri, pl. 2, fig. 12, pl. 4, fig. 1, 9, 12, pl. 5, fig. 2.
1992 *Gigasbia gigas* Strank - Somerville et al., fig. 5R.
1993 *Earlandia* of the group *E. vulgaris* (Rauzer-Chernousova and Reitlinger) - Mamet et al., pl. 1, fig. 4.
1994 *Earlandia* ex gr. *E. vulgaris* (Rauzer-Chernousova and Reitlinger) - Herbig and Mamet, text-fig. 4 p. 101.
1997 *Gigasbia gigas* Strank - Gallagher and Somerville, text-fig. 4 p. 318, text-fig. 5 p. 320, text-fig. 6 p. 321, text-fig. 8 p. 325 (no illustration).
1998 *Gigasbia gigas* Strank - Gallagher, pl. 2, fig. 3.
1998 *Earlandia* du groupe *E. vulgaris* (Rauzer-Chernousova and Fursenko) - Pinard and Mamet, p. 11-12, pl. 1, fig. 8 (with synonymy).
1999a *Earlandia vulgaris* (Rauzer-Chernousova) (sic) - Cózar and Rodríguez, text-fig. 5 (pars).

v. 1999 *Earlandia vulgaris* (Rauser and Reitlinger) - Berkhli, p. 103, 107, 108, 109, 110, 117, 118 (no illustration).
v. 1999 *Earlandia vulgaris* (Rauser and Reitlinger) - Fontaine et al., p. 464 (no illustration).
2000a *Gigasbia gigas* Strank - Cózar and Rodríguez, p. 113, fig. 4A.
2000b *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) (sic) - Cózar and Rodríguez, p. 92, pl. 1, figs. 4, 6.
v. 2002b *Earlandia minor* (Rauzer-Chernoussova) - Berkhli et al., p. 138 (no illustration).
v. 2002 *Earlandia* ex gr. *vulgaris* (Rauzer-Chernousova and Reitlinger) - Krainer and Vachard, p. 15, pl. 3, figs. 7-8.
v. 2005 *Earlandia vulgaris* (Rauzer-Chernousova and Reitlinger) - Saïd, p. 179, p. 184, p. 187, p. 192 (no illustration).
2006 *Gigasbia gigas* Strank - Gallagher et al., fig. 14. 8.

Description. According to Armstrong and Mamet (1977) and Pinard and Mamet (1998), the group *E. vulgaris* is characterized by a diameter ranging from 0.300 to 0.400 mm (up to 0.580 in *Gigasbia*). I measured: Length = 1000-4.000 mm; outer diameter = 0.300-0.500 mm; thickness of wall = 0.050-0.110 mm.

Occurrence. Early Viséan-late Serpukhovian of Palaeotethys and North-America (Armstrong and Mamet, 1977; Fewtrell et al., 1989; Krainer and Vachard, 2002). Early Bashkirian of Donets Basin (Voznessensky: Aizenverg et al., 1983). Bashkirian of Canadian Arctic (Pinard and Mamet, 1998). Earliest Asbian-latest Brigantian of Montagne Noire: sommet 224-Valuzières (DV600C); Roquemaillère (ML764, DV134C, DV134D); Roque Redonde (RR59); Vailhan-Château (DV246G); Les Mentaresses (DV328'B).

Family ?Earlandiidae

Remarks. Generally considered as an incertae sedis, *Magnitella* was assigned to the Earlandiidae by Conil et al. (1980) and Vdovenko et al. (1993). This assignment is not admitted by Vachard (1991, 1994a) or Pinard and Mamet (1998). Since the clear paraboloids of *Magnitella* are similar to the paraboloids of *Earlandia vulgaris*/*Gigasbia*, it seems to be logical for me to assume that *Magnitella*, with a pseudofibrous second layer, preludes to the phylogenetic trend, which will be repeated by *Syzrania* and rises the Hyaline foraminifera (e. g., Groves, 1992, 1997; Vachard, 1994a; Groves and Wahlman, 1997 and Groves and Boardman, 1999).

Genus *Magnitella* Malakhova, 1975a

Type species. *Magnitella porosa* Malakhova, 1975a.

Synonyms. *Hyperammina* Brady, 1878 (pars), *Beresella* Maslov and Kulik, 1956 (pars) *Earlandia* Plummer, 1930 (pars).

Diagnosis. Test tubular cylindrical undivided. Proloculus not preserved. Wall with two layers an inner thick brownish, microgranular layer, and a pseudo-fibrous outer layer disposed as paraboloids, oblique to the axis of development.

Occurrence. The exact biostratigraphical distribution in the Viséan is unknown. It is latest Asbian to late Brigantian in Montagne Noire. The taxon is probably useful for the paleobiogeography (Donbass, Urals, Montagne Noire, Kazakhstan, Moscow Basin, Bulgaria, Sumatra, but also questionable in Brazil).

Magnitella praecursor (Vachard, 1977b) emend. herein
Pl. 39, figs. 16-24.

?1967 *Earlandia*? *vulgaris* var. *orientalis* (Prikhodko) - Brazhnikova et al., p. 28, 29, 104, pl. 9, fig. 5.
?1968 *Earlandia*? *vulgaris* var. *orientalis* (Prikhodko) - Aizenverg et al. , pl. 3, fig. 11.
?1973 *"Earlandia" vulgaris* var. *orientalis* (Prikhodko) - Brazhnikova and Vdovenko, pl. 40, figs. 5, 8, 10, tabl. 2 p. 70-71, 72-73.
?1973 *Earlandia vulgaris orientalis* (Prikhodko) - Ivanova, pl. 3, fig. 5.
v. 1974b *Goksuella*? sp. - Vachard, p. 183, pl. 8, figs. 1, 3.
? 1975 *Earlandia*? *vulgaris* subsp. *orientalis* - Mikhno and Balakin, p. 23, pl. 1, figs. 7-8.
v. 1977a "*Beresella*" *praecursor* Vachard - Vachard, p. 374, tabl. 1 (no illlustration; nomen nudum).
v. 1977b *Beresella praecursor* n. sp. Vachard, p. 136, pl. 1, fig. 10 (with 2 references in synonymy).
1977 *Earlandia*? *orientalis* (Prikhodko) - Vdovenko, pl. 5. 63, figs. 5-6.
1985 *Earlandia*? *orientalis* (Prikhodko) - Ross and Ross, text-fig. 1 p. 195.
1989b *Magnitella orientalis* (Prikhodko? in Brazhnikova et al.) n. comb. (= *Beresella praecursor* Vachard) - Vachard, pl. 3, fig. 23.
1989 *Earlandia*? *vulgaris* (Prikhodko) - Spasov and Vdovenko, pl. 1, fig. 2.
? 1997 "*Syzrania*" sp. - Altiner and Savini, p. 14, pl. 3, fig. 8-10.
2003 indeterminate organism - Brenckle and Milkina, pl. 4, fig. 5.
2005 *Earlandia*? *orientalis* (Prikhodko) - Orlov-Labkovsky, p. 23 (no illustration).

Description. Length = 0.470-2.500 mm; outer diameter = 0.200-0.375 mm; inner diameter = 0.060-0.200 mm; thickness of wall = 0.065-0.110 (0.170) mm.

Remarks. It differs from *M. porosa* or *M. orientalis* (Prikhodko?) in Brazhnikova et al., 1967, which seems to be a nomen nudum, by a larger length and a thicker wall. However, further studies can prove the synonymy of the three taxa.

Occurrence. MFZ12 = Cf5 of Sumatra. Middle-late Viséan of Uzbekistan. Late Viséan (C_1^vd-$C_1^v f_2$) Donbass (erroneously indicated as Cf4 (= MFZ7-9) by Ross and Ross, 1985). Tulsky-Protvinsky (Shcherbakova and Shcherbakov, 2002, p. 312) of Southern Urals. Late Viséan of Kazakhstan. Questionable in the early late Moscovian ("Atokan") of Brazil. Brigantian of Tien-Shan. Latest Asbian- Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293A, DV293C, DV293F, DV293H, DV 293I, DV293.2A); sommet 224-Valuzières (DV600C); Castelsec (MA10.12); Roquemaillère (DV140A); Vailhan-Château (DV246A, DV246F); Saint Rome (DV132C); Roc de Murviel (MA83, MA330.1, MA330.5). Only one specimen (eventually reworked) in the early Serpukhovian of Montagne Noire: La Serre (ML1054).

7.5. Pseudoammodiscoids

Superfamily Pseudoammodiscoidea Conil and Lys, 1970
nomen translat. Vdovenko et al., 1993 (ex family) orth. mut. herein
Family Pseudoammodiscidae Conil and Lys in Conil and Pirlet, 1970

Remarks. Because of the multiple descendents of pseudoammodiscids: tournayellids, archaediscids, lasiodiscids, they are considered at least as a superfamily. Their homeomorphs among the miliolins or textulariins are fundamentally different, hence, the classifications of Mikhailevich (1998) and Pronina (1994) must be completely revised.

Genus *Pseudoammodiscus* Conil and Lys in Conil and Pirlet, 1970
Type species. *Ammodiscus priscus* Rauzer-Chernousova, 1948f.

Synonyms. *Cornuspira* Schultze, 1854 (auctorum, pars), *Ammodiscus* Reuss, 1862 (pars), *Eotournayella* Lipina and Pronina, 1964 (pars?), *Tournayella* Dain, 1953 (pars).

Diagnosis. Test small, planispirally coiled, evolute and undivided. Wall microgranular. Simple terminal aperture.

Remarks. In many recent analyses, Pennsylvanian "*Pseudoammodiscus*" are must probably *Cornuspira* (see in particular Groves and Boardman, 1999). Inversely, Mississippian *Cornuspira* migth belong to *Pseudoammodiscus*. (e. g., Skipp, 1969, p. 195, pl. 24, fig. 4). The replacement of two genera probably took place during the Bashkirian, where ambar well preserved tests can be observed (D. Vachard pers. comm., 2005).

Occurrence. Late Devonian? (depending of the status of *Eotournayella*); Early Mississippian-Early Pennsylvanian, cosmopolite.

Pseudoammodiscus ex gr. *priscus* (Rauzer-Chernousova, 1948f)
Pl. 40, figs. 1-11, 13-14.

1948f *Ammodiscus priscus* n. sp. Rauzer-Chernousova, p. 227-228, pl. 15, figs. 2-3.
1967 *Ammodiscus* sp. - Conil and Paproth, pl. 4, fig. 4.
1972 *Ammodiscus priscus* Rauzer-Chernousova - Malakhova, p. 38, pl. 1, fig. 15-18, 22.
1973 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Browne and Pohl, pl. 27, figs. 4-5 (refigured type material).
v. 1974b *Pseudoammodiscus priscus (*Rauzer-Chernousova) - Vachard, p. 232-233, pl. 10, fig. 17 (with synonymy).
v. 1974b *Pseudoammodiscus* sp. - Vachard, p. 233, fig. 13-14.
1975 *Ammodiscus*? *priscus* Rauzer-Chernousova - Mikhno and Balakin, p. 9 (no illustration).
1975a *Ammodiscus priscus* Rauzer-Chernousova - Malakhova, p. 15, pl. 4, figs. 10-13.
1979 *Ammodiscus* sp. 2 - Mansourian, p. 50, pl. 1, fig. 12.
1980 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Rich, p. 44, pl. 20, figs. 7-9 (with synonymy).
? 1981 *Pseudoammodiscus* aff. *buskensis* Brazhnikova (sic without brackets) - Strank, pl. 5, fig. 1.
1982 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Rich, pl. 6, figs. 25-26.
1987 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Loeblich and Tappan, pl. 214, figs. 5-6.
1991 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Sánchez et al., p. 113, pl. 1, fig. 8.
1991 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Marfenkova, pl. 2, figs. 5-6.
1993 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Makhlina et al., pl. 4, fig. 13.
1993 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Vdovenko et al., p. 54, pl. 10, figs. 1-2.
1995 *Pseudoammodiscus* cf. *P. priscus* (Rauzer-Chernousova) - Hoare and Skipp, p. 618, fig. 3-14.
1996 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Marfenkova in Einor, pl. 41, fig. 6.
1997 *Pseudoammodiscus priscus (*Rauzer-Chernousova) - Harris et al., fig. 8. 18.
v. 1997 *Pseudoammodiscus priscus (*Rauzer-Chernousova) - Caridroit et al., pl. 2, figs. 9-10.
1999a *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Cózar and Rodríguez, text-fig. 5 (pars).
2000b *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Cózar and Rodríguez, p. 94, pl. 1, figs. 7-8.
2001 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Vdovenko, tabl. 1 p. 168, pl. 2, figs. 1-2.
2001 *Pseudoammodiscus*? sp. aff. *priscus* (Rauzer-Chernousova) - Vdovenko, pl. 28, figs. 24-28.
2003 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Cózar, pl. 2, fig. 4.
2004 *Pseudoammodiscus priscus* (Rauzer-Chernousova) - Brenckle, pl. 3, figs. 19, 34-36.

Description. Diameter (D) = 0.240-0.300 mm; width (w) = 0.045-0.050 mm; ratio w/D = 0.17-0.19; proloculus diameter = 0.030-0.050 mm; number of whorls: 3-3.5; height of the last whorl = 0.050 mm; thickness of wall at the last whorl = 0.004-0.008 mm.

Occurrence. Tournaisian of Turkey. Middle-early late Viséan of Moscow Basin, Urals and Uzbekistan. Early Viséan of Kazakhstan. Late Holkerian-late Serpukhovian of Southwestern Spain and ?England.. V1b-V2a, V3c of Germany. Late Viséan of Donets Basin ($C_1^{v}f_2$-$C_1^{v}g$). Brigantian-early Serpukhovian of Monteagle and Bangor Fm. (USA). Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV332A); Roc du Cayla (DV82C, DV465A); Roquemaillère (DV137D); Roque Redonde (RR53); Les Boutinelles (MA.BOU25.3, MA.BOU25.14); Jeantels (DV690); Les Mentaresses (DV328'C, DV329D); Roc de Murviel (?MA24, MA49, MA72).

Pseudoammodiscus volgensis (Rauzer-Chernousova, 1948g)
Pl. 40, fig. 12.

1948g *Ammodiscus volgensis* n. sp. Rauzer-Chernousova, p. 240-241, pl. 17, figs. 7-8.
1956 *Ammodiscus volgensis* Rauzer-Chernousova - Brazhnikova, p. 21-22, pl. 1, figs. 10-11, 16.
1967 *Ammodiscus* sp. - Eickhoff, pl. 2, figs. 10-11.
1972 *Ammodiscus* aff. *volgensis* Rauzer-Chernousova - Malakhova, pl. 1, fig. 23.
1972 *Pseudoammodiscus* sp. - Bertrand, pl. 3, fig. 6.
1973 *Cornuspira volgensis* (Rauzer-Chernousova) - Ivanova, pl. 2, fig. 11, pl. 9, fig. 4, pl. 19, fig. 5, pl. 31, fig. 10.
1975 *Ammodiscus volgensis* Rauzer-Chernousova - Mikhno and Balakin, p. 28, pl. 2, figs. 16-17.
1977 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Armstrong and Mamet, p. 28, pl. 26, figs. 26-27 (with synonymy).
v. 1977 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Vachard et al., pl. 2, fig. 8.
1977 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Vdovenko, pl. 53, figs. 10-14.
1980 *Pseudoammodicus volgensis* (Rauzer-Chernousova) - Rich, p. 44, pl. 20, figs. 10-11, 12? (with synonymy).
1980 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Conil et al., pl. 14, fig. 8, pl. 24, fig. 12.
p. 1980 *Loeblichia ammonoides* Brady - Skompski and Sobon-Podgorska, pl. 1, fig. 3 (non pl. 4, fig. 4-5 = true *Loeblichia*).
1981 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Altiner, p. 177-178, pl. 2, figs. 24-25 (with synonymy).
non 1981 *Pseudoammodiscus* aff. *volgensis* (Rauzer-Chernousova) - Strank, pl. 12, fig. 9, pl. 14, fig. 6 (another species of *Pseudoammodiscus*).
1983 *Pseudoammodicus volgensis* (Rauzer-Chernousova) - Aizenverg et al., p. 10 (no illustration).
1987 *Pseudoammodicus volgensis* (Rauzer-Chernousova) - Ouarache, p. 42, text-fig. 16.
? 1989 *Pseudoammodicus* aff. *volgensis* (Rauzer-Chernousova) - Fewtrell et al., p. 55, pl. 3. 8, fig. 10 (not characteristic transverse section).
1991 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Sánchez et al., p. 113, pl. 1, figs. 5-7.
1991 *Pseudoammodicus volgensis* (Rauzer-Chernousova) - Ouarache et al., pl. 1, fig. 12.
v.1991 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Vachard and Tahiri, pl. 1, fig. 10.
v. 1992 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Vachard and Berkhli, pl. 1, fig. 12, pl. 3, fig. 5.
1993 *Pseudoammodiscus* cf. *volgensis* (Rauzer-Chernousova) - Ueno and Nakazawa, p. 11, fig. 3. 22-24 (with 14 references in synonymy).
1993 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Makhlina et al., p. 152, pl. 4, figs. 17-18.
non 1993 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Mamet et al., pl. 1, figs. 5-7.
v.1993b *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Vachard et al., pl. 3, fig. 15.
?1996 *Eolasiodiscus maximus* (Potievskaya) - Leven and Okay, pl. 1, fig. 9.
1997 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Harris et al., fig. 8. 19.
?1997 *Pseudoammodiscus* ex gr. *volgensis* (Rauzer-Chernousova) - Mazuno and Ueno, tabl. 2, pl. 2, figs. 7-9.
1998 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Gallagher, pl. 2, fig. 11.
v. 1999 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Berkhli, p. 110, 113 (no illustration).
v. 1999 *Pseudoammodiscus volgensis* (Rauser) - Fontaine et al., p. 464 (no illustration).
v. 1999 *Pseudoammodiscus volgensis* (Rauser) - Berkhli, p. 103 (no illustration).
2000b *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Cózar and Rodríguez, p. 95, pl. 1, fig. 12.
2001 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Vdovenko, tabl. 1 p. 168, pl. 2, figs. 6-8.
2001 *Pseudoammodiscus*? aff. *volgensis* (Rauzer-Chernousova) - Vdovenko, pl. 28, figs. 15-16, 18-20.
2002 *Ammodiscus volgensis* Rauzer-Chernousova - Sergeeva, p. 269 (no illustration).
v. 2002b *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Berkhli et al., p. 138 (no illustration).
2004 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Brenckle, pl. 3, fig. 37.
v. 2005 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Saïd, p. 177, p. 178, p. 182, p. 186, p. 189 (no illustration).
2005 *Pseudoammodiscus volgensis* (Rauzer-Chernousova) - Orlov-Labkovsky, p. 23, 25, 26 (no illustration).
?2006 "*Pseudoammodiscus*" spp. - Gallagher et al., fig. 14. 27-31 (or "*Rectocornuspira*").

Description. Test relatively large for the genus, regularly discoidal and biumbilicate, with a regular growth in height and wide of the tubular chamber. Diameter (D) = 0.260-0.540 mm; width (w) = 0.075-0.125 mm; ratio w/D = 0.23-0.34; proloculus diameter = 0.030-0.050 mm; number of whorls: 3-5; height of the last whorl = 0.075-0.100 mm; thickness of wall at the last whorl = 0.008-0.012 mm.

Occurrence. Late Viséan (Mikhailovsky and Venevsky)-Serpukhovian (Stechevsky and Protvinsky) of Moscow Basin, Donets Basin ($C_1^{v}e_2$-$C_1^{s}a$) and Urals, late Viséan of Morocco (FAD: late Asbian or early Brigantian of Tizra Formation, Berkhli, 1999, p. 110), early Asbian of Libya, Tennessee/Georgia/Alabama, Alaska, Ireland, Poland and Uzbekistan. ?Late Asbian of England. "V3c" of Turkey (Eastern Taurus). Late Viséan of Kazakhstan, Tien-Shan, Thailand, central Japan and Tarim (North China). Late Viséan-late Serpukhovian of Southwestern Spain. Late Asbian of Monteagle Limestone (USA). Serpukhovian-earliest Bashkirian of Hina Group (Japan). Specimens of Bashkirian from Alaska are misinterpreted.

Genus *Pseudoglomospira* Bykova in Bykova and Polenova, 1955

Type species. *Pseudoglomospira devonica* Bykova in Bykova and Polenova, 1955.

Synonyms. *Glomospira* Rzehak, 1885 (pars), *Glomospira*? (pars), *Hemigordiellina* Marie in Deleau and Marie, 1961 emend. Vachard and Beckary, 1991 (pars), *Brunsia* Mikhailov, 1935 (pars), *Warnantella* Conil and Lys in Conil, Groessens and Lys, 1977a (pars) (see Vachard and Beckary, 1991).

Diagnosis. Test small, streptospirally coiled and undivided. Wall microgranular. Simple terminal aperture.

Remarks. The status of *Pseudoglomospira* was revised by Vachard in Vachard and Beckary (1991): (a) it is not unquestionable that the Devonian generotype is truly a foraminifer and not an incertae sedis reitlingerellid; (b) the abundant populations of the Moliniacian are in fact incomplete *Brunsia*; (c) the abundant populations of the Serpukhovian (*P. elegans* auctorum, *P. subquadrata*, etc.) are composed of a genus poorly understood and denominated: *Glomospira, Warnantella, Pseudoglomospira*, etc.; (d) the Pennsylvanian-Permian forms are Porcelaneous and compose another genus, perhaps *Hemigordiellina* already described or a genus to create; (e) the Triassic forms are difficult to interpretate, but already distinguished as *Hoella, Pilamminna, Pilamminella*, etc. In many publications, the Pennsylvanian "*Pseudoglomospira*" belong most probably to *Hemigordiellina* (see in particular Vachard and Beckary, 1991). As for *Pseudoammodiscus* and *Cornuspira/Ammodiscus*, the limit between *Pseudoglomospira* and *Hemigordiellina/"Glomospira*", is very difficult to establish morphologically, but it is important because it corresponds to the passage of the order Fusulinida to the order Miliolida. This phylogenetic event is more or less coeval with the Viséan/Serpukhovian boundary. Independently of these relations, the modification can concern also the groups Pseudolituotubidae (for instance *Scalebrina*) and Calcivertellidae (*Calcitornella*?, here) (see below, the chapter Miliolida). *Warnantella* Conil and Lys in Conil et al., 1977 can correspond to *Pseudoglomospira* and or *Calcitornella*, depending on the exact composition of its wall.

Occurrence. Late Devonian-late Permian, cosmopolite.

Pseudoglomospira gordialiformis Rich, 1980

Pl. 40, fig.15.

1948g *Glomospira gordialis irregularis* var. nov. (sic) Rauzer-Chernousova, p. 240, pl. 17, figs. 5-6.

1956 a *Glomospira gordialis* Jones et Parker (sic, without parentheses) var. *irregularis* Rauser - Malakhova, p. 37, pl. 1, fig. 3.

? p. 1962 *Glomospira gordialis* (Jones and Parker) - Bogush and Juferev, p. 102, pl. 2 , fig. 3 (the Famennian specimens excepted).

non 1962 *Glomospira irregularis* Rauser - Bogush and Juferev, p. 102-103, pl. 2 , fig. 4 (a « *Tolypammina* » auct.).

1972 *Glomospira gordialis* Jon. et Park. (sic, without parentheses) var. *irregularis* Rauser - Malakhova, p. 37, pl. 1, fig. 7.

1973 *Glomospira gordialis irregularis* Rauser - Ivanova, pl. 22, figs. 6-7, pl. 29, figs. 7-8, pl. 32, fig. 4.
1973 *Glomospira gordialis* (Jones et Parker) var. *irregularis* Rauser - Popova and Reitlinger in Einor, p. 48, pl. 5, figs. 2-3, 5.
v. 1974b *Pseudoglomospira glomerosa* (Malakhova) - Vachard, p. 233, pl. 10, fig. 23 (with synonymy).
1980 *Pseudoglomospira gordialiformis* n. sp. Rich, p. 45, pl. 21, figs. 4-8.
1980 *Pseudoglomospira irregularis* (Rauzer-Chernousova) - Rich, p. 45-46, pl. 21, figs. 9-16, 18-19.
?1984 *Pseudoglomospira irregularis* (Rauzer-Chernousova) - Groves, text-fig. 6 p. 287, text-fig. 7 p. 289, pl. 1, figs. 8-14.
1988 *Pseudoglomospira gordialis irregularis* (Rauzer-Chernousova) - Kulagina, pl. 4, fig. 2.
1988 *Pseudoglomospira gordialis irregularis* (Rauzer-Chernousova) - Kulagina and Pazukhin, p. 41 (no illustration).
1993 *Pseudoglomospira irregularis* (Rauzer-Chernousova) - Mamet et al., pl. 1, figs. 16-17, pl. 16, figs. 1-4.
1997 *Pseudoglomospira* ex gr. *irregularis* (Rauzer-Chernousova) - Mazuno and Ueno, tabl. 2 (no illustration).
?2006 *Pseudoglomospira* spp. - Groves and Beason, pl. 1, fig. 10-13.

Description. Height = 0.250 mm; width = 0.150 mm; proloculus diameter = 0.050 mm; number of whorls: 5 or 6; height of last whorl = 0.030 mm; wall thickhness of the last whorl = 0.010 mm.

Remarks. This unique specimen of my material differs from *P. glomerosa* (which is probably a teratogenic or neotenic *Brunsia*) in all the smaller parameters, and seems to be more similar to *Glomospira gordialis* var. *irregularis* Rauzer-Chernousova, 1948g. I consider this taxon as a synonym of *Pseudoglomospira gordialiformis* Rich, 1980, which has priority, although junior synonymy, because the name "*irregularis*" is preoccupied by *Glomospira irregularis* Mikhailov, 1939 and by *Glomospira irregularis* Brazhnikova and Potievskaya, 1948.

Occurrence. Venevsky of Moscow Basin. Venevsky-Protvinsky (Gusikhinsky-Ust-grekovsky) of Urals, Monteagle, Bangor and Pennington Limestones (USA). ? Pella Fn. (Iowa). Late Serpukhovian of Alaska. Earliest Bashkirian (Bogdanovsky of Urals). Serpukhovian-earliest Bashkirian of Hina Group of Japan. ?Earliest Atokan of Idaho. Latest Brigantian of Montagne Noire: Colline 199 (Hill 199) (DV142A).

Pseudoglomospira ex gr. *subquadrata* (Potievskaya and Vakarchuk in Brazhnikova et al., 1967)

Pl. 40, figs. 16-23.

1967 *Glomospira subquadrata* n. sp. Potievskaya and Vakarchuk, p. 139-140, pl. 19, fig. 5, pl. 20, fig. 1, pl. 51, figs. 4-6.
1968 *Glomospira* sp. - Aizenverg et al., pl. 17, figs. 21-23.
1973 *Glomospira* aff. *G. subquadrata* Potievskaya and Vakarchuk - Popova and Reitlinger, p. 48, pl. 5, fig. 1.
v. 1973b *Pseudoglomospira subquadrata* (Potievskaya and Vakarchuk) - Perret, p. 295, pl. 1, figs. 15-22.
1973 *Glomospira subquadrata* Potievskaya and Vakarchuk - Popova and Reitlinger in Einor, p. 48, tabl. 2 p. 58, pl. 5, fig. 1.
1976 *Glomospia subquadrata* Potievskaya and Vakarchuk - Lys, p. 380, 381 (no illustration).
v. 1977 *Warnantella subquadrata* (Potievskaya and Vakarchuk) - Perret and Vachard, p. 90 (no illustration).
1977 *Glomospira subquadrata* Potievskaya and Vakarchuk - Fomina, pl. 4, fig. 8.
1978 *Glomospira subquadrata* Potievskaya and Vakarchuk - Lys et al., pl. 2, fig. 7.
1979 *Pseudoglomospira subquadrata* (Potievskaya and Vakarchuk) - Wagner et al., pl. 5, fig. 13.
?1980 *Warnantella* cf. *subquadrata* (Potievskaya and Vakarchuk) - Conil et al., pl. 4, fig. 6.
1980 *Warnantella* sp. - Conil et al., pl. 4, fig. 7.
1980 *Glomospira subquadrata* Potievskaya and Vakarchuk - Malakhova, pl. 2, fig. 5.
1981 *Pseudoglomospira subquadrata* (Potievskaya and Vakarchuk) - Altiner, pl. 2, figs. 32-33.
1983 *Pseudoglomospira subquadrata* (Potievskaya and Vakarchuk) - Aizenverg et al., p. 10-11, pl. 1, figs. 23, 27.
1985 *Glomospira subquadrata* Potievskaya and Vakarchuk - Lys, pl. 1, fig. 12, pl. 2, fig. 1.
non 1985 *Glomospira subquadrata* Potievskaya and Vakarchuk - Lin, p. 45, pl./figs. 6-8 (an attached form).
1987 *Glomospira subquadrata* Potievskaya and Vakarchuk - Luo, pl. 1, figs. 13, 19.
? 1987 *Glomospira subquadrata* Potievskaya and Vakarchuk - Liao et al., pl. 3, fig. 12.

1988 *Pseudoglomospira subquadrata* (Potievskaya and Vakarchuk) - Kulagina, pl. 2, fig. 1.
1988 *Pseudoglomospira subguadrata* (sic) (Pot. et Vak.) - Kulagina and Pazukhin, p. 42 (no illustration).
1988b *Pseudoglomospira subquadrata* (Potievskaya and Vakarchuk) - Ivanova, pl. 1, fig. 2.
1989 *Warnantella subquadrata* (Potievskaya and Vakarchuk) - Fewtrell et al., p. 64, pl. 3. 12, figs. 11-12.
1989 *Pseudoglomospira subquadrata* (Potievskaya and Vakarchuk) - Sebbar and Lys, pl. 1, fig. 8.
v. 1989 *Warnantella* - Vachard and Beckary, pl. 1, fig. 4.
? 1990 *Glomospira subquadrata* Potievskaya and Vakarchuk - Postoyalko, pl. 1, figs. 9-10.
v. 1991 *Hemigordiellina subquadrata* (Potievskaya and Vakarchuk) - Vachard and Beckary, p. 334-335, pl. 4, figs. 25-27 (with 26 references in synonymy).
?1991 *Pseudoglomospira* sp. (Potievskaya and Vakarchuk) - Gibshman and Akhmetshina, pl. 1, fig. 3.
1992 *Pseudoglomospira* sp. - Matsusue, text-fig. 2 p. 383, fig. 3. 23.
1992 *Glomospira* sp. - Kulagina et al., pl. 9, fig. 24.
v. 1993 *Pseudoglomospira subquadrata* (Potievskaya and Vakarchuk) - Perret, pl. F.VI, figs. 1-50, pl. F.XI, fig. 22.
? 1995 *Glomospira subquadrata* Potievskaya and Vakarchuk - Pajic and Filipovic, pl. 29, fig. 3-4, pl. 32, figs. 1-2, pl. 37, fig. 2 (probably *Palaeonubecularia*).
? 1997 *Pseudoglomospira elegans* (Lipina) - Ueno and Igo, pl. 1, fig. 10.
? 1997 *Pseudoglomospira subquadrata* (Potievskaya and Vakarchuk) - Altiner and Savini, p. 435, pl. 4, figs. 32-33.
? 1997 *Pseudoglomospira* ex gr. *elegans* (Lipina) - Mazuno and Ueno, tabl. 2, pl. 3, figs. 9-11.
2002 *Glomospira subquadrata* (Pot. et Wak.) (sic) - Shcherbakova and Shcherbakov, p. 312 (no illustration).
? v. p. 2003 *Pseudoglomospira* sp. - Fontaine et al., pl. 8, fig. 4 (non pl. 9, fig. 11 = ?*Calcitornella*?).
?2003 *Pseudoglomospira* sp. - Brenckle and Milkina, pl. 6, fig. 10.
?2005 *Pseudoglomospira elegans* (Lipina) - Orlov-Labkovsky, p. 23, 26 (no illustration).

Description. Height = 0.200-0.390 mm; proloculus diameter = 0.022-0.024 mm; numbers of whorls: 4-5; height of last whorl = 0.015-0.060 mm; wall thickhness of the last whorl = 0.020-0.024 mm.

Remarks. I agree with Altiner and Savini (1997) and consider the wall of this species as microgranular; consequently it belongs to *Pseudoglomospira*.

Occurrence. Serpukhovian-early Bashkirian of Donets Basin ($C_1^ne_1$-C_2^ba). Protvinsky-Bashkirian of Southern Urals. Late Serpukhovian of England. Late Serpukhovian-earliest Bashkirian of Algeria (Bechar Basin, Djenien Formation). ?Earliest Serpukhovian-early late Serpukhovian of Tien-Shan. ?Serpukhovian of Kazakhstan, Malaysia, Thailand (Chiang Dao), South China. Late Serpukhovian of Hina Group of Japan. Early Bashkirian of Northern Spain. Bashkirian R2 of Northern France. Earliest Bashkirian (H) to late Bashkirian (G2) in Turkey (Eastern Taurus). Earliest Bashkirian in nortern Iran (Eastern Alborz). Akiyoshi Group of Japan. Late Serpukhovian of Ardengost area: Areng (MFP.AH4, MFP.AH8, MFP.AH11, MFP.AH21, MFP.AH22), Bois de Gertous (MFP.GER5, MFP.GER11-12) (Perret, 1973b); MailC, Mail1, Mail3, Mail7, Mail8, Mail11, Mail11', Mail14, Mail15, Mail16, Mail17, Mal17', Mail18, Mail21bis, Mail22, Mail30, Cas15, Cas15bis, Cas25, Cas25b, Cas25d, Cas45, AH1 (Perret, 1993); MFP.Mar19, MFP.AH2, AH20E, MFP.CAS15 (this study). Bashkirian of Pyrenees.

Pseudoglomospira spp.

Remarks. My material of Ardengost might contain representatives of *Pseudoglomospira elegans* (Lipina) sensu Rumyantseva, 1970; Rich, 1980; Aizenverg et al., 1983; Adachi, 1985, Kulagina, 1988; *P. gordialiformis* Rich, 1980 (= Latest Viséan/Serpukhovian *P. gordialis* auctorum); *P. irregularis* (Rauzer-Chernousova) emend. Rich, 1980; *P. prisca* (Rauzer-Chernousova) sensu Kulagina, 1988 (pl. 3, fig. 5); *P. postserenae* Brazhnikova in Aizenverg et al. (1983, pl. 1, figs. 28-29); *Glomospira karzhantavica* Rumyantseva, 1970 (pl. 1, figs. 24-25); and *Warnantella* auct.

Occurrence. Late Serpukhovian of Ardengost area: MFP.Mar19, MFP.AH20'F, AH.B/81.6, AH.B/81.9, MFP.CAS14.3, CAS15bis.

Genus *Brunsia* Mikhailov, 1935

Type species. *Spirillina irregularis* von Moeller, 1879.

Diagnosis. Test discoidal. Proloculus followed by a undivided tube, streptospirally coiled in the early stage, prominent or not, and aligned to planispiral in adult stage. Simple terminal aperture. Wall microgranular.

Remarks. Only one population is known in Montage Noire. As it is only represented in the first assemblage, SF1, they can correspond to the LAD of *Brunsia*, i.e. top of MFZ14 = Cf6γ (see also *Brunsia jactata* (Conil and Lys) of Fewtrell et al., 1989, pl. 3. 8, fig. 14, *B.* sp. and *B. pulchra* Mikhailov of Dil, 1977, pl. 7, fig. 106, and *B. irregularis* (Rauzer-Chernousova) (sic) of Cózar et al., 2004: fig. 3. 4) but an early Brigantian (Cózar and Somerville, 2004, figs. 7, 9), or even early Serpukhovian range is possible according to Skipp and Mamet (1970, p. B121), Mamet et al. (1981, p. 29) and Mamet (1974a, p. 395) and Reitlinger (1975, text-fig. 2 p. 11). *Brunsia* still exists in the Spirale zone of goniatites in Germany (Conil and Paproth, 1983, tabl. 1 p. 34). Since the Bashkirian, *Brunsia* is replaced by a Porcelaneous homeomorph *Brunsiella* Reitlinger, 1950 which is the direct ancestor of *Hemigordius*, common during the late Pennsylvanian and the Permian (e. g., Vachard and Krainer 2001a-b; Altiner et al., 2003).

Occurrence. Late Ivorian (top Cf2 = top MFZ5)-Viséan, Palaeotethys (until to South China, Hance, 1996 and Sumatra, Fontaine and Vachard, 1981), Urals, Southeastern Canada, Alberta (Petryk et al., 1970), Idaho (Skipp and Mamet, 1970; Mamet et al., 1971; Sando et al., 1976), Alaska (Harris et al., 1997, fig. 8. 17).

Brunsia spirillinoides (Grozdilova and Glebovskaya, 1948)

Pl. 40, figs. 25-29.

? 1931 *Ammodiscus* - Derville, text-fig. 17 p. 119.
1948 *Glomospira spirillinoides* n. sp. Grozdilova and Glebovskaya, p. 147-148, pl. 1, figs. 2-4.
1963 *Glomospirella spirillinoides* (Grozdilova and Glebovskaya) - Conil, pl. 1, fig. 12.
1964 *Glomospirella spirillinoides* (Grozdilova and Glebovskaya) - Conil and Lys, p. 65, pl. 8, figs. 145-149.
1964 *Glomospirella spirillinoides* var. *longa* nov. var. Conil and Lys, p. 66, pl. 8, fig. 150.
1967 *Glomospirella spirillinoides* (Grozdilova and Glebovskaya) - Conil and Paproth, p. 62, 65, 72 (no illustration).
1973 *Brunsia spirillinoides* (Grozdilova and Glebovskaya) - Bozorgnia, p. 100-101, pl. 7, fig. 10 (with synonymy).
v. 1974b *Brunsia spirillinoides* (Grozdilova and Glebovskaya) - Vachard, p. 230-231, pl. 11, fig. 2 (with synonymy).
1975a *Brunsia spirillinoides* (Grozdilova and Glebovskaya) - Malakhova, p. 15, pl. 4, fig. 9.
v. 1977b *Brunsia spirillinoides* (Grozdilova and Glebovskaya) - Vachard, p. 138, pl. 2, fig. 4.
1978 *Brunsia spirillinoides* (Grozdilova and Glebovskaya) - Lin, p. 12, pl. 1, figs. 11-12.
1979 *Brunsia spirillinoides* (Grozdilova and Glebovskaya) - Mansourian, p. 53-54, pl. 2, figs. 29-32 (with synonymy: 3 references).
1981 *Brunsia spirillinoides* (Grozdilova and Glebovskaya) - Strank, pl. 6, fig. 22, pl. 7, fig. 24.
1982 *Brunsia spirillinoides* (Grozdilova and Glebovskaya) - Fontaine and Vachard, p. 191, 193, 194 (no illustration).
1989 *Brunsia spirillinoides* (Grozdilova and Glebovskaia) - Fewtrell et al., pl. 3. 1, fig. 11.
1989 *Brunsia* cf. *spirillinoides* (Grozdilova and Glebovskaia) - Davies et al., text-fig. 8 p. 39.
?1997 *Brunsia irregularis* (Möller) - Ueno and Igo, pl. 1, figs. 1-3.

Description. Test entirely discoidal, biconcave, without central hump and with evolute last whorls. Diameter = 0.420-0.630 mm; width = 0.110-0.150 mm; w/D = 0.23-0.26; whorl number: 7-8; proloculus diameter = 0.020 mm; height of last whorl = 0.037-0.085 mm; wall thickness in last whorl = 0.010-0.022 mm.

Occurrence. Late Tournaisian-Viséan: Russia (Moscow Basin, Urals, Timan; the type material is "early middle Viséan" in age), Belgium (V2a-V3a), England, Denmark, Germany , Poland, Southern France, Kazakhstan, Donets Basin (Ukraine), Bulgaria, Turkey, Tien-shan, Iran (V1b of central Alborz), South China, ?Thailand and Laos. Latest Asbian of Montagne Noire: Lenses of the road, near Roquessels (DV293A, DV293C, DV293.2B) and sommet 224-Valuzières (?DV600A).

7.6. Archaediscoids

?Suborder Archaediscina Haynes, 1981

Superfamily Archaediscoidea Cushman, 1928a nomen translat. Piller, 1978 (ex subfamily)

Diagnosis. Test free, discoidal to inflated lenticular. Proloculus followed by enrolled undivided tubular chamber. Wall bilayered or monolayered, evolving from an outer dark dominant wall with a subalternative hyaline layer (Planoarchaediscidae), to a hyaline layer dominant (Archaediscidae) and finally only present (Eosigmoilinidae) (see Conil and Pirlet, 1974 in Pirlet and Conil, 1974; Brenckle et al., 1987; and Vachard, 1988a).

Occurrence. Second biozone of early Viséan (MFZ10 = Cf4β)-earliest Moscovian (early Vereisky: e.g., Vilesov, 2002).

Family Ammarchaediscidae Conil and Pirlet in Pirlet and Conil, 1974 nomen translat. Vachard in Vachard et al., 2003b (ex subfamily)

Diagnosis. Archaediscoidea with a microgranular black wall dominant upon an inner hyaline (Ammarchaediscinae = Planoarchaediscinae), pseudofibrous and yellow outer layer, or remaining important (Uralodiscinae). Test entirely involute, oscillant, sygmoidal to planispiral.

Composition. Two subfamilies: Ammarchaediscinae Conil and Pirlet in Pirlet and Conil, 1974 emend. Vachard in Vachard et al., 2003b (dark layer predominant, faint yellow layer limited to the flanks, composed of *Ammarchaediscus* and *Planoarchaediscus*; see below) and Uralodiscinae Vachard in Vachard et al., 2003b (including *Glomodiscus* Malakhova, 1975b and *Uralodiscus* Malakhova, 1975b; i. e. composed of Ammarchaediscidae with a developed yellow layer, but with important dark layer).

Occurrence. Viséan (from the MFZ10 = Cf4β)-Serpukhovian, probably cosmopolite.

Genus *Planoarchaediscus* Miklukho-Maklay, 1956

Type species. *Archaediscus spirillinoides* Rauzer-Chernousova, 1948h.

Diagnosis. Test undivided, initially streptospirally coiled, after aligned to planspiral, involute to semi-evolute. Inner mirogranular wall well developed, outer pseudo-fibrous, yellow layer relatively discrete and limited to the umbilical areas. Simple terminal aperture.

Remarks. The characters of *Brunsiarchaediscus* Conil and Pirlet in Pirlet and Conil, 1974 and *Nudarchaediscus* Conil and Pirlet in Pirlet and Conil, 1974 seem to be only specific.

Ammarchaediscus Conil and Pirlet in Pirlet and Conil, 1974 = *Viseidiscus* Mamet, 1975 differs in a complete planispiral coiling.

Occurrence. Late early Viséan (Cf4β = MFZ10)-Serpukhovian, probably cosmopolite.

Planoarchaediscus spirillinoides (Rauzer-Chernoussova, 1948h)
Pl. 41, figs. 1-5.

1948 *Archaediscus spirillinoides* Rauser msc. (sic) - Chernysheva, p. 153, pl. 2, figs. 7-8.
1948h *Archaediscus spirillinoides* n. sp. Rauzer-Chernoussova, p. 12, pl. 3, figs. 7-9.
1953 *Archaediscus spirillinoides* Rauzer-Chernousova - Grozdilova, p. 110, pl. 4, figs. 16-18.
1956 *Archaediscus spirillinoides* Rauzer-Chernoussova - Brazhnikova, p. 65-66, pl. 13, fig. 16.
1956 *Archaediscus* ex gr. *spirillinoides* Rauzer-Chernoussova - Reitlinger, pl. 1, fig. 10.
1960 *Planoarchaediscus spirillinoides* (Rauzer-Chernousova) - Grozdilova and Lebedeva, p. 95-96, pl. 11, figs. 7-8.
1963 *Planoarchaediscus spirillinoides* (Rauzer-Chernousova) - Conil and Pirlet, pl. 2, fig. 28.
1964 *Planoarchaediscus spirillinoides* (Rauzer-Chernousova) - Conil and Lys, p. 133, pl. 20, figs. 399-400.
v. 1974b *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) -Vachard, p. 341-342, pl. 24, figs. 10-12 (with synonymy).
1967 *Propermodiscus liebusi* n. sp. - Conil and Paproth, p. 74 (no illustration; nomen nudum).
1967 *Propermodiscus liebusi* n. sp. Conil and Lys in Conil and Paproth, p. 90-91, pl. 6, fig. 24.
1967 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Conil and Paproth, p. 74, 76 (no illustration).
1975 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Mikhno and Balakin, p. 53, pl. 17, figs. 20-21.
1975 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Grozdilova et al., p. 63, pl. 14, fig. 18.
v. 1977b *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) -Vachard, p. 159, pl. 7, fig. 4.
1979 *Paraarchaediscus* sp. 1 aff. *liebusi* (Conil and Lys) - Mansourian, p. 76, pl. 8, fig. 109.
1980 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Skompski and Sobon-Podgorska, pl. 1, fig. 2.
1982 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Fontaine and Vachard, p. 192 (no illustration).
non 1989 *Ammarchaediscus spirillinoides* (Rauzer-Chernoussova) - Fewtrell et al., p. 42, pl. 3. 4, fig. 5 (A true *Ammarchaediscus*).
?1989 *Brunsiarchaediscus* sp. - Fewtrell et al., p. 42, pl. 3. 4, fig. 6.
?1989 *Archaediscus* (*Nudarchaediscus*) sp. - Skompski et al., pl. 7, fig. 41.
1991 *Planoarchaediscus* of the group *P. spirillinoides* (Rauzer-Chernoussova) - Brenckle, fig. 5 D-L.
non 1991 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Sánchez et al., pl. 5, fig. 5 (= *Glomodiscus oblongus*).
v. 1992 *Planoarchaediscus spirillinoides* (Rauzer-Chernousova) - Vachard and Berkhli, pl. 3, fig. 7, pl. 4, fig. 5.
1992 *Planoarchaediscus spirillinoides* (Rauzer-Chernousova) - Somerville et al., fig. 5N.
1996 *Planoarchaediscus spirillinoides* (Rauser) - Marfenkova in Einor, pl. 41, fig. 15.
1999 *Planoarchaediscus spirillinoides* (Rauzer-Chernousova) - Berkhli, p. 110 (no illlustration).
2000b *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Cózar, p. 194, pl. 1, fig. 3.
2001 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Vdovenko, tabl. 1 p. 169, pl. 2, figs. 23-25.
2002 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Sergeeva, p. 271, 275 (no illustration).
2002 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Shcherbakova and Shcherbakov, p. 308 (no illustration).
2003 *Planoarchaediscus spirillinoides* (Rauzer-Chernoussova) - Kulagina et al., text-fig. 4 p. 177 (no illustration).
?2005 *Planoendothyra* (sic: problem of the publications without reviewer) *spirillinoides* - Orlov-Labkovsky, p. 23 (no illustration).
? 2005 *Uralodiscus adindanii* Brenckle & Marchant - Somerville and Cózar, pl. 1, fig. 6 (or *P. paraspirillinoides*).

Description. Diameter (D) = 0.180-0.400 mm; width (w) = 0.040-0.100 mm; w/D = 0.25-0.35; number of whorls = 4-6; proloculus diameter = 0.020-0.045 mm; height of last whorl = 0.015-0.040 mm; wall thickness = 0.008-0.015 mm.

Occurrence. ?Arundian of England. V1b of Belgium and Germany. Livian-early Asbian of Ireland. ?Late Asbian of Ireland. Early middle Viséan-early Serpukhovian of Urals, Southern Timan, Russian Platform and Kazakhstan. Late Viséan of Morocco, Poland, Germany and Uzbekistan. C_1^ve-C_1^vg of Donets Basin and Galitsie-Volyn (Ukraine). Viséan-Serpukhovian

of Tien-Shan. Late Holkerian-early Asbian, Brigantian of Southwestern Spain. Late Serpukhovian of Donets Basin. ?Early Bashkirian of Hina Group (Japan) (Mizuno and Ueno,1997, tabl. 2). Brigantian of Montagne Noire: Roquemaillère (DV133D, DV139A DV330A); Roc du Cayla (DV84A); ? Roque Redonde (RR54); Les Mentaresses (DV328'E); Roc de Murviel (MA33).

Genus *Ammarchaediscus* Conil and Pirlet in Pirlet and Conil, 1974

Type species. *Ammarchaediscus bozorgniai* Conil and Pirlet in Pirlet and Conil, 1974.

Synonym. *Viseidiscus* Mamet, 1975.

Diagnosis. Test undivided, planispirally coiled, involute to semi-evolute. Inner microgranular wall well developed, outer pseudo-fibrous, yellow layer relatively discrete and limited to the umbilical areas. Simple terminal aperture.

Remarks. The priority of *Ammarchaediscus* Conil and Pirlet in Pirlet and Conil, 1974 upon *Viseidiscus* Mamet, 1975 is discussed.

Occurrence. Late early Viséan (Cf4β = MFZ10) (late Chadian according to Fewtrell et al., 1989, pl. 3. 3, fig. 5)-Brigantian (Dil, 1977), probably cosmopolite (see Vachard et al., 2003b). Mentioned in Japan by Matsusue (1992, text-fig. 2).

Ammarchaediscus primaevus (Pronina, 1963)

Pl. 41, fig. 6.

1963 *Permodiscus*? *primaevus* n. sp. Pronina, p. 150-151, pl. 7, figs. 10-13.
v. p. 1974b *Planodiscus primaevus* (Pronina) -Vachard, p. 343, pl. 24, fig. 5 (non figs. 3-4) (with synonymy).
v. p. 1977b *Ammarchaediscus (Ammarchaediscus)* aff. *eospirillinoides* (Brazhnikova) -Vachard, p. 159 (non pl. 7, fig. 1; only the specimen of Roc du Cayla) (with 2 references in synonymy).
1985 *Planodiscus* ex gr. *primaevus* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
?1989 *Ammarchaediscus spirillinoides* (Rauzer-Chernoussova) - Fewtrell et al., p. 42, pl. 3. 4, fig. 5.
1990 *Viseidiscus primaevus* (Pronina) – Vdovenko et al., pl. 1, fig. 13 (holotype reillustrated from Pronina, 1963).
1996 *Viseidiscus primaevus* (Pronina) - Marfenkova in Einor, pl. 41, fig. 15.

Description. Diameter (D) = 0.215-0.300 mm; width (w) = 0.085-0.100 mm; w/D = 0.25-0.35; number of whorls = 4-4.5.

Occurrence. ?Arundian of England. Middle Viséan of Kazakhstan. Brigantian of Montagne Noire: Roc du Cayla (DV82C).

Family Archaediscidae Cushman, 1928a
nomen translat. Chernysheva, 1948a (ex subfamily)

Diagnosis. Archaediscoidea with a hyaline wall dominant upon an inner dark layer. Test entirely involute, oscillant, sigmoidal to aligned. Base of tube of five types: involutus, concavus, concavo-angulatus, angulatus and tenuis. Nodosities present in two subfamilies: Permodiscinae and Asteroarchaediscinae

Occurrence. As for the superfamily.

Subfamily Archaediscinae Cushman, 1928a

Genus *Archaediscus* Brady, 1873

Type species. *Archaediscus* karreri Brady, 1873.
Synonym. *Paraarchaediscus* Orlova 1955 sensu Brenckle et al., 1987.

Diagnosis. Archaediscinae with a hyaline wall dominant upon an inner dark layer. Test entirely involute, oscillant, sygmoidal to aligned. Base of tube of six types*: involutus, concavus, concavo-angulatus* (new name), *angulatus, angulo-evolutus* (new name) and *tenuis*. Nodosities absent.

Remarks. The distinction between *Paraarchaediscus* and *Archaediscus*, due to the presence or absence of dark layer (Brenckle et al., 1987) is arbitrary. The use of this classification needs to the entry of a transitional genus: "*Archaediscus*" (see Cózar and Somerville, 2005a, p. 273). The use of *Archaediscus*, as defined herein, is suficient. Generally, the species or group of species of *Archaediscus* are very diversified at the concavus stage (e. g., Conil and Lys, 1964) and concavo-angulatus stage, rare at angulatus stage, very rare at the tenuis stage (compare with Austin et al., 1974); these latter must be designated by other specific names (for example *A. angulatus* for stilus group). Perhaps the involutus stages can be denominated with another generic or subgeneric name (e. g., "*Propermodiscus*"). *Paraarchaediscus* to emendate might correspond only to the stage concavus. *Archaediscus* might designate only the stage concavo-angulatus due to the wall of *A. karreri*, and *Betpakodiscus* (to emendate) can be extended to the grandiculus stage (see the proposal of Vachard in Krainer and Vachard, text-fig. 7 p. 19).

Palaeoecology. The *Archaediscus* sensu lato are relatively tolerant to the turbid waters due to their presence in wackestone where other foraminifers (the more opportunistic species excepted) are absent. The first, archaediscids that appears upwards in the slope of microbialite buildups are *A. chernousssovensis* (Roque Redonde, RR56).

Occurrence. Early middle Viséan (= late Moliniacian = Arundian) Cf4δ (= MFZ11)-earliest Moscovian, cosmopolite.

Archaediscus stilus Grozdilova and Lebedeva in Grozdilova, 1953
Pl. 41, figs. 7-9.

1953 *Archaediscus stilus* n. sp. Grozdilova and Lebedeva in Grozdilova, p. 110-111, pl. 4, figs. 19-20.
1953 *Archaediscus krestovnikovi* Rauzer-Chernousova - Grozdilova, p. 94-95, pl. 2, figs. 17-19, pl. 3, figs. 1-4 (with synonymy) (non Rauzer-Chernousova, 1948h fide Conil and Lys, 1968).
1960 *Archaediscus krestovnikovi* Rauzer-Chernousova - Grozdilova and Lebedeva, p. 93, pl. 11, figs. 3-4.
1963 *Archaediscus krestovnikovi* Rauzer-Chernousova - Conil and Pirlet, pl. 2, figs. 12-13.
1964 *Archaediscus krestovnikovi* var. *krestovnikovi* Rauzer-Chernousova - Conil and Lys, p. 120-121, pl. 18, figs. 345-351.
1967 *Archaediscus krestovnikovi* Rauzer-Chernousova - Conil and Paproth, p. 62, 65, 69, 71, 72, 75 (no illustration).
p. 1968 *Archaediscus krestovnikovi krestovnikovi* Rauzer-Chernousova - Conil and Lys, p. 510-512, text fig. 2 p. 511, pl. 11, figs. 153-154.
p. 1970 *Archaediscus krestovnikovi* Rauzer-Chernousova - Mamet, n° 2? (of the group), n° 3 of the text-fig. 3 p. 4-5, p. 8, p. 30 (with references), n° 2? (of the group) of text-fig. 14 p. 28-29, pl. 4, figs. 3-4, pl. 7, figs. 1-3 only (no figs. 2, 4-6 = *Hemiarchaediscus planus*), pl. 11, fig. 3, pl. 12, fig. 1, pl. 18, fig. 3.
1970 *Archaediscus krestovnikovi* Rauzer-Chernousova - Petryk et al., n° 69? (of the group), 70 of text-fig. 4 p. 93 (no illustration).
1970 *Archaediscus* of the group *A. krestovnikovi* Rauzer-Chernousova - Skipp and Mamet, p. B120, B121 (no illustration).
1972 *Archaediscus krestovnikovi* Rauser - Malakhova, p. 42, pl. 9, figs. 2-4.
v. 1973b *Archaediscus* ex gr. *stilus* Grozdilova and Lebedeva - Perret, p. 303, pl. 3, figs. 9-10.

1973 *Archaediscus* (*Archaediscus*) *stilus* Grozdilova and Lebedeva - Bozorgnia, p. 112-113, pl. 17, fig. 6, pl. 19, figs. 11-13, pl. 22, fig. 7.
1973 *Archaediscus stilus* Grozdilova and Lebedeva (type évolué) - Malpica, pl. 2, fig. 26.
1973 *Archaediscus* (*Archaediscus*) *krestovnikovi* var. *krestovnikovi* Rauzer-Chernoussova - Bozorgnia, p. 115-116, pl. 22, figs. 3-4.
non 1974 *Archaediscus* (*Archaediscus*) ex gr. *stilus* Grozdilova and Lebedeva subsp. *tenuis* - Austin et al., pl. 3, fig. 1 (= ? *Betpakodiscus*).
v. 1974b *Archaediscus krestovnikovi krestovnikovi* Rauzer-Chernoussova - Vachard, p. 348-350, pl. 24, figs. 19-21, pl. 25, fig. 8.
v. 1974b *Archaediscus krestovnikovi piesis* Conil and Lys - Vachard, p. 350-351, pl. 24, figs. 23-25, pl. 25, fig. 1.
1975 *Propermodiscus krestovnikovi* (Rauzer-Chernoussova) - Grozdilova et al., p. 63, pl. 14, fig. 5.
1975b *Propermodiscus krestovnikovi* (Rauzer-Chernoussova) - Malakhova, p. 79, pl. 5, figs. 9-10.
p. 1977 *Archaediscus* (*Archaediscus*) *stilus* Grozdilova and Lebedeva - Dil, pl. 7, fig. 112, pl. 9, fig. 150? (= stade angulatus) (non pl. 6, fig. 91 = *Nodosarchaediscus*).
non 1977 *Archaediscus* (*Archaediscus*) *krestovnikovi* Rauzer-Chernoussova - Dil, pl. 6, fig. 92 (= *A. koktjubensis*).
v. 1977 *Archaediscus* ex gr. *krestovnikovi* Rauzer-Chernoussova - Perret and Vachard, p. 90 (no illustration).
1977 *Archaediscus* (*Archaediscus*) *stilus* Grozdilova and Lebedeva - Paproth et al., p. 67, 71, 76, 77 (no illustration).
v. 1977b *Archaediscus krestovnikovi krestovnikovi* Rauzer-Chernoussova - Vachard, p. 159, pl. 7, fig. 5.
v. 1977b *Archaediscus krestovnikovi piesis* Conil and Lys - Vachard, p. 159, pl. 7, fig. 7.
1978 *Archaediscus krestovnikovi krestovnikovi* Rauzer-Chernoussova - Sosipatrova, pl. 2, fig. 14.
non 1978 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Lys et al., pl. 1, fig. 24, pl. 2, fig. 26 (= *Hemiarchaediscus planus*).
1979 *Archaediscus krestovnikovi krestovnikovi* Rauser-Cernoussova - Mansourian, p. 70, pl. 9, figs. 116-117.
1979 *Archaediscus krestovnikovi* Rauser - Wagner et al., pl. 2, fig. 20, pl. 3, fig. 21, pl. 4, fig. 4.
1980 *Archaediscus stilus* Grozdilova and Lebedeva - Rich, p. 34, pl. 15, figs. 12-20 (with synonymy).
v. 1981 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Fontaine and Vachard, p. 15, pl. 1, fig. 8.
1981 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Mamet et al., p. 26, 27? (of the group) (no illustration).
1981 *Archaediscus stilus stilus* Grozdilova & Lebedeva - Strank, pl. 8, fig. 6, pl. 9, fig. 8.
1981 *Archaediscus stilus* subsp. nov. - Strank, pl. 5, fig. 6.
1981 *Archaediscus* sp. nov. ex gr. *stilus* - Strank, pl. 5, fig. 14.
1981 *Archaediscus stilus piesis* (Conil and Lys) (sic for the brackets) - Strank, pl. 6, figs. 3, 6.
1981 *Archaediscus stilus amplus* Conil and Lys - Strank, pl. 6, fig. 15.
1981 *Archaediscus stilus eurus* Conil and Longerstaey - Strank, pl. 7, fig. 15, pl. 12, fig. 26.
1982 *Archaediscus stilus* Grozdilova and Lebedeva, 1954 (sic) - Rich, pl. 6, figs. 8-10.
1982 *Archaediscus krestovnikovi* Rauzer-Chernousova - Fontaine and Vachard, p. 191, 192, 193, 194 (no illustration).
1983 *Archaediscus krestovnikovi* Rauzer-Chernousova - Aizenverg et al., p. 14-15 (no illustration).
1983 *Archaediscus stilus* Grozdilova and Lebedeva - Aizenverg et al., p. 14-15 (no illustration).
1983 *Archaediscus (Archaediscus) stilus stilus* Grozdilova and Lebedeva - Conil and Paproth, tabl. 1 p. 34 (no illustration).
1984 *Archaediscus stilus* Grozdilova and Lebedeva - Somerville and Strank, fig. 5f.
1985 *Archaediscus krestovnikovi* Rauser - Lys, pl. 1, fig. 1, 4? (aff.).
? 1985 *Archaediscus stilus* (Grozilova and Lebedeva) - Lys, pl. 2, fig. 11 (maybe *Hemiarchaediscus*).
1985 *Propermodiscus krestovnikovi* (Rauzer-Chernoussova) - Ross and Ross, text-fig. 1 p. 195 (no illustration).
?1988 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Kulagina, p. 25, pl. 1, fig. 14 (maybe *Hemiarchaediscus*).
1988 *Archaediscus stilus* (Grozilova and Lebedeva) - Kulagina, p. 25, 26, pl. 1, fig. 23.
1988b *Archaediscus krestovnikovi* Rauzer-Chernoussova - Ivanova, pl. 3, fig. 20.
1989 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Fewtrell et al., p. 42, pl. 3. 4, figs. 12-14.
1989 *Archaediscus reditus* (Conil and Lys) (sic for the parentheses) - Fewtrell et al., p. 50, pl. 3. 7, fig. 4.
1989 *Archaediscus stilus* (Grozilova and Lebedeva) (sic for the parentheses) - Fewtrell et al., p. 55, pl. 3. 8, fig. 11.
?1989 *Archaediscus stilus eurus* (Conil and Longerstaey) (sic for the parentheses) - Fewtrell et al., p. 58, pl. 3. 10, fig. 5 (passing to an angulatus stage).
v. 1989 *Archaediscus* ex gr. *krestovnikovi* Rauser - Chalot-Prat and Vachard, fig. 3. 5-7.
1991 *Archaediscus* ex gr. *Arch. krestovnikovi* Rauzer-Chernoussova - Gibshman and Akhmetshina, pl. 3, fig. 1.

v. 1991 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Vachard and Tahiri, pl. 3, fig. 12, pl. 4, fig. 4? (ex gr.).
v. 1992 *Archaediscus* ex gr. *krestovnikovi* Rauzer-Chernoussova - Vachard and Berkhli, pl. 1, fig. 18.
p. 1993 *Archaediscus* of the group *A. krestovnikovi* Rauzer-Chernoussova - Mamet et al., pl. 14, figs. 2-23, 25, 27 (no figs. 24, 26, 28 = *Hemiarchaediscus planus*; nor fig. 29-31 = *Hemiarchaediscus viae*).
v. 1993 *Archaediscus stilus* Grozdilova and Lebedeva - Perret, pl. F.VIII, fig. 7? (ex gr.) , pl. F.X, figs. 10, 18.
v. 1993 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Perret, pl. F.VIII, fig. 22? (ex gr.), pl. F.X, figs. 14-19.
v. 1993 *Archaediscus* ex gr. *krestovnikovi* Rauzer-Chernoussova - Vachard et al., pl. 2, fig. 10, pl. 3, figs. 5, 8.
1994 *Archaediscus* of the group *A. krestovnikovi* Rauzer-Chernoussova - Herbig and Mamet, text-fig. 4 p. 101, pl. 11, fig. 1.
non 1996 *Archaediscus krestovnikovi* (Rauser) (sic with parentheses) - Reitlinger in Einor, pl. 2, fig. 3 (the holotype at the angulatus stage).
1996 *Archaediscus krestovnikovi* Rauser - Marfenkova in Einor, pl. 41, fig. 12.
v. 1996 *Archaediscus krestovnikovi* Rauser - Vachard and Montenat, text-fig. 4 p. 469, pl. 2, figs. 12-15.
1996b *Archaediscus* of the group *A. krestovnikovi* Rauzer-Chernoussova - Mamet, pl. 1, fig. 4.
p. 1997 *Pararchaediscus stilus* (Grozdilova and Lebedeva in Grozdilova) - Harris et al., fig. 6. 5-6 (non fig. 4 = *Hemiarchaediscus*).
1997 *Archaediscus krestovnikovi* Rauser - Mizuno and Ueno, tabl. 2 (no illustration).
v. 1999 *Pararchaediscus stilus* (Grozdilova and Lebedeva in Grozdilova) - Berkhli, p. 103 107?, 111? (ex gr.) (no illustration).
2001 *Archaediscus krestovnikovi krestovnikovi* Rauser - Vdovenko, tabl. 1 p. 169, pl. 3, figs. 2-4.
v. 2002a *Archaediscus stilus* (Grozdilova and Lebedeva in Grozdilova) - Berkhli et al., p. 192, p. 193? (ex gr.) (no illustration).
v. 2002b *Paraarchaediscus stilus* (Grozdilova and Lebedeva in Grozdilova) - Berkhli et al., p. 138, p. 139? (ex gr.) (no illustration).
2002 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Ponomareva et al., p. 240 (no illustration).
2002 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Sergeeva, p. 271, 275 (no illustration).
2002 *Propermodiscus krestovnikovi* (Rauzer-Chernoussova) - Shcherbakova and Shcherbakov, p. 307, 308, 310, 312 (no illustration).
2002 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Van amerom et al., pl. 3, fig. 21.
2003 *Paraarchaediscus stilus* (Grozdilova and Lebedeva in Grozdilova) - Kulagina et al., text-fig. 4 p. 177, text-fig. 6 p. 179 (no illustration).
2003 *Paraarchaediscus stilus* (Grozdilova and Lebedeva in Grozdilova) - Groves et al., fig. 5. 1-5.
2004 *Archaediscus krestovnikovi* Rauzer-Chernousova - Cózar and Somerville, fig. 10. 17.
v. 2005 *Archaediscus* ex gr. *stilus* Grozdilova and Lebedeva - Saïd, p. 177, p. 178, p. 179, p. 180, p. 182, p. 184, p. 186, p. 190, p. 192, p. 193 (no illustration).
2005 *Archaediscus krestovnikovi* Rauzer-Chernousova - Orlov-Labkovsky, p. 24 (no illustration).
2005 *Archaediscus* at "*angulatus*" stage (*Archaediscus krestovnikovi* Rauzer-Chernousova) - Somerville and Cózar, pl. 1, fig. 9.
2005 *Archaediscus* ex gr. *stilus* Grozdilova and Lebedeva - Sanz-Lopez et al., pl. 6, fig. 10.
non 2005c *Archaediscus* at *angulatus* stage (*Archaediscus krestovnikovi* Rauzer-Chernoussova) - Cózar et al., fig. 11. 4 (a *Betpakodiscus*).
2005c *Archaediscus* at "*angulatus*" stage - Cózar et al., fig. 11. 5.

Description. Small concavus stage, discoidal, with aligned coiling. Diameter (D) = 0.170-0.340 mm; width (w) = 0.061-0.160 mm; ratio w/D = 0.32-0.45; proloculus diameter = 0.010-0.038 mm; number of whorls: 5-6; height of the last whorl = 0.015-0.040 mm; thickness of wall at the last whorl = 0.007-0.019 mm.

Remarks. Conil and Lys (1966, text-fig. 2 p. 511) have indicated that true *A. krestovnilovi* is a species at the angulatus stage, the classical stages concavus with aligned coiling, namely *A. krestovnikovi*, are identified by these authors to *A. stilus*, but *A. koktjubensis* or *Archaediscus reditus* are other possible available names for the taxon or the group of species if the concept is extended to slightly lenticular forms.

Occurrence. Early Viséan-Bashkirian, cosmopolite. Middle Viséan of Kazakhstan. Tulsky-latest Serpukhovian of central and Southern Urals. Brigantian-?earliest Bashkirian of Algeria

(Bechar Basin). Middle-late Viséan of Belgium, Morocco and Afghanistan. Arundian of North Wales. Holkerian-Serpukhovian of England. Early-late Viséan of Germany. Late Serpukhovian of Alaska. Earliest Bashkirian of Pennington Formation (USA). V2a-V3a of central Alborz (Iran). Middle Viséan of Sumatra. Late Viséan of Chios (Greece). Late Viséan of Viet-Nam and Laos. Late Viséan-early Serpukhovian of Windsor Group (Canada) and Idaho (USA). Late Serpukhovian of Hina Group (Japan). Bashkirian of Spitsbergen. Bashkirian of Bolivia. Montagne Noire: Arundian (Vachard, 1974b) to Brigantian: Roquemaillère (DV134C, DV137F); Roc du Cayla (DV82B, DV82F, DV465A); Japhet (DV126A, ?DV127A); Roque Redonde (RR66); Vailhan-Château (DV247B); Vailhan-Roque de Loup (DV248B, DV248E, MA.RL4); Les Boutinelles (MA.BOU25.1); Mounio (DV349A); Les Mentaresses (?DV328'A); Laurens (ML.UM.LAU.T); Gare de Laurens (ML789). Late Serpukhovian of Ardengost area: Bois de Gertous (MFP.Ger1), Areng (MFP.AH14), Cas0 (Perret, 1973b, 1993); MFP.CAS22, MFP.CAS23 (@angulatus) (this study). Bashkirian of Pyrenees.

Archaediscus complanatus Conil and Lys, 1964

Pl. 41, figs. 10-12.

1964 *Archaediscus complanatus* n. sp. Conil and Lys, p. 107-108, pl. 15, figs. 273-274.
v. 1974b *Archaediscus complanatus* Conil and Lys - Vachard, p. 352-353, pl. 26, figs. 7-9 (with synonymy).
v. 1977b *Archaediscus complanatus* Conil and Lys - Vachard, p. 160, pl. 7, figs. 16-17. (with 6 references in synonymy).
v. 1993b *Archaediscus complanatus* Conil and Lys - Vachard et al., pl. 2, figs. 10-11.

Description. Small angulatus stage, discoidal, with aligned coiling, transitional between *Archaediscus* angulatus stage and *Tubispirodiscus*. Diameter (D) = 0.270-0.370 mm; width (w) = 0.100-0.160 mm; ratio w/D = 0.30-0.48; proloculus diameter = 0.020-0.030 mm; number of whorls: 5-7.

Occurrence. Lower V3c of Belgium. Late Asbian of Libya. Late Brigantian of Montagne Noire: Vailhan-Roque de Loup (DV248C, DV313B) and Les Batailles (DV611B, DV611C).

Archaediscus enormis Schlykova, 1951

Pl. 41, figs. 13-15.

1951 *Archaediscus krestovnikovi* var. *enormis* n. var. Schlykova, p. 172, pl. 6, fig. 3.
1953 *Archaediscus enormis* Schlykova - Grozdilova, p. 97-98, pl. 3, fig. 8.
1963 *Archaediscus enormis* Schlykova - Conil and Pirlet, pl. 2, fig. 15.
1964 *Archaediscus enormis* Schlykova - Conil and Lys, p. 112, pl. 15, fig. 296.
1968 *Archaediscus enormis* Schlykova - Mamet, pl. 5, fig. 14, 18.
1970 *Archaediscus enormis* Schlykova - Petryk et al., n° 86 of text-fig. 4 p. 93 (no illustration).
v. 1974b *Archaediscus* cf. *magnus* Schlykova - Vachard, p. 353-354, pl. 25, fig. 9 (with synonymy).
1994 *Archaediscus* ex gr. *enormis* Shlykova - Herbig and Mamet, text-fig. 4 p. 101.
1980 *Archaediscus enormis* Schlykova - Skompski and Sobon-Podgorska, pl. 2, figs. 4-5.
1983 *Archaediscus* ex gr. *enormis* Schlykova - Aizenverg et al., p. 14-15 (no illustration).
non 2000 *Archaediscus enormis* Schlykova - Sebbar, pl. 12, fig. 8 (= *A. karreri*).
v. p. 2003 *Archaediscus* ex gr. *karreri* Brady - Fontaine et al., pl. 7, fig. 7 (non fig. 9), pl. 9, fig. 6.
v. 2005 *Archaediscus enormis* Schlykova - Saïd, p. 184, p. 186 (no illustration).

Description. Medium to large concavus stage, lenticular, with aligned coiling. Diameter (D) = 0.660-0.785 mm; width (w) = 0,305-0.390 mm; ratio w/D = 0.46-0.56; proloculus diameter = 0.060-0.070 mm; number of whorls: 5-5.5.

Occurrence. Late Viséan of Russia and Poland. V3bα of Belgium. Early Asbian of Alberta (Canada). Zapaltiubinsky of Donets Basin. Late Brigantian of central Morocco. Brigantian of

Turkey (Pille et al., submitted-b). Brigantian of Montagne Noire: Japhet (DV126D, DV126E, DV126G, DV164C) and Vailhan-Château (DV247B).

Archaediscus chernoussovensis Mamet in Mamet, Choubert and Hottinger, 1966
Pl. 41, figs. 16-17.

1948f *Archaediscus karreri* Brady - Rauzer-Chernousova, p. 230, pl. 15, figs. 10-11.
1948f *Archaediscus karreri nanus* var. nov. Rauzer-Chernousova, p. 231, pl. 15, figs. 12-13.
1953 *Archaediscus karreri* var. *nana* Brady - Grozdilova, p. 80-81, pl. 1, figs. 1-6 (non figs. 7-8 = *A. chernoussovensis*).
1953 *Archaediscus karreri* var. *nana* Rauzer-Chernousova - Grozdilova, p. 81-82, pl. 1, fig. 7-8.
1956a *Archaediscus karreri* Brady - Malakhova, p. 40, pl. 3, fig. 1 (= *A. chernoussovensis*).
1960 *Archaediscus karreri* Brady - Grozdilova and Lebedeva, p. 91, pl. 11, fig. 2 (= *A. chernoussovensis*).
1963 *Archaediscus karreri* Brady - Conil and Pirlet, pl. 2, fig. 14.
1964 *Archaediscus karreri* Brady var. *karreri* Brady - Conil and Lys, p. 118, pl. 17, figs. 326-333.
? 1967 *Archaediscus karreri* Brady - Conil and Paproth, p. 62, 65, 70, 72 (no illustration).
1970 *Archaediscus* of the group *A. chernoussovensis* Mamet (sic) - Mamet, n° 5 of text-fig. 3 p. 4-5, p. 8, p. 30-31 (with references), n° 4 of text-fig. 4 p. 28-29 (no illustration).
1970 *Archaediscus* of the group *A. chernoussovensis* Mamet (sic) - Petryk et al., n° 68 of text-fig. 4 p. 93 (no illustration).
1970 *Archaediscus* of the group *A. chernoussovensis* Mamet (sic) - Skipp and Mamet, p. B120 (no illustration).
1972 *Archaediscus karreri* Brady - Malakhova, p. 42, pl. 9, figs. 2-4.
v. 1973b *Archaediscus cyrtus* Conil and Lys - Perret, p. 300, pl. 3, fig. 4
v. 1974b *Archaediscus chernoussovensis* Mamet - Vachard, p. 354-355, pl. 25, figs. 2-3, 7 (with synonymy).
v. 1974b *Archaediscus* cf. *nanus* Rauzer-Chernousova - Vachard, p. 355, pl. 26, fig. 6.
v. 1974b *Archaediscus mohae* Conil and Lys - Vachard, p. 360, pl. 25, fig. 16.
1976 *Archaediscus* (*Archaediscus*) *chernoussovensis* Mamet - Bless et al., pl. 10, fig. 12.
1977 *Archaediscus* (*Archaediscus*) *chernoussovensis* Mamet - Dil, pl. 8, fig. 116.
v. 1977 *Archaediscus* ex gr. *chernoussovensis* Mamet - Perret and Vachard, p. 90 (no illustration).
1977 *Archaediscus* ex gr. *chernoussovensis* Mamet - Paproth et al., p. 67, 73, pl. 5, fig. 8, pl. 6, fig. 15, pl. 9, fig. 152? (= stade angulatus).
v. 1977b *Archaediscus chernoussovensis* Mamet - Vachard, p. 160, pl. 7, fig. 12.
v. 1977b *Archaediscus mohae* Conil and Lys - Vachard, p. 160, pl. 7, fig. 9.
v. 1977b *Archaediscus chernoussovensis* Mamet - Vachard, p. 160, pl. 7, fig. 12.
? 1978 *Archaediscus karreri* Brady - Sosipatrova, pl. 2, fig. 17 (= *A.* ex gr. *chernoussovensis*).
1979 *Archaediscus karreri karreri* Brady - Mansourian, p. 69, pl. 8, figs. 113-115.
1980 *Archaediscus nanus* Rauzer-Chernousova - Rich, p. 33-34, pl. 15, figs. 4-8 (with synonymy).
1981 *Archaediscus nanus* Rauser - Strank, pl. 6, fig. 7.
v. 1982 *Archaediscus nanus* Rauzer-Chernousova - Fontaine and Vachard, p. 193 (no illustration).
1983 *Archaediscus chernoussovensis* Mamet - Aizenverg et al., p. 14-15 (no illustration).
1991 *Archaediscus* sp. - Gibshman and Akhmetshina, pl. 3, fig. 2.
v. 1991 *Archaediscus chernoussovensis* Mamet, Choubert and Hottinger - Vachard and Tahiri, pl. 3, fig. 3, 15, pl. 5, fig. 13.
1991 *Paraarchaediscus* sp. - Sánchez et al., pl. 5, figs. 3-4.
?1992 *Archaediscus* ex gr. *karreri* Brady - Matsusue, text-fig. 2 p. 383, fig. 3. 6 (= *A.* ex gr. *chernousovensis*).
v. ? 1993 *Archaediscus chernoussovensis* Mamet - Perret, pl. F.VIII, figs. 11, 17, pl. F.XI, fig. 15.
v. non 1993 *Nodosarchaediscus* ex gr. *chernoussovensis* (Mamet) - Perret, pl. F.VIII, figs. 4, 21 (truly *Nodosarchaediscus*, therefore no *chernoussovensis*).
1994 *Archaediscus* ex gr. *chernoussovensis* Mamet - Herbig and Mamet, text-fig. 4 p. 101.
v. 1999 *Pararchaediscus chernoussovensis* (Mamet, Choubert et Hottinger) - Berkhli, p. 103 , 111 ? (ex gr.) (no illustration).
2003a *Archaediscus* ex gr. *chernoussovensis* (Mamet, Choubert et Hottinger) - Cózar, fig. 4M.
2004 *Archaediscus* ex gr. *chernoussovensis* Mamet - Cózar and Somerville, fig. 10. 8, 15-16, 21, fig. 14. 1-4.
2005a *Archaediscus chernoussovensis* Mamet - Cózar and Somerville, fig. 13. 4.
v. 2005 *Archaediscus* ex gr. *chernoussovensis* Mamet - Saïd, p. 176, 178, p. 180, p. 191(no illustration).
2005 *Archaediscus chernoussovensis* Mamet - Somerville and Cózar, pl. 1, fig. 7.
2005 *Archaediscus* ex gr. *chernoussovensis* Mamet, Choubert & Hottinger - Sanz-Lopez et al., pl. 6, figs. 12-13, 15.
? 2006 *Pararchaediscus* @ concavus stage - Gallagher et al., fig. 14. 1.

Description. Small concavus stage, lenticular, with oscillating coiling. Diameter (D) = 0.130-0.420 mm; width (w) = 0.080-0.230 mm; ratio w/D = 0.40-0.57-0.63; proloculus diameter = 0.030-0.035 mm; number of whorls: 5-5.5; thickness of wall at the last whorl = 0.015-0.020 mm.

Remarks. According to the strict application of the Code of Nomenclature, the name of this species seems to be *Archaediscus nanus* Rauzer-Chernousova, due to the synonymy, perfectly justified, of Grozdilova (1953), no *A. chernoussovensis*.

Occurrence. Viséan of all the former USSR and Morocco. V2b-V3c sup. of Germany. Serpukhovian-early Bashkirian of Donets Basin. Asbian of Laos. Asbian of Monteagle Limestone (USA). Late Viséan-early Serpukhovian of Windsor Group (SE Canada). Late Viséan of Alberta (Canada), Idaho (USA). Bashkirian of Spitsbergen. Holkerian-Brigantian of Montagne Noire (Vachard, 1974b). Latest Asbian-Brigantian of Montagne Noire: sommet 224-Valuzières (DV600B), Roquemaillère (ML764, ML.UM.ROQ, DV134E) and Roque Redonde (RR56). Late Serpukhovian of Ardengost area: Areng (MFP.AH10) (Perret, 1973b); MFP.AH.18I (this study). ?Bashkirian of Pyrenees.

Archaediscus moelleri Rauzer-Chernousova, 1948f

Pl. 41, figs. 18-19.

1948f *Archaediscus moelleri* n. sp. Rauzer-Chernousova, p. 231, pl. 15, figs. 14-15.
p. 1953 *Archaediscus moelleri* Rauzer-Chernousova - Grozdilova, p. 84-85, pl. 1, figs. 15-18 (with sujective synonymy).
1960 *Archaediscus moelleri* Rauzer-Chernousova - Grozdilova and Lebedeva, p. 91-92, pl. 10, fig. 7.
1964 *Archaediscus moelleri* Rauzer-Chernousova - Brazhnikova, pl. 1, figs. 21-22 ? (ex gr.).
1964 *Archaediscus mölleri* var. *mölleri* (sic) Rauzer-Chernousova - Conil and Lys, p. 125-126, pl. 19, fig. 370.
1970 *Archaediscus* of the group *A. moelleri* Rauzer-Chernousova - Mamet, n° 4 of text-fig. 3 p. 4-5, p. 30 (with references), n°3 of text-fig. 14 p. 28-29 (no illustration).
1970 *Archaediscus* of the group *A. moelleri* Rauzer-Chernousova - Petryk et al., n° 72 of text-fig. 4 p. 93 (no illustration).
1970 *Archaediscus* of the group *A. moelleri* Rauzer-Chernousova - Skipp and Mamet, p. B120, B121 (no illustration).
1972 *Archaediscus moelleri* Rauser - Malakhova, p. 43, pl. 9, figs. 11-12, 14-16, 22.
1973 *Archaediscus* (*Archaediscus*) *moelleri* Rauzer-Chernousova - Bozorgnia, p. 114-115, pl. 22, fig. 1.
v. 1974b *Archaediscus moelleri* Rauzer-Chernousova - Vachard, p. 356-357, pl. 25, figs. 4, 10 (with synonymy).
1973 *Archaediscus moelleri* Rauzer-Chernousova - Popova and Reitlinger in Einor, p. 56, tabl. 2 p. 60, pl. 9, figs. 4-5 (with synonymy).
v. 1974b *Archaediscus moelleri* Rauzer-Chernousova - Vachard, p. 356-357, pl. 25, figs. 4, 10 (with synonymy).
1975 *Archaediscus moelleri* Rauzer-Chernousova - Grozdilova et al., p. 61, pl. 14, fig. 9.
1975b *Archaediscus* ex gr. *moelleri* Rauzer-Chernousova - Malakhova, p. 80, pl. 5, figs. 12-13.
v. 1977b *Archaediscus moelleri* Rauzer-Chernousova - Vachard, p. 160, pl. 7, fig. 10.
1978 *Archaediscus moelleri* Rauzer-Chernousova - Sultanaev et al., p. 100, pl. 8, fig. 10.
1978 *Archaediscus moelleri* Rauzer-Chernousova - Lys et al., pl. 1, fig. 23.
1978 *Archaediscus moelleri* Rauzer-Chernousova - Lin, p. 37, pl. 8, fig. 8.
1979 *Archaediscus moelleri* Rauser - Wagner et al., pl. 2, fig. 17.
1980 *Archaediscus moelleri* Rauzer-Chernousova - Rich, p. 33, pl. 15, figs. 1-3 (with synonymy).
1982 *Archaediscus moelleri* Rauzer-Chernousova - Fontaine and Vachard, p. 193 (no illustration).
1983 *Archaediscus moelleri* Rauzer-Chernousova - Aizenverg et al., p. 14-15 (no illustration).
1983 *Archaediscus (Archaediscus) karreri moelleri* Rauzer-Chernousova - Conil and Paproth, tabl. 1 p. 34 (no illustration).
1984 *Archaediscus moelleri* Rauzer-Chernousova - Zhao et al., p. 109, pl. 20, figs. 13-15.
1988 *Archaediscus moelleri* Rauser - Kulagina, p. 26, pl. 1, fig. 13, pl. 2, fig. 24.
1989 *Archaediscus moelleri* Rauzer-Chernoussova - Fewtrell et al., p. 66, pl. 3. 12, fig. 15.
v. 1991 *Archaediscus moelleri* Rauzer-Chernousova - Vachard and Tahiri, pl. 2, fig. 5.
v. 1992 *Archaediscus moelleri* Rauzer-Chernoussova - Vachard and Berkhli, pl. 1, fig. 20.
1993 *Archaediscus* of the group *A. moelleri* Rauzer-Chernoussova - Mamet et al., pl. 15, fig. 1.
v. 1993 *Archaediscus* ex gr. *moelleri* (stade angulatus) Rauzer-Chernoussova - Perret, pl. F.VIII, fig. 24.
v. 1999 *Paraarchaediscus* ex gr. *moelleri* (Rauzer-Chernoussova) - Berkhli, p. 107 (no illustration).

2001 *Archaediscus moelleri* Rauzer-Chernoussova - Vdovenko, tabl. 1 p. 169, pl. 3, figs. 12-13.
2001 *Archaediscus moelleri* gr. - Kulagina et al., text-fig. 11 p. 37 (no illustration).
2002 *Archaediscus moelleri* Rauzer-Chernoussova - Shcherbakova and Shcherbakov, p. 307, 308, 312 (no illustration).
2002 *Archaediscus moelleri* Rauzer-Chernoussova - Van amerom et al., pl. 3, figs. 14-15.
v. 2002a *Archaediscus* ex gr. *moelleri* Rauzer-Chernoussova - Berkhli et al., p. 193 (no illustration).
v. 2002b *Paraarchaediscus* ex gr. *moelleri* Rauzer-Chernoussova - Berkhli et al., p. 139 (no illustration).
2003 *Archaediscus moelleri* Rauzer-Chernousova - Kulagina et al., text-fig. 3 p. 176 (no illustration).
non 2003 *Archaediscus moelleri* (Rauzer-Chernousova) (sic for the brackets) - Brenckle and Milkina, pl. 5, fig. 30 (= *A. convexus*).
v. p. 2003 *Archaediscus* ex gr. *karreri* Brady - Fontaine et al., pl. 7, fig. 9 (non fig. 7 = *A. enormis*).
2003a *Archaediscus* ex gr. *moelleri* Rauzer-Chernoussova - Cózar, fig. 4L.
v. 2005 *Archaediscus* ex gr. *moelleri* Rauzer-Chernoussova - Saïd, p. 178, p. 180, p. 182, p. 187, p. 193 (no illustration).
2005 *Archaediscus moelleri* Rauzer-Chernousova - Orlov-Labkovsky, p. 23, 25 (no illustration).

Description. Small, globose, sigmoidally coiled *Archaediscus* at concavus stage. Diameter (D) = 0.300-0.490 mm; width (w) = 0.215-0.340 mm; ratio w/D = 0.70-0.81; proloculus diameter = 0.030-0.060 mm; number of whorls: 3-5; thickness of wall at the last whorl = 0.005-0.020 mm.

Occurrence. Aleksinky-Protvinsky of Submoscovite Basin. Late Viséan of Samara Bend. C_1^vf-C_1^vg of Donets Basin (up to Bashkirian: Aizenverg et al., 1983; Vachard and Maslo, 1996). Mikhailovsky-Bogdanovsky of Urals. V2b-V3b of Belgium. Late Viséan of Germany. V3a-V3bγ of Morocco. Brigantian-Serpukhovian of England. Late Viséan-base of middle Serpukhovian of Tien-Shan. Viséan of South China. Late Viséan of Alaska. Asbian? ("zone 16i") of Monteagle Limestone (USA) and Idaho (USA). V3a-V3b of central and Eastern Alborz (Iran). Late Viséan of Laos. Brigantian of Montagne Noire: Castelsec (MA10.12); Roquemaillère (ML764); Roc du Cayla (DV82C); Mounio (DV431E). Late Serpukhovian of Ardengost area: MFP. MailC (Perret, 1993) MFP.AH2, MFP.CAS25bis.A, MFP.CAS22, MFP.CAS23.2.

Archaediscus convexus Grozdilova and Lebedeva in Grozdilova, 1953
Pl. 41, fig. 20.

1953 *Archaediscus convexus* n. sp. Grozdilova and Lebedeva in Grozdilova, p. 91-92, pl. 2, fig. 11.
1954 *Archaediscus convexus* Grozdilova and Lebedeva - Grozdilova and Lebedeva, p. 48-49, pl. 5, figs. 9-12.
1963 *Archaediscus convexus* Grozdilova and Lebedeva - Conil and Pirlet, pl. 2, fig. 18.
1964 *Archaediscus convexus* var. *convexa* Grozdilova and Lebedeva - Conil and Lys, p. 108-109, pl. 15, figs. 276-281.
1967 *Archaediscus convexus* var. *convexa* Grozdilova and Lebedeva - Conil and Paproth, p. 65, 69, 71? (cf.), 72, 74, 75, pl. 5, fig. 13.
v. 1973b *Archaediscus* cf. *glomus* Ganelina - Perret, p. 301-302, pl. 3, fig. 6.
v. ? 1973b *Archaediscus* cf. *vertens* Conil and Lys - Perret, p. 302, pl. 3, fig. 7.
1973 *Archaediscus convexus* Grozdilova and Lebedeva - Popova and Reitlinger in Einor, p. 56, pl. 9, fig. 3 (with synonymy).
1973 *Archaediscus* (*Archaediscus*) *convexus* Grozdilova and Lebedeva - Bozorgnia, p. 118-119, pl. 23, figs. 7-9.
v. 1974b *Archaediscus convexus* Grozdilova and Lebedeva - Vachard, p. 358, pl. 25, fig. 5 (with synonymy).
v. 1974b *Archaediscus* cf. *enodatus* Sossipatrova - Vachard, p. 359, pl. 25, fig. 11.
v. 1974b *Archaediscus pauxillus* Schlykova - Vachard, p. 359, pl. 25, figs. 14, 18-19.
1974 *Archaediscus* (*Archaediscus*) *convexus* Grozdilova and Lebedeva - Conil and Lees, pl. 4, fig. 47.
1976 *Archaediscus* (forme transitoire *Glomodiscus-Archaediscus*) ex gr. *convexus* Grozdilova and Lebedeva - Conil and Naum, pl. 1, fig. 5.
1976 *Archaediscus* (*Archaediscus*) *convexus* Grozdilova and Lebedeva - Bless et al., pl. 11, fig. 16.
v. 1977 *Archaediscus* cf. *convexus* Grozdilova and Lebedeva in Grozdilova - Perret and Vachard, p. 90 (no illustration).
1977 *Archaediscus* (*Archaediscus*) *convexus* Grozdilova and Lebedeva - Dil, pl. 7, fig. 113.
1977 *Archaediscus* (*Archaediscus*) *convexus* Grozdilova and Lebedeva - Paproth et al., p. 67, 73 (no illustration).
v. 1977b *Archaediscus convexus* Grozdilova and Lebedeva - Vachard, p. 160, pl. 7, fig. 8.

v. 1977b *Archaediscus* cf. *enodatus* Sossipatrova - Vachard, p. 160 (no illustration).
v. 1977b *Archaediscus pauxillus* Schlykova - Vachard, p. 160 (no illustration).
? 1978 *Archaediscus convexus* Grozdilova and Lebedeva - Lys et al., pl. 1, fig. 22 (or group *A. karreri*).
1978 *Archaediscus karreri spira* Conil and Lys - Lys et al., pl. 1, fig. 27.
1979 *Archaediscus convexus* Grozdilova and Lebedeva - Wagner et al., pl. 3, fig. 25.
1979 *Archaediscus convexus* Grozdilova and Lebedeva - Mansourian, p. 70-71, pl. 9, fig. 120.
1980 *Archaediscus convexus* Grozdilova and Lebedeva - Skompski and Sobon-Podgorska, pl. 2, figs. 1, 9.
1981 *Archaediscus* aff. *convexus convexus* (sic) Grozdilova and Lebedeva - Strank, pl. 12, fig. 7.
1981 cf. *Archaediscus convexus convexus* (sic) Grozdilova and Lebedeva - Strank, pl. 17, fig. 6.
1981 *Archaediscus convexus convexus* Grozdilova and Lebedeva - Strank, pl. 20, fig. 12.

1983 *Archaediscus convexus* Grozdilova and Lebedeva - Aizenverg et al., p. 14-15 (no illustration).
1983 *Archaediscus* (*Archaediscus*) *convexus* Grozdilova and Lebedeva - Conil and Paproth, fig. 3. 11.
?1985 *Archaediscus convexus* Grozdilova and Lebedeva - Lys, pl. 1, fig. 9 (doubtful because too large).
1987 *Archaediscus convexus* Grozdilova and Lebedeva - Sinitsyna and Sinitsyn, pl. 11, fig. 14.
1988 *Archaediscus* cf. *convexus* Grozdilova and Lebedeva - Lys, pl. 1, fig. 1.
v. 1991 *Archaediscus convexus* Grozdilova and Lebedeva - Vachard and Tahiri, pl. 2, fig. 6.
v. 1992 *Archaediscus convexus* Grozdilova and Lebedeva - Vachard and Berkhli, pl. 3, fig. 7.
v. ? 1993 *Archaediscus donetzianus* Sosnina - Perret, pl. F.VIII, fig. 6.
v. non 1993 *Nodosarchaediscus* ex gr. *convexus* (Grozdilova and Lebedeva) - Perret, pl. F.VIII, fig. 15 (a true *Nodosarchaediscus*).
v. 1993 *Archaediscus* ex gr. *convexus* (Grozdilova and Lebedeva) - Perret, pl. F.VIII, figs. 18-20, pl. F.X, figs. 12, 15.
v. 1996 *Archaediscus convexus* Grozdilova and Lebedeva - Vachard, pl. 1, fig. 7.
v. 1999 *Archaediscus* ex gr. *convexus* (Grozdilova and Lebedeva) - Fontaine et al., p. 464 (no illustration).
v. 1999 *Pararchaediscus* ex gr. *convexus* (Grozdilova and Lebedeva) - Berkhli, p. 111 (no illustration).
2000 *Archaediscus convexus* Grozdilova and Lebedeva - Sebbar, pl. 11, fig. 21.
2001 *Archaediscus convexus* Grozdilova and Lebedeva - Vdovenko, tabl. 1 p. 169, pl. 3, fig. 24? (ex gr.), 26-27.
2002 *Paraarchaediscus convexus* (Grozdilova and Lebedeva) - Kulagina and Gibshman, text-fig. 3 p. 186, pl. 1, fig. 31.
2002 *Archaediscus convexus* (Grozdilova and Lebedeva) - Shcherbakova and Shcherbakov, p. 312, 314 (no illustration).
v. 2002a *Archaediscus convexus* Grozdilova and Lebedeva - Berkhli et al., p. 193 (no illustration).
v. 2002b *Paraarchaediscus convexus* Grozdilova and Lebedeva - Berkhli et al., p. 139 (no illustration).
v. 2002 *Archaediscus* ex gr. *convexus* Grozdilova and Lebedeva - Krainer and Vachard, p. 18, pl. 4, figs. 9, 14-15 (with synonymy).
2003 *Pararchaediscus* ex gr. *convexus* (Grozdilova and Lebedeva in Grozdilova) - Groves et al., fig. 5. 6-10.
2003 *Pararchaediscus convexus* (Grozdilova and Lebedeva in Grozdilova) - Brenckle and Milkina, pl. 3, fig. 19.
2003 *Archaediscus moelleri* (Rauzer-Chernousova) (sic for the brackets) - Brenckle and Milkina, pl. 5, fig. 30.
2003 *Archaediscus gradiculus* (Schlykova) (sic for the brackets) - Brenckle and Milkina, pl. 5, fig. 31.
?2004 *Archaediscus* sp. (at angulatus stage, *A. grandiculus* Schlykova) - Cózar and Somerville, fig. 10. 7.
?2004 *Archaediscus* sp. - Cózar and Somerville, fig. 14. 15.
v. 2005 *Archaediscus* ex gr. *convexus* Grozdilova and Lebedeva - Saïd, p. 176, 177, 178, 179, 180, 182, 192 (no illustration).
2005 *Archaediscus convexus* Grozdilova and Lebedeva - Orlov-Labkovsky, p. 23 (no illustration).
non 2005 *"Nodosarchaediscus" convexus* (Grozdilova and Lebedeva) - Somerville and Cózar, pl. 1, fig. 10 (= *Archaediscus karreri*).
?2005c Large *Archaediscus* at *angulatus* stage - Cózar et al., fig. 11. 3.

Description. Small *Archaediscus*, lenticular, at concavus stage, initially streptospirally coiled and after sigmoidally coiled. Diameter (D) = 0.320-0.480 mm; width (w) = 0.200-0.320 mm; ratio w/D = 0.62-0.67 (0.78); number of whorls: 4-5.5

Occurrence. $C_1{}^{v}f_2$-Protvinsky of Donets Basin. Venevsky-early Bashkirian of Southern Urals. V3bβ-γ of Morocco. V2a of Ireland and Belgium. V2a-V3bγ of Germany. Late Viséan of Poland, Chios Island (Greece) and Kazakhstan. Protvinsky of Kazakhstan. Bashkirian of Southern Tunisia. Early Serpukhovian of Algeria (Bechar Basin) and Iran (central and Eastern Alborz). V3bβ of Turkey (Zonguldak). V3c of Eastern Alborz (Iran). Brigantian of Tien-Shan. Late Viséan/Serpukhovian of Thailand. Latest Asbian-late Brigantian of Montagne

Noire: Lenses of the road (DV332A); Roc du Cayla (DV82B, DV82C); Vailhan-Roque de Loup (DV327A); Mounio (DV431D). Late Serpukhovian of Ardengost area: Bois de Gertous (MFP.Ger5), Frechet (MFP.Bar1) (Perret, 1973b); ?MFP.AHC/81, Rui5, Cas15bis, CasAC (Perret, 1993); MFP.AH18F, AH.B/81.9 (this study). Bashkirian of Pyrenees.

Archaediscus karreri Brady, 1873

Pl. 42, figs. 1-6.

1873 *Archaediscus Karreri* n. sp. Brady, p. 286-290 (no illustration).
1876 *Archaediscus Karreri* Brady - Brady, p. 142-145, pl. 11, figs. 1-6.
1879 *Archaediscus Karreri* Brady - von Möller, p. 77-78, pl. 2, fig. 5, pl. 7, figs. 4-5.
1948f *Archaediscus moelleri gigas* sp. et var. nov. (sic) Rauzer-Chernousova, p. 232, pl. 15, figs. 16-18, pl. 16, fig. 1.
1953 *Archaediscus karreri* var. *karreri* Brady - Grozdilova, p. 80-81, pl. 1, figs. 1-6 (non figs. 7-8 = *A. karreri* var. *nana*; see *A. chernoussovensis*) (with subjective synonymy).
1953 *Archaediscus moelleri* var. *gigas* Rauser - Grozdilova, p. 85-86, pl. 1, figs. 19-20.
non 1956a *Archaediscus karreri* Brady - Malakhova, p. 40, pl. 3, fig. 1 (= *A. chernoussovensis*).
non 1960 *Archaediscus karreri* Brady - Grozdilova and Lebedeva, p. 91, pl. 11, fig. 2 (= *A. chernoussovensis*).
1960 *Archaediscus moelleri* var. *gigas* Rauzer-Chernousova - Grozdilova and Lebedeva, p. 92-93, pl. 10, figs. 8-9.
non 1963 *Archaediscus karreri* Brady - Conil and Pirlet, pl. 2, fig. 14 (= *A. chernoussovensis*).
1963 *Archaediscus gigas* Rauzer-Chernousova var. - Conil and Pirlet, pl. 2, figs. 24-25.
1966 *Archaediscus mölleri var. grandis* Conil and Lys - Conil and Lys, p. B211, pl. 2, fig. 14.
non 1967 *Archaediscus karreri* Brady - Conil and Paproth, p. 62, 65, 70, 72 (no illustration; but probable *A. chernoussovensis*, due to the type of identification of Conil in this epoch, Vachard (pers. comm.)).
1968 *Archaediscus karreri* Brady (non auct.) - Mamet, pl. 2, fig. 6.
1970 *Archaediscus karreri* Brady - Mamet, p. 27, 30, text-fig. 14 p. 28-29 (no illustration).
1972 *Archaediscus moelleri gigas* Rauser - Malakhova, p. 43, pl. 9, figs. 20-21.
1973 *Archaediscus* (*Archaediscus*) *moelleri* var. *gigas* Rauzer-Chernoussova - Bozorgnia, p. 117-118, pl. 23, figs. 4-6.
1973 *Archaediscus karreri* Brady - Browne and Pohl, pl. 24, figs. 11-13 (from Brady, 1876).
v. 1974b *Archaediscus karreri* Brady - Vachard, p. 361-365, pl. 25, figs. 12-13, 15, 17.
1975 *Archaediscus moelleri* var. *gigas* Rauzer-Chernousova - Grozdilova et al., p. 61, pl. 14, fig. 13.
1976 *Archaediscus* (*Archaediscus*) aff. *karreri* Brady - Conil, pl. 3, fig. 30.
?1977 *Archaediscus* (*Archaediscus*) ex gr. *gigas* Rauser - Dil, pl. 7, fig. 108.
1977 *Archaediscus* (*Archaediscus*) *karreri* Brady - Dil, pl. 8, fig. 117.
v. 1977b *Archaediscus karreri* Brady - Vachard, p. 160 (no illustration).
1978 *Archaediscus moelleri gigas* Raus. - Sultanaev et al., p. 100, pl. 8, fig. 16.
non 1978 *Archaediscus karreri* Brady - Sosipatrova, pl. 2, fig. 17 (= *A.* ex gr. *chernoussovensis*).
1978 *Archaediscus moelleri* var. *gigas* Raus. - Sosipatrova, pl. 2, fig. 13.
? 1978 *Archaediscus convexus* Grozdilova and Lebedeva - Lys et al., pl. 1, fig. 22.
non 1979 *Archaediscus karreri karreri* Brady - Mansourian, p. 69, pl. 8, figs. 113-115 (= *A. chernoussovensis*).
1979 *Archaediscus* ex gr. *karreri* Brady - Wagner et al., pl. 9, fig. 16.
1980 *Archaediscus moelleri gigas* Rauser - Skompski and Sobon-Podgorska, pl. 1, figs. 2-3, 6.
1982 *Archaediscus karreri* Brady - Fontaine and Vachard, p. 189, 192 (no illustration).
1983 *Archaediscus (Archaediscus) karreri grandis* Conil and Lys - Conil and Paproth, tabl. 1 p. 34, fig. 4. 23.
1985 *Archaediscus* aff. *A. gigas* Rauser - Lys , pl. 1, fig. 5, 11.
1985 *Archaediscus gigas* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1988 *Archaediscus moelleri gigas* Rauser - Kulagina, p. 25, pl. 1, fig. 22.
?1989 *Archaediscus karreri* Brady, 1973 (sic) (at angulatus stage) - Fewtrell et al., p. 58, pl. 3. 10, figs. 2-3.
v. 1990 *Archaediscus* ex gr. *karreri* Brady - Caridroit et al, p. 338 (no illustration).
1990 *Archaediscus gigas* Rauzer-Chernousova - Vdovenko et al., pl. 1, fig. 19.
v. 1991 *Archaediscus* ex gr. *karreri* Brady (= *Archaediscus inflatus* Schlykova, 1951) - Vachard and Tahiri, pl. 2, fig. 4, pl. 4, fig. 9, pl. 5, fig. 8, pl. 5, figs. 7, 16-17, 20 (= *A. mellitus*).
v. 1991 *Archaediscus karreri* Brady - Vachard et al., pl. 1 fig. 5.
non 1992 *Archaediscus* ex gr. *karreri* Brady - Matsusue, text-fig. 2 p. 383, fig. 3. 6 (= *A.* ex gr. *chernousovensis*).
1992 *Archaediscus gigas* Rauzer-Chernousova - Matsusue, text-fig. 2 p. 383, fig. 3. 14.
v. non 1993 *Archaediscus* ex gr. *karreri* Brady - Perret, pl. F.XI, fig. 2 (= *Betpakodiscus*?).

1996 *Archaediscus gigas* Rauser - Reitlinger in Einor, pl. 2, fig. 9.
1997 *Archeadiscus* (sic) *karreri* Brady - Gallagher and Somerville, text-fig. 6 p. 321, text-fig. 7b (no illustration).
1997 *Archaediscus* n. sp. (aff. *karreri*) Brady - Mizuno and Ueno, tabl. 2, pl. 2, fig. 30.
v. 1999 *Archaediscus karreri* Brady - Berkhli, p. 106? (ex gr.), 108, 111? (ex gr.), 112, 114, 118? (ex gr.), 121 (no illustration).
2000 *Archaediscus enormis* Schlykova - Sebbar, pl. 12, fig. 8.
2001 *Archaediscus gigas* Rauser - Vdovenko, tabl. 1 p. 168, pl. 3, figs. 16-17.
2002 *Archaediscus gigas* Rauser - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
2003 *Archaediscus gigas* Raus. - Kulagina et al., text-fig. 3 p. 176, text-fig. 7 p. 180 (no illustration).
? 2003 *Archaediscus* aff. *gigas* Raus. - Brenckle and Milkina, pl. 3, fig. 28 (some nodosities seem visible).
v. ? 2003 *Archaediscus karreri* Brady - Fontaine et al., pl. 8, fig. 7, pl. 9, fig. 9 (sections too oblique to conclude).
non v. p. 2003 *Archaediscus* ex gr. *karreri* Brady - Fontaine et al., pl. 7, fig. 7, 9 (= *A. enormis* and *A. moelleri*, respectively), nor pl. 9, fig. 6 (= *A. enormis*).
2004 *Archaediscus* ex gr. *karreri* Brady - Cózar and Somerville, fig. 10. 9-14, 21, fig. 14. 5-7, 10-11, 13.
2004 *Archaediscus* ex gr. *karreri* Brady - Cózar, pl. 1, fig. 12.
2005a *Archaediscus karreri* Brady - Cózar and Somerville, fig. 13. 2.
v. 2005 *Archaediscus karreri* Brady - Saïd, p. 176? (ex gr.), p. 184, p. 190 ? (ex gr.), p. 192 (no illustration).
2005 *Archaediscus moelleri gigas* Rauzer-Chernoussova - Orlov-Labkovsky, p. 23, 24, 25, 26 (no illustration).
2005 *Archaediscus karreri* Brady - Orlov-Labkovsky, p. 25 (no illustration).
2005 *Archaediscus karreri grandis* Conil and Lys - Somerville and Cózar, pl. 1, fig. 8.
2005 *"Nodosarchaediscus" convexus* (Grozdilova and Lebedeva) - Somerville and Cózar, pl. 1, fig. 10.
? 2005c Large *Archaediscus* at *angulatus* stage - Cózar et al., figs. 11. 1-2.
2005 *Archaediscus karreri* Brady - Sanz-Lopez et al., pl. 8, figs. 10, 15.
2006 *Archaediscus karreri grandis* Conil and Lys - Somerville and Cózar, fig. 3. 8.

Description. Large, globose, sigmoidally-coiled, *Archaediscus* at concavus stage. Diameter (D) = 0.300-1.200 mm; width (w) = 0.220-0.580 mm; ratio w/D = 0.65-0.87; proloculus diameter = 0.050-0.175 mm; number of whorls: 4-5; height of the last whorl = 0.038-0.150 mm; thickness of wall at the last whorl = 0.020-0.030 mm.

Remarks. The synonymy of *A. moelleri gigas* and *A. karreri* was firstly indicated by Mamet (1970, p. 27). The group *A. karreri*, in my definition, is constituted of large species with different irregularities of the sigmoidal coiling, and which remains to rare for constituting truly different species (as for *A. convexus*); they are *A. mellitus* Schlykova, 1951, *A. densaspira* Conil and Lys, 1964, *A. angusta* Conil and Lys, 1964, *A. seroflexa* Conil and Lys, 1964, *A. subangusta* Conil and Lys, 1964, etc.
Occurrence. Aleksinsky-Protvinsky of Submoscovite Basin. Late Viséan of Samara Bend. ?Late Viséan of Kazakhstan. Late Viséan-Serpukhovian of Urals (Gubashkinsky, Ladeininsky and Ust-Sarbaisky). Mikhailovsky of central Urals. $C_1^{v}f_2$-Serpukhovian Donbass (up to Zapaltiubinsky: Vachard and Maslo, 1996, text-fig. 1 p. 359). Cf6 (MFZ13-15) of Belgium. Early Brigantian in Ireland. Spirale zone of Germany. Late Viséan of Poland. Latest Asbian of Southwestern Spain. Early Asbian-early Serpukhovian of Morocco. Latest Brigantian-early Serpukhovian of Algeria (Bechar Basin, Reggan Basin). V3b of Turkey (Zonguldak). V3b of central Alborz (Iran). ?V3c of Eastern Alborz (Iran). Brigantian of Tien-Shan. Early Asbian of Thailand. Late Viséan of Viet-Nam. Serpukhovian of Malaysia. Akiyoshi Group and Hina Group (late Serpukhovian) of Japan. Bashkirian of Spitsbergen. Brigantian of Montagne Noire: Japhet (DV126C, DV126G); Roque Redonde (RR59). Serpukhovian of Pyrenees (Arize area).

Archaediscus suppressus Schlykova, 1951
Pl. 42, fig. 7.

1951 *Archaediscus itinerarius* var. *suppressa* var. nov. Schlykova, p. 165, pl. 4, figs. 9-10.
1953 *Archaediscus itinerarius* var. *suppressa* Schlykova - Grozdilova, p. 88-89, pl. 2, fig. 9.
1963 *Archaediscus suppressus* Schlykova - Conil and Pirlet, pl. 2, figs. 17, 23.
1964 *Archaediscus suppressus* Schlykova - Conil and Lys, p. 127-128, pl. 19, figs. 382-383.
v. 1973b *Archaediscus* aff. *suppresus* Schlykova - Perret, p. 302-303, pl. 3, fig. 8.
v. 1974b *Archaediscus ventrosus clarus* Conil and Lys emend. - Vachard, p. 360-361, pl. 26, figs. 1-4.
v. 1977b *Archaediscus suppressus* Schlykova - Vachard, p. 160, pl. 7, figs. 14-15.
1981 *Archaediscus suppressus* Schlykova - Strank, pl. 14, figs. 17.
1983 *Archaediscus itinerarius* var. *suppressa* Schlykova - Aizenverg et al., p. 14 (no illustration).
v. 1993 *Archaediscus suppressus* Schlykova - Perret, pl. F.VIII, fig. 5.
2001 *Archaediscus suppressus* Schlykova - Vdovenko, tabl. 1 p. 169, pl. 3, fig. 20.

Description. Medium-sized *Archaediscus* at concavus stage, lenticular, with oscillating coiling. Diameter (D) = 0.340-0.690 mm; width (w) = 0.160-0.315 mm; ratio w/D = 0.49-0.59; proloculus diameter = 0.030-0.050 mm; number of whorls: (4)-5; height of the last whorl = 0.050 mm.
Occurrence. $C_1^V f_2$-Protvinsky of Donets Basin. Robinson Limestone of England. Brigantian of Montagne Noire: Japhet (DV126C, DV126E, DV126G, DV164C); Roquemaillère (DV139A) and Vailhan-Château (DV247B). Late Serpukhovian of Ardengost area: Areng (MFP.AH18) (Perret, 1973b, 1993).

Archaediscus spp.
Pl. 42, figs. 8-11.

Remarks. Although numerous species of archaediscids are described here, numerous ones remain in open nomenclature.
Occurrence. Latest Asbian-early Serpukhovian of Montagne Noire: Lenses of the road, near Roquessels (DV293E); Castelsec (MA10.II); Roquemaillère (DV134D, DV134E, DV134F, DV137A, DV137B, DV137C, DV137F, DV137G, DV139A, DV139B, DV139C, DV140B, ML764); Roc du Cayla (DV82E, DV82F, ?DV84A); Les Boutinelles (MA.BOU25.1A); Les Pascales (MA.PA5, MA.PA16, MA.PA18); Les Batailles (DV608, DV609); Péret (ML784: 6 specimens); Vailhan-Roque de Loup (DV248A, DV248B, DV248C); Serre de Péret (MASP13, MASP19C, MA.SP24); Les Mentaresses (DV328'C); Mounio (DV349A); Jeantels (DV690C); Roc de Murviel (DV250A,MA34, MA40); Gare de Laurens (ML789); La Serre (ML1054).

Genus *Betpakodiscus* Marfenkova, 1983 emend.
Type species. *Propermodiscus? attenuatus* Marfenkova, 1978.
Synonym. *Archaediscus* (pars).
Diagnosis. Archaediscinae at angulatus stage (or concavus to angulatus) with a hyaline wall, occasionally with a faint inner dark layer. Test entirely involute generally aligned, rarely oscillant or sygmoidal. Nodosities absent.

Remarks. This genus, adopted here to try to reconciliate the classifications of Brenckle et al. (1987) and Vachard (1988), has been in fact poorly defined, essentially in reference with aligned coilings. *Hemiarchaediscus* sensu Browne and Pohl, 1973, is intermediary between *Betpakodiscus* and *Browneidiscus* (angulatus stage passing to tenuis stage). *Tubispirodiscus* Browne and Pohl, 1973 is another Archaediscinae at angulatus stage, but nearly planisiral and evolute.

Occurrence. Brigantian to Bashkirian (Vachard, 1988a), probably cosmopolite.

Betpakodiscus? sp.
Pl. 42, fig. 12.

v. 1993 *Archaediscus angulatus* Sosnina - Perret, pl. F.VIII, fig. 9, pl. F.X, figs. 7, 16.
2005c *Archaediscus* at *angulatus* stage (*Archaediscus krestovnikovi* Rauzer-Chernoussova) - Cózar et al., fig. 11. 4.

Description. Diameter (D) = 0.570 mm; width (w) = 0.185 mm; ratio w/D = 0.32; proloculus diameter = 0.050 mm; number of whorls: 5; height of the last whorl = 0.070 mm; thickness of wall at the last whorl = 0.017 mm.

Occurrence. Late Serpukhovian of Ardengost area: MFP.Mail17' (Perret, 1993). Bashkirian of Pyrenees.

Genus *Hemiarchaediscus* Miklukho-Maklay, 1957 emend.

Type species. *Hemiarchaediscus planus* Miklukho-Maklay, 1957.

Synonym. *Nodosarchaediscus* Conil and Pirlet in Pirlet and Conil 1974 (non 1973, nec 1977) (pars), and sensu Vachard, 1988 (pars);? *Paraarchaediscus* with nodes (Gallagher, 1996, fig. 2), "*Nodasperodiscus*" sensu Cózar (2004) seems to be more probably synonym of *Nodosarchaediscus*, consequently "*Nodosarchaediscus*" sensu Cózar (2004, p. 374), not illustrated, is difficult to interpretate, whereas "*Nodosarchaediscus*" sensu Somerville and Cózar (2005) is an *Archaediscus karreri* at angulatus stage.

Diagnosis. Archaediscinae at concavus stage with partial occlusion of the tube by episodic round nodosities.

Remarks. *Hemiarchaediscus* Miklukho-Maklay, 1957 is probably prioritary upon *Nodosarchaediscus* because its type species *H. planus* Miklukho-Maklay, 1957 shows some nodosities in a concavus stage. Moreover, the presence of nodosities in the type species of *Nodosarchaediscus* (*Archaediscus maximus* Grozdilova and Lebedeva, 1954) can result of an artefact of a poor microphotograph in a species of the group *A. karreri* (the "*Nodosarchaediscus" convexus* of Somerville and Cózar (2005, pl. 1, fig. 10, seems to correspond exactly to this explanation). *Nodosarchaediscus* was admitted by Baxter and Brenckle, 1982, p. 140, 142 but considered as a no existing taxon by Brenckle et al., 1987. I think that *Archaediscus krestovnikovi* ("including *Nodosarchaediscus demaneti* (Conil and Lys, 1969" (sic for 1964)) sensu Mamet et al., 1993, pl. 14, fig. 24 is an excellent re-illustration of *Hemiarchaediscus planus*. Similarly, if *Hemiarchaediscus* is misinterpreted by Rich (1980, p. 34, pl. 15, figs. 25-26) some "*Archaediscus pusillus*" illustrated by this author (pl. 15, figs. 9-10) seem to be truly *Hemiarchaediscus planus*. *Hemiarchaediscus* sensu Browne and Pohl, 1973 is entirely different: it is a very advanced form, intermediary between *Betpakodiscus* and *Browneidiscus* (i. e., an angulatus stage passing to tenuis stage).

Occurrence. Cf4δ-Cf6 (MFZ11-15) (Conil and Naum, 1976, pl. 3, figs. 45-46; Vachard, 1988; Fewtrell et al., 1989; Somerville et al., 1992); Palaeotethyan (until to Japan: Matsusue, 1992, text-fig. 2) and Uralian. V2b/V3a of Belgium and Germany. Spirale zone of Germany. Holkerian-Brigantian of England. Cf5 (MFZ12)-?early Brigantian of Ireland. Meramecian of the Midcontinent. Early Serpukhovian of Monteagle and Bangor Formations (USA). Late Serpukhovian-early Bashkirian of Alaska. In general, the presence in the Serpukhovian/Bashkirian is poorly established due to a probable confusion with *Archaediscus* or *Neoarchaediscus*.

Hemiarchaediscus viae (Vachard, 1977b)
Pl. 42, figs. 13-19.

v. 1974b *Propermodiscus viae* n. sp. Vachard, p. 347, pl. 24, figs. 13-16 (nomen nudum).
v. 1974b *Asteroarchaediscus ovoides* (Rauzer-Chernousova) - Vachard, p. 368-369, pl. 26, fig. 14-15 (a recrystallized *N. viae*) (with synonymy).
1977 *Nodosarchaediscus* (*Nodosarchaediscus*) (type oscillant-aligné) - Paproth et al., pl. 6, fig. 18.
v. 1977b *Asteroarchaediscus ovoides* (Rauzer-Chernousova) - Vachard, p. 161-162, pl. 7, fig. 30 (a recrystallized *N. viae*) (with 3 references in synonymy).
v. 1977b *Nodosarchaediscus viae* n. sp. Vachard, p. 160-161, pl. 7, figs. 19-23 (with 1 reference in synonymy).
1989 *Nodosarchaediscus* sp. - Fewtrell et al., p. 46, p. 50, pl. 3. 5, fig. 5, pl. 3. 7, fig. 7.
1989 *Nodosarchaediscus cornua* (Conil and Lys) - Fewtrell et al., p. 55, pl. 3. 8, fig. 13.
v. 1992 *Nodosarchaediscus viae* Vachard - Vachard and Berkhli, pl. 2, fig. 1.
p. 1993 *Archaediscus* of the group *A. krestovnikovi* Rauzer-Chernoussova - Mamet et al., pl. 14, figs. 24, 26, 28 (no figs. 2-23, 25, 27 = True *Archaediscus krestovnikovi*; nor fig. 29-31 = *Hemiarchaediscus viae*).
1996 *Asteroarchaediscus* sp. - Cózar-Maldonado, pl. 2, fig. 14.
1996 *Neoarchaediscus* sp. - Cózar-Maldonado, pl. 2, fig. 15.
v. 2003 *Hemiarchaediscus* sp. - Fontaine et al., pl. 6, fig. 4 (probably *H. viae*).
? 2004 "*Nodasperodiscus*" sp. - Cózar, pl. 1, fig. 18 (not a *Nodasperodiscus*, probably *N. viae* due to the coiling and the dimensions).

Description. Test short, discoid-inflated, coiling of oscillating-aligned type. Nodosities triangular, large and low present in already each whorl. Diameter (D) = 0.180-0.390 mm; width (w) = 0.130-0.185 mm; ratio w/D = 0.44-0.72; proloculus diameter = 0.020-0.030 mm; number of whorls: 4-6.

Occurrence. Holkerian-Brigantian of England. ?Early Brigantian of Ireland. V3b of Germany. Late Viséan of Southern Spain. Late Serpukhovian-early Bashkirian of Alaska. Latest Asbian-latest Brigantian of Montagne Noire: sommet 224-Valuzières (DV600C); Japhet (DV126G, DV164A); Les Pascales (DV601E); Les Mentaresses (DV328'A); Mounio (DV431D).

Hemiarchaediscus planus Miklukho-Maklay, 1957
Pl. 42, fig. 20.

1957 *Hemiarchaediscus planus* n. gen. n. sp. Miklukho-Maklay, p. 36, figs. 1-2.
p. 1970 *Archaediscus krestovnikovi* Rauzer-Chernousova - Mamet, pl. 7, figs. 2, 4-6 only (no figs. 1, 3? well identified).
1973 *Hemiarchaediscus planus* Miklukho-Maklay - Browne and Pohl, pl. 25, fig. 3 (holotype).
1973 *Archaediscus* (*Neoarchaediscus) planus* n. sp. Bozorgnia, p. 133-134, pl. 24, figs. 6-12.
1978 *Neoarchaediscus planus* Bozorgnia - Lys et al., pl. 1, fig. 21.
1978 *Archaediscus krestovnikovi* Rauzer-Chernoussova - Lys et al., pl. 1, fig. 24, pl. 2, fig. 26
p. 1993 *Archaediscus* of the group *A. krestovnikovi* Rauzer-Chernoussova - Mamet et al., pl. 14, figs. 29-31 (no figs. 2-23, 25, 27 = True *Archaediscus krestovnikovi*; nor figs. 24, 26, 28 = *Hemiarchaediscus planus*).
1993 *Nodosarchaediscus planus* Bozorgnia - Perret, pl. F.VIII, fig. 13.
v. 1993b *Nodosarchaediscus planus* (Bozorgnia) - Vachard et al., pl. 3, figs. 1, 6.
?1997 *Kasachstanodiscus kischkinensis* Marfenkova - Harris et al., fig. 6. 2.
p. 1997 *Paraarchaediscus stilus* (Grozdilova and Lebedeva in Grozdilova) - Harris et al., fig. 6. 4 (non fig. 6. 5-6 = true *Archaediscus stilus*).
? 2006 *Paraarchaediscus* plus nodes - Gallagher et al., fig. 14. 2, 5, 20.

Description. Diameter (D) = 0.300 mm; width (w) = 0.100 mm; ratio w/D = 0.33; proloculus diameter = 0.025 mm; number of whorls: 5;height of the last whorl = 0.050 mm; thickness of wall at the last whorl = 0.010 mm.
Remarks. *Hemiarchaediscus planus* Miklukho-Maklay and *Hemiarchaediscus planus* (Bozorgnia) (sic *Neoarchaediscus*) are homonyms and synonyms at the same time. This unusual particularity illustrates the most importance given to some authors on the coiling

("*planus*") upon the occlusion of the whorl (*Hemi-/Neo-*) and the fundamental differences between the classifications of archaediscids.

Occurrence. Holkerian-Brigantian of England. V3a-early Serpukhovian of Eastern Alborz (Iran). Asbian-early Serpukhovian of Maritime Provinces (SE Canada). ?Early Brigantian of Ireland. Middle-latest Viséan of Mississippi Valley (Ross and Ross, 1985, fig. 1). Alapah Limestone of Alaska. Late Serpukhovian-early Bashkirian of Alaska. Latest Asbian-latest Brigantian of Montagne Noire: Lenses of the road, near Roquessels (type locality; DV293C, D293E: 4 specimens, DV293G: 2 specimens, DV293I). Roque Redonde (?RR5: 1 specimen). ?Late Serpukhovian of Ardengost Serre de Castets, Cas13d (Perret, 1993).

Hemiarchaediscus spp.

v. non 1973b *Nodosarchaediscus* aff. *ovoides* (Rauzer-Chernousova) - Perret, p. 306, pl. 4, figs. 1-2 (= *Asteroarchaediscus baschkiricus*).
v. 1974b *Archaediscus* (?) *saleei* Conil and Lys - Vachard, p. 365-366, pl. 26, fig. 11.
v. 1974b *Propermodiscus cornua* (Conil and Lys) - Vachard, p. 346, pl. 24, figs. 17-18.
v. 1974b *Archaediscus* (?) cf. *demaneti* Conil and Lys - Vachard, p. 366, pl. 26, fig. 10.
1989 *Nodosarchaediscus* sp. - Fewtrell et al., p. 46, p. 50, pl. 3. 5, fig. 5, pl. 3. 7, fig. 7.
1989 *Nodosarchaediscus cornua* (Conil and Lys) - Fewtrell et al., p. 55, pl. 3. 8, fig. 13.
v. 1992 *Nodosarchaediscus viae* Vachard - Vachard and Berkhli, pl. 2, fig. 1.
p. 1993 *Archaediscus* of the group *A. krestovnikovi* Rauzer-Chernoussova - Mamet et al., pl. 14, figs. 24, 26, 28 (no figs. 2-23, 25, 27 = True *Archaediscus krestovnikovi*; nor fig. 29-31 = *Hemiarchaediscus viae*).
p. 1993 *Archaediscus* of the group *A. krestovnikovi* Rauzer-Chernoussova - Mamet et al., pl. 14, figs. 29-31 (no figs. 2-23, 25, 27 = True *Archaediscus krestovnikovi*; nor figs. 24, 26, 28 = *Hemiarchaediscus planus*).
1993 "*Nodosarchaediscus*" sp. - Mamet et al., pl. 14, figs. 32-33.
v. 1993 *Nodosarchaediscus demaneti* (Conil and Lys) - Perret, pl. F.VIII, fig. 8.
v. 1993 *Nodosarchaediscus* ex gr. *convexus* (Grozdilova and Lebedeva) - Perret, pl. F.VIII, fig. 15.
? 2004 "*Nodasperodiscus*" sp. - Cózar, pl. 1, fig. 18 (not a *Nodasperodiscus*, probably *N. viae* due to the coiling and the dimensions).
? 2005a *Neoarchaediscus ovoides* (Rauzer-Chernousova) - Cózar and Somerville, fig. 13. 11.
v. 2005 *Nodosarchaediscus demaneti* (Conil and Lys) - Saïd, p. 181, fig. X. 1. 5.
v. 2005 *Nodosarchaediscus* sp. - Saïd, p. 182 (no illustration).
2005c *Nodasperodiscus* sp. - Cózar et al., fig. 11. 6 (= *N. demaneti*).
2005c *Neoarchaediscus*? sp. - Cózar et al., fig. 11. 7 (= *N. demaneti*).

Occurrence. Latest Asbian-latest Brigantian of Montagne Noire: Lenses of the road, near Roquessels (type locality; DV293C, D293E: 4 specimens, DV293G: 2 specimens, DV293I); sommet 224-Valuzières (DV600C); Japhet (DV126G, DV164A); Les Pascales (DV601E); Les Mentaresses (DV328'A); Mounio (DV431D). ?Late Serpukhovian of Ardengost area: Bois de Gertous (MFP.Ger.5) (Perret, 1973b); Cas15 (Perret, 1993).

Subfamily Asteroarchaediscinae Miklukho-Maklay, 1957

Genus *Nodasperodiscus* Conil and Pirlet in Pirlet and Conil, 1974

Type species. *Archaediscus saleei* var. *saleei* Conil and Lys, 1964.

Diagnosis. Archaediscinae at grandiculus stage with complete occlusion of the central volutions and partial occlusion of the external volutions.

Synonyms. *Asteroarchaediscus* (pars), *Neoarchaediscus* (pars), *Planospirodiscus* (pars), *Kasachstanodiscus* (pars). "*Nodasperodiscus*" sensu Cózar (2004) seems to be more probably synonym of *Nodosarchaediscus*, whereas *Neoarchaediscus occlusus* of Somerville and Cózar, 2005, pl. 1, fig. 13 is a typical *Nodosasperodiscus saleei*.

Remarks. Contrary to Vachard (1974b, 1977b), the genus *Asteroarchaediscus* Miklukho-Maklay, 1956 (sensu stricto) is not present in Montagne Noire but is replaced by *Nodasperodiscus*.

Occurrence. Late Asbian-Brigantian, Palaeotethys (until Tien-Shan: Orlov-Labovsky, 2005, p. 23, 24, 25, 26) (poorly known, because of confusions with *Asteroachaediscus*, *Neoarchaediscus* and *Planospirodiscus*). Puzzling distribution in Alaska (see below *N. parvus*).

Nodasperodiscus ovoides (Rauzer-Chernousova, 1948f)
Pl. 42, figs. 21-22.

1948f *Archaediscus ovoides* n. sp. Rauzer-Chernousova, p. 232-233, pl. 16, figs. 6-8.
v. 1973b *Rugosoarchaediscus* sp. - Perret, p. 304-305, pl. 4, figs. 3-4.
v. 1977 *Neoarchaediscus* (= *Asperodiscus*) cf. *stellatus* (Bozorgnia) - Perret and Vachard, p. 90 (no illustration).
? 1979 *Asteroarchaediscus* sp. - Wagner et al., pl. 3, fig. 22.
1988 *Asteroarchaediscus ovoides* (Rauser) - Kulagina, p. 26, pl. 2, fig. 29, pl. 3, fig. 24.
1993 *Asteroarchaediscus ovoides* (Rauzer-Chernousova) - Mamet et al., pl. 15, figs. 28, 30-34.
v. 1993 *Neoarchaediscus stellatus* (Bozorgnia) - Perret, pl. F.IX, figs. 5, 11.
v. 1993 *Neoarchaediscus* ex gr. *subbaschkiricus* (Reitlinger) - Perret, pl. F.IX, figs. 4, 7, 10, 12, 14, 21.
v. 1993 *Neoarchaediscus* ex gr. *postrugosus* (Reitlinger) - Perret, pl. F.IX, figs. 6, 13.
v. 1993 *Asteroarchaediscus* ex gr. *rugosus* (Reitlinger) - Perret, pl. F.IX, figs. 8-9, 17.
v. 1993 *Asteroarchaediscus ovoides* (Rauzer-Chernousova) - Perret, pl. F.IX, fig. 15, pl. F.XI, fig. 19? (cf.).
v. 1993 *Asteroarchaediscus* ex gr. *baschkiricus* (Krestovnikov and Teodorovich) - Perret, pl. F.IX, figs. 16, 18-20.
2002 *Asteroarchaediscus ovoides* (Rauzer-Chernousova) - Shcherbakova and Shcherbakov, p. 308, 310 (no illustration).
2005a *Neoarchaediscus ovoides* (Rauzer-Chernousova) - Cózar and Somerville, fig. 13.11.
2005 *Neoarchaediscus ovoides* (Rauzer-Chernousova) - Somerville and Cózar, pl. 1, fig. 16.
? 2005c *Neoarchaediscus subbaschkiricus* (Reitlinger) - Cózar et al., fig. 11. 10 (or *N. akchimensis*).

Description. Test medium sized to large, lenticular with oscillating coiling. Diameter (D) = 0.425-0.515 mm; width (w) = 0.225-0.260mm; ratio w/D = 0.50-0.53; proloculus diameter = 0.010-0.015 mm; number of whorls:6-6.5; height of the last whorl = 0.050-0.075 mm; thickness of wall at the last whorl = 0.005-0.010 mm.
Occurrence. Late Aleksinsky-Tarussky of Submoscovite Basin, Kazakhstan and Donets Basin. Protvinsky-Siuransky of Urals. Brigantian of England. Early Brigantian of Ireland. Serpukhovian-Bashkirian of Alaska. Late Serpukhovian of Ardengost area: AH2, AH4, AH9, AH18, Cas37, Cas41, Mail4, Mail7, Mail11, Mail15, Mail22 (Perret, 1993).

Nodasperodiscus parvus (Rauzer-Chernoussova, 1948f)
Pl. 42, figs. 24-27, Pl. 43, 1-2.

1948f *Archaediscus parvus* n. sp. Rauzer-Chernoussova, p. 233, pl. 16, figs. 9-12.
1953 *Archaediscus parvus* var. *parvus* Rauser - Grozdilova, p. 104-105, pl. 4, fig. 6.
1956a *Archaediscus parvus* Rauser - Malakhova, p. 41, pl. 3, figs. 4-5.
p. 1970 *Neoarchaediscus* of the group *N. incertus* (Grozdilova and Lebedeva) - Mamet, n° 42 of text-fig. 3 p. 4-5, n° 37 of text-fig. 14 p. 28-29, p. 41, pl. 7, figs. 7-8 only (no fig. 12 well identified).
1972 *Asteroarchaediscus parvus* (Rauser) - Malakhova, p. 43, pl. 9, fig. 24.
1973 *Neoarchaediscus* cf. *N. parvus* (Rauser) - Brenckle, p. 63-64, pl. 9, figs. 11-15.
1973 *Neoarchaediscus* - Browne and Pohl, pl. 25, figs. 7-8.
v. 1974b *Asteroarchaediscus parvus parvus* (Rauzer-Chernousova) - Vachard, p. 369, pl. 26, figs. 17-20 (with synonymy).
v. 1977b *Asteroarchaediscus parvus parvus* (Rauzer-Chernousova) - Vachard, p. 161, pl. 7, figs. 26-29 (with 4 references in synonymy).
1978 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Sosipatrova, pl. 3, figs. 54-55.
1979 *Asteroarchaediscus parvus* (Rauser) - Wagner et al., pl. 19, fig. 6.
?1980 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Rich, p. 36-37, pl. 16, figs. 5-11(with synonymy).
1980 *Neoarchaediscus accuratus* Sosipatrova - Rich, p. 16-17, pl. 15, fig. 23.
1983 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Aizenverg et al., p. 16- 17 (no illustration).
1985 *Neoarchaediscus parvus* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1988 *Neoarchaediscus parvus* (Rauser) - Kulagina, p. 25, pl. 1, figs. 17, 21.

? p. 1989 *Nodasperodiscus gregorii* (Dain) - Fewtrell et al, p. 58, pl. 3. 10, fig. 6 (non *Asteroarchaediscus gregorii*: p. 66, pl. 3. 12, fig. 14).
1990 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Vdovenko et al., pl. 1, fig. 22.
v. 1991c *Asteroarchaediscus parvus* (Rauzer-Chernousova) - Vachard et al., p. 677, pl. 1, figs. 28-29.
1993 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Ueno and Nakazawa, fig. 4. 13-17 (with 18 references in synonymy).
1993 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Mamet et al., pl. 14, figs. 34-35.
p. 1996 *Neoarchaediscus incertus* - Somerville et al., figs. 6Q?, 6R (non figs. 6E, 6L = *Neoarchaediscus* spp.).
1996b *Neoarchaediscus parvus* (Rauzer-Chernousova) - Mamet, pl. 1, fig. 5.
1997 *Asteroarchaediscus* sp. - Gallagher and Somerville, fig. 9M.
1997 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Kulagina et al., text-fig. 2 (no illustration).
2000 *Neoarchaediscus* gr. *N. parvus* (Rauzer-Chernousova) - Sebbar, pl. 11, figs. 29-30.
2001 *Neoarchaediscus* (*Neoarchaediscus*) *parvus* (Rauzer-Chernousova) - Vdovenko, tabl. 1 p. 170, pl. 4, figs. 5-6, 7? (ex gr.).
2002 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Marfenkova, p. 193, 194, 195, 196, 197 (no illustration).
2002 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Pazukhin et al., p. 221 (no illustration).
v. 2002 *Asteroarchaediscus parvus* (Rauzer-Chernousova) - Krainer and Vachard, p. 18-19 (no illustration) (with synonymy).
? 2003a *Neodiscus parvus* (Rauzer-Chernousova) - Cózar, fig. 5D.
2004 *Neoarchaediscus parvus* (Reitlinger) (sic) - Cózar et al., fig. 3. 14.
2004 *Planospirodiscus minimus*? (Grozdilova and Lebedeva) - Cózar et al., fig. 3. 11.
? 2004 *Planospirodiscus minimus* (Grozdilova and Lebedeva) - Cózar and Somerville, fig. 10. 19.
?2004 *Neoarchaediscus* cf. *parvus* (Reitlinger) (sic) - Cózar and Somerville, fig. 14. 20 (or *Hemiarchaediscus*).
non 2005a *Neoarchaediscus parvus* (Reitlinger) (sic) - Cózar and Somerville, fig. 13. 5 *(=Neoarchaediscus*).
2005 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Orlov-Labkovsky, p. 23, 24, 25, 26 (no illustration).
2005 *Tubispirodiscus* aff. *simplicissimus* Browne and Pohl - Somerville and Cózar, pl. 1, fig. 11.
non 2005 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Somerville and Cózar, pl. 1, fig. 14 (= *N. incertus*).
2005 *Planospirodiscus* aff. *taimyricus* (Sossipatrova) - Somerville and Cózar, pl. 1, fig. 21.
non 2005c *Neoarchaediscus parvus* (Reitlinger) (sic) - Cózar et al., fig. 11. 9 (= *Neoarchaediscus borealis chantonae* Vachard in Termier et al., 1975).
2005 *Asteroarchaediscus* ex gr. *parvus* (Rauzer-Chernousova) - Sanz-Lopez et al., pl. 7, figs. 5, 10.

Description. Test small, discoidal with oscillating coiling. Proloculus spherical, proportionally big and free of occlusion. Lumen occluded by the typical nodes of the genus: complete in the inner volutions, incomplete (W-shaped in axial sections) in the outer volutions. Diameter (D) = 0.150-0.210 mm; width (w) = 0.050-0.087 mm; ratio w/D = 0,30-0,40; proloculus diameter = 0.012-0.030 mm; number of whorls: 4-5; height of the last whorl = 0.010-0.015 mm; thickness of wall at the last whorl = 0.010-0.015 mm.

Occurrence. Late Mikhailovsky-Venevsky of Submoscovite Basin. Venevsky-early Serpukhovian of Southern Urals. Serpukhovian of Kazakhstan. $C_1^{v}f_2$-late Serpukhovian of Donets Basin. Brigantian of England. Early Brigantian in Ireland. Early Serpukhovian of Southern Urals and Algeria. Late Serpukhovian-middle Bashkirian of Alaska. Brigantian of Monteagle Limestone (USA). Latest Viséan-base of late Serpukhovian of Tien-Shan. Omi Limestone in central Japan. Latest Brigantian of South China. Serpukhovian-Morrowan of Nevada. Bashkirian of Spitsbergen. Bashkirian of Bolivia. Latest Brigantian of Mounio (DV431C, DV431D).

Nodasperodiscus spp.
Pl. 42, fig. 23.

v. 1974b *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Vachard, p. 369-370, pl. 26, figs. 21-22 (with synonymy).
v. 1974b *Planospirodiscus* cf. *gregorii* (Dain in Grozdilova) - Vachard, p. 369, pl. 26, fig. 23 (with synonymy).
v. 1977 *Asteroarchaediscus* cf. *rugosus* (Rauzer-Chernousova) - Perret and Vachard, p. 90 (no illustration).
v. 1977b *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Vachard, p. 162, pl. 7, figs. 31-32 (with 3 references in synonymy).

v. 1977b *Asteroarchaediscus* aff. *gregorii* (Dain in Grozdilova) - Vachard, p. 162, pl. 7, fig. 33 (with 3 references in synonymy).
1979 *Asteroarchaediscus* ex gr. *rugosus* (Rauzer-Chernousova) - Wagner et al., pl. 4, figs. 6-7, pl. 5, fig. 42.
1980 *Neoarchaediscus gregorii* (Dain) - Rich, p. 35, pl. 15, figs. 27-35 (with synonymy).
1991 *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Brenckle, fig. 6. I, P-Q.
1991 *Neoarchaediscus* ex gr. *N. rugosus* (Rauzer-Chernousova) - Gibshman and Akhmetshina, pl. 3, figs. 8-10.
v. 1993 *Nodosarchaediscus* ex gr. *chernoussovensis* (Mamet) - Perret, pl. F.VIII, figs. 4, 21.
v. 1993 Forme intermédiaire entre *Archaediscus* et *Nodosarchaediscus* ex gr. *stilus* (Grozd. & Lebed.) - Perret, pl. F.VIII, fig. 10.
v. 1993 Forme intermédiaire entre *Archaediscus* et *Nodosarchaediscus* ex gr. *chernoussovensis* (Mamet) - Perret, pl. F.VIII, figs. 12, 14, 16.
2001 *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Vdovenko, tabl. 1 p. 169, pl. 4, fig. 2.
2002 *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Wood et al., pl. 7, figs. 7, 13.
2003 *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Brenckle and Milkina, pl. 6, fig. 34.
2003a *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Cózar, fig. 5J.
? v. 2005 *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Saïd, p. 187 (no illustration).
? 2005a *Planospirodiscus taimyricus* (Sossipatrova) - Cózar and Somerville, fig. 13. 7.
? 2005a *Tubispirodiscus* sp. - Cózar and Somerville, fig. 13.8.
? 2005a *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Cózar and Somerville, fig. 13.9.
2005 *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Somerville and Cózar, pl. 1, fig. 19.
2005 *Neoarchaediscus* aff. *borealis* (Reitlinger) - Somerville and Cózar, pl. 1, fig. 23.
2005 *Planospirodiscus minimus* (Grozdilova and Lebedeva) - Somerville and Cózar, pl. 1, fig. 25.
2005 *Planospirodiscus* cf. *gregorii* (Dain) - Somerville and Cózar, pl. 1, fig. 26.
2005 *Planospirodiscus gregorii* (Dain) - Somerville and Cózar, pl. 1, fig. 27.
2006 *Asteroarchaediscus rugosus* (Rauzer-Chernousova) - Groves and Beason, pl. 1, figs. 1-9.

Occurrence. Brigantian of Montagne Noire: Roquemaillère (DV134'B, DV134'C); Roc du Cayla (DV82C); Japhet (DV127A); Les Batailles (DV611A: "*Kazachstanodiscus*"); Mounio (DV431C, DV431D). Late Serpukhovian of Ardengost area: MFP.AH14, Cro14, Mail3, Mail17', Mail24, Cas13d (Perret, 1993).

Genus *Neoarchaediscus* Miklukho-Maklay, 1956

Type species. *Archaediscus incertus* Grozdilova and Lebedeva, 1954

Diagnosis. Asteroarchaediscinae at angulatus stage with internal whorls entirely occluded and stellate, and outer volutions entirely devoid of occlusion. The species are small and generally discoid, or larger and lenticular (synonym genus *Rugosoarchaediscus*).

Remarks. *Neoarchaediscus* sensu Cózar (2004), as illustrated pl. 1, figs. 14-15, seems to belong to *Hemiarchaediscus* and *Nodosarchaediscus*.

Occurrence. Late Viséan (MFZ13)-Bashkirian of Russian Platform, Urals and "central Asia", Japan, North Africa, Alberta (Canada), and southeastern Alaska and Idaho (USA).

Neoarchaediscus incertus (Grozdilova and Lebedeva, 1954)
Pl. 43, figs. 3-4.

1954 *Archaediscus incertus* n. sp. Grozdilova and Lebedeva, p. 60-61, pl. 7, figs. 14-15.
1960 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Grozdilova and Lebedeva, p. 98, pl. 11, fig. 11.
1963 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Conil and Pirlet, pl. 2, fig. 29.
p. 1970 *Neoarchaediscus* of the group *N. incertus* (Grozdilova and Lebedeva) - Mamet, n° 42 of text-fig. 3 p. 4-5, n° 37 of text-fig. 14 p. 28-29, p. 41, pl. 7, fig. 12 only (no figs. 7-8 = *Nodasperodiscus parvus*).
?1970 *Neoarchaediscus* of the group *N. incertus* (Grozdilova and Lebedeva) - Skipp and Mamet, p. B121, B122 (no illustration).
v. 1973b *Neoarchaediscus postrugosus* (Reitlinger) - Perret, p. 304, pl. 3, fig. 11.
1973 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Popova and Reitlinger in Einor, p. 57, pl. 9, fig. 12 (with synonymy).
1973 *Archaediscus* (*Neoarchaediscus*) *incertus* (Grozdilova and Lebedeva) - Bozorgnia, p. 130-131, pl. 30, figs. 1-6.

1973 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Brenckle, p. 63, pl. 9, figs. 16-25.
1973 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Browne and Pohl, pl. 25, figs. 7-9 (refigured holotype).
1975 *Neoarchaediscus* cf. *incertus* (Grozdilova and Lebedeva) - Grozdilova et al., p. 62, pl. 14, fig. 16.
1978 *Neoarchaediscus* aff. *N. incertus* (Grozdilova and Lebedeva) - Lys et al., pl. 2, fig. 32 (= *Nodasperodiscus regularis*).
1978 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Sosipatrova, pl. 2, fig. 12, pl. 3, figs. 41-42.
1979 *Neoarchaediscus* ex gr. *incertus* (Grozdilova and Lebedeva) - Wagner et al., pl. 5, figs. 43-44.
1980 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Rich, p. 35-36, pl. 16, figs. 1-4, pl. 22, figs. 10, 13, 18, 21-22 (with synonymy).
1981 *Neoarchaediscus* of the group *N. incertus* (Grozdilova and Lebedeva) - Mamet et al., p. 28, 29 (no illustration).
1983 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Aizenverg et al., p. 16-17 (no illustration).
1984 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Groves, text-fig. 6 p. 287, text-fig. 7 p. 289, pl. 2, figs. 9-14.
1985 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Lys, pl. 2, fig. 12.
1985 *Neoarchaediscus* aff. *incertus* (Grozdilova and Lebedeva) - Adachi, p. 121-122, pl. 21, figs. 6-7 (with synonymy).
1988 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Kulagina, p. 25 (no illustration).
1989 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Fewtrell et al., p. 66, pl. 3. 12, figs. 13, 20.
1989 *Nodosarchaediscus* (*Neoarchaediscus*) *incertus* (Grozdilova and Lebedeva) - Skompski et al., pl. 7, fig. 26.
v. 1989 *Neoarchaediscus* ex gr. *incertus* (Grozdilova and Lebedeva) - Chalot-Prat and Vachard, fig. 3. 3-4.
1993 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Mamet et al., pl. 15, figs. 5-6.
v. 1993 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Perret, pl. F.IX, figs. 1-2, pl. F.X, figs. 3, 13? (cf.), 20.
p. 1996 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Somerville et al., fig. 6L (non fig. 6E, another species), nec fig. 6Q?-R (= *Nodasperodiscus parvus*).
? 1996 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Gallagher, text-fig. 2 p. 242 (no illustration).
v. 1996 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Proust et al, p. 349 (no illustration).
v. 1996 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Vachard and Maslo, text-fig. 1 p. 359 (no illustration).
? 1997 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Gallagher and Somerville, text-fig. 4 p. 318, text-fig. 6 p. 321, text-fig. 7a-c p. 323, text-fig. 8 p. 325, fig. 9n.
v. 1999 *Neoarchaediscus* ex gr. *incertus* (Grozdilova and Lebedeva) - Berkhli, p. 111 (no illustration).
2002 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Shcherbakova and Shcherbakov, p. 310, 312, 313, 314 (no illustration).
2003a *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Cózar, fig. 5B.
? 2004 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Cózar, text-fig. 6 p. 378 (no illustration).
? 2004 *Neoarchaediscus* cf. *incertus* (Grozdilova and Lebedeva) - Cózar, pl. 1, fig. 15 (stellate part very faint, maybe *Nodosarchaediscus*).
2004 *Neoarchaediscus* cf. *incertus* (Grozdilova and Lebedeva) - Cózar et al., fig. 3. 8.
? 2004 *Neoarchaediscus* cf. *incertus* (Grozdilova and Lebedeva) - Cózar and Somerville, fig. 10. 18.
v. 2005 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Saïd, p. 190 (no illustration).
2005 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Orlov-Labkovsky, p. 25, 26 (no illustration).
? 2005a *Neoarchaediscus parvus* (Rauzer-Chernousova) - Cózar and Somerville, fig. 13.5
non 2005a *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Cózar and Somerville, fig. 13.6 (= *A. borealis chantonae*).
2005 *Neoarchaediscus parvus* (Rauzer-Chernousova) - Somerville and Cózar, pl. 1, fig. 14.
non 2005 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Somerville and Cózar, pl. 1, fig. 22 (= *A. borealis chantonae*).
? 2006 *Neoarchaediscus* (*Nodasperodiscus*) spp. (sic) - Gallagher et al., fig. 14. 4.
? 2006 *Neoarchaediscus incertus* (Grozdilova and Lebedeva) - Gallagher et al., fig. 14. 25-26 (maybe *Planospirodiscus*).

Description. Test small, discoidal; coiling aligned; three intial whorls stellate, last whorls nearly planispiral, typically at angulatus stage. Diameter (D) = 0.190-0.430 mm; width (w) = 0.060-0.160 mm; ratio w/D = 0.27-0.46; proloculus diameter = 0.028-0.035 mm; number of whorls: 4-6; height of the last whorl = 0.015-0.026 mm; thickness of wall at the last whorl = 0.008-0.016 mm.

Occurrence. Late Asbian-Serpukhovian of England. Late Asbian to early Serpukhovian of Windsor Group (SE Canada). Donets Basin (up to early Voznessensky: Aizenverg et al., 1983; Vachard and Maslo, 1996). Latest Asbian-Brigantian of Ireland. Late Viséan-early Bashkirian of Urals. Cf6δ (= MFZ15) of Poland. Late Asbian-late Brigantian of central Morocco. Latest Viséan-late Serpukhovian of Idaho (USA). Late Serpukhovian of Alaska. Ichinotani Formation of Japan. Earliest Bashkirian of Algeria (Bechar Basin). V3c-Serpukhovian of central Alborz (Iran). Akiyoshi Group of Japan. Middle Serpukhovian-base of late Serpukhovian of Tien-Shan. Serpukhovian-Morrowan of Nevada. Morrowan of Idaho. Bashkirian of Spitsbergen. Late Serpukhovian of Ardengost area: Bois de Gertous (MFP.Ger14-15), Serre de Castets Cas14 (Perret, 1973b, 1993). Bashkirian of Pyrenees.

Neoarchaediscus akchimensis (Grozdilova and Lebedeva, 1954)
Pl. 43, figs. 5-15.

1954 *Archaediscus akchimensis* n. sp. Grozdilova and Lebedeva, p. 53-54, pl. 5, fig. 13, pl. 6, fig. 1.
1962 *Neoarchaediscus akchimensis* (Grozdilova and Lebedeva) - Bogush and Juferev, p. 208-209, pl. 9, fig. 18.
1973 *Archaediscus* (*Rugosoarchaediscus*) *stellatus* n. sp. Bozorgnia, p. 123-124, pl. 26, figs. 1-4.
v. 1974b *Neoarchaediscus akchimensis* (Grozdilova and Lebedeva) - Vachard, p. 367, pl. 26, fig. 12 (with synonymy).
v. non 1977 *Neoarchaediscus* (= *Asperodiscus*) cf. *stellatus* (Bozorgnia) - Perret and Vachard, p. 90 (no illustration).
1979 *Neoarchaediscus agapovensis* (Ivanova) - Wagner et al., pl. 9, fig. 15.
non 1981 *Asperodiscus stellatus* Bozorgnia - Strank, pl. 20, fig. 18.
1985 *Neoarchaediscus akchimensis* (Grozdilova and Lebedeva) - Lys, pl. 2, fig. 8.
1985 *Archaediscus akchimensis* Grozdilova and Lebedeva - Adachi, p. 120-121, pl. 21, fig. 1.
?1985 *Neoarchaediscus agapovensis* (Ivanova) - Adachi, p. 122, pl. 21, figs. 8-9.
1988b *Rugosoarchaediscus agapovensis* (Ivanova) - Ivanova, pl. 3, fig. 24.
1989 *Nodosarchaediscus stellatus* (Bozorgnia) - Fewtrell et al., p. 58, pl. 3. 10, fig. 1.
v. 1992 *Neoarchaediscus stellatus* (Bozorgnia) - Vachard and Berkhli, pl. 3, fig. 8.
non 1992 *Neoarchaediscus stellatus* (Bozorgnia) - Somerville et al., fig. 6G, fig. 6K (= *Nodasperodiscus* or *Hemiarchaediscus*).
?1996 *Neoarchaediscus stellatus* (Bozorgnia) - Gallagher, text-fig. 2 p. 242 (no illustration).
?1997 *Neoarchaediscus stellatus* (Bozorgnia) - Gallagher and Somerville, text-fig. 6 p. 321, text-fig. 7a-c p. 323, text-fig. 8 p. 325, fig. 9P.
1997 *Neoarchaediscus akchimensis* (Grozdilova and Lebedeva) - Mizuno and Ueno, tabl. 2, pl. 2, figs. 27-28.
1997 *Neoarchaediscus agapovensis* (Ivanova) - Mizuno and Ueno, tabl. 2, pl. 2, fig. 29.
1998 *Neoarchaediscus stellatus* (Bozorgnia) - Gallagher, pl. 2, fig. 9.
1999 *Rugosoarchaediscus stellatus* (Bozorgnia) - Berkhli, p. 113 (no illustration).
2000 *Neoarchaediscus* sp. - Sebbar, pl. 11, figs. 3-4.
2002 *Rugosoarchaediscus akchimensis* (Grozdilova and Lebedeva) - Ponomareva et al., p. 240 (no illustration).
? 2003 *Neoarchaediscus akchimensis* (Grozdilova & Lebedeva) - Brenckle and Milkina, pl. 5, fig. 28.
?2003 *Neoarchaediscus agapovensis* Ivanova - Brenckle and Milkina, pl. 3, fig. 24.
? 2003 *Neoarchaediscus tumefactus* Ivanova) - Brenckle and Milkina, pl. 5, fig. 19.
? 2004 *Neoarchaediscus stellatus* (Bozorgnia) - Cózar and Somerville, fig. 14. 9 (the shape is apparently different).
non 2004 *Neoarchaediscus stellatus* (Bozorgnia) - Cózar, text-fig. 6 p. 378, pl. 1, fig. 21 (clearly a *Nodosarchaediscus*).
2005 *Rugosoarchaediscus agapovensis* (Ivanova) - Orlov-Labkovsky, p. 23, 25 (no illustration).
non 2005c *Neoarchaediscus stellatus* (Bozorgnia) - Cózar et al., fig. 11. 8 (= *Nodasperodiscus saleei*).
2006 *Neoarchaediscus* (*Nodasperodiscus*) *stellatus* (Bozorgnia) - Gallagher et al., fig. 14. 18, 24.

Description. Relatively large *Neoarchaediscus*, lenticular, with sigmoidal coiling. Diameter (D) = 0.390-0.540 mm; width (w) = 0.220-0.280 mm; ratio w/D = 0.51-0.63; proloculus diameter = 0.035 mm; number of whorls: >6.

Occurrence. V3a-V3b of central Alborz (Iran). ?Late Viséan-?Protvinsky of Kazakhstan. Serpukhovian of Donets Basin. Asbian-Serpukhovian of England. Brigantian Southwestern Spain. Latest Asbian-earliest Serpukhovian of Ireland. Earliest Serpukhovian of Tien-Shan.

Early Serpukhovian of Algeria. Late Serpukhovian of Urals and Japan (Hina Group). Ichinotani Formation of Japan. Late Serpukhovian of Ardengost area: Areng (MFP.AH18) (Perret, 1973b), MFP.AH18A, AH18F, AH.18H (this study).

Neoarchaediscus spp.

v. 1974b *Neoarchaediscus* aff. *occlusus* (Hallett) - Vachard, p. 367-368, pl. 26, figs. 5, 13 (with synonymy).
v. 1974b *Neoarchaediscus* sp. 1 - Vachard, p. 368, pl. 26, fig. 16.
v. 1977b *Nodasperodiscus* aff. *occlusus* (Hallett) - Vachard, p. 161, pl. 7, fig. 25.
v. 1977b *Neoarchaediscus* cf. *mutans* (Conil and Lys) - Vachard, p. 161, pl. 7, fig. 24.
1988 *Neoarchaediscus karreriformis* (Reitlinger) - Kulagina, p. 25, pl. 1, fig. 25.
?1989 *Asteroarchaediscus occlusus* (Hallett) - Fewtrell et al., p. 58, pl. 3. 10, figs. 3-17.
1992 *Neoarchaediscus (Nodasperodiscus) occlusus* (Hallett) - Somerville et al., figs. 6I-J, N.
1992 *Neoarchaediscus (Nodasperodiscus)* sp. - Somerville et al., fig. 6O.
1993 *Neoarchaediscus* sp. - Mamet et al., pl. 14, figs. 36-37.
2004 *Neoarchaediscus occlusus* (Hallett) - Cózar and Somerville, fig. 14. 8.
2005a *Neoarchaediscus* cf. *karreriformis* (Rauser-Chernousova) (sic) - Cózar and Somerville, text-fig. 16 p. 59, fig. 13. 1, 3.
2005 *Neoarchaediscus regularis* (Suleimanov) - Somerville and Cózar, pl. 1, fig. 14.
2005 *Neoarchaediscus* cf. *karreriformis* (Rauser-Chernousova) (sic) - Somerville and Cózar, pl. 1, fig. 17.

Occurrence. Brigantian of Montagne Noire: Roc du Cayla (DV82B: *N. akchimensis*, DV82D); Japhet (?DV126B); Colline 199 (DV141A); Les Pascales (DV601F); Les Batailles (DV611:"*Kazachstanodiscus*" sensu Pinard and Mamet, 1998); Les Mentaresses (DV328'C).

Genus *Asteroarchaediscus* Miklukho-Maklay, 1956

Type species. *Archaediscus baschkiricus* Krestovnikov and Teodorovich, 1936.

Diagnosis. Asteroarchaediscinae at angulatus stage with almost all the whorls entirely occluded and stellate, excepted the last one or two whorl with faint nodosities or devoid of occlusion (for example, *A. postrugosus* (Reitlinger, 1949)).

Remarks. As admitted here, the Viséan forms can belong to *Nodasperodiscus*, and the FAD of *Asteroarchaediscus* corresponds truly as the base of Serpukhovian, as always indicated in the work of Mamet. My conception of the related genus *Planospirodiscus* corresponds exactly to *Asteroarchaediscus*? sp. A of Harris et al. (fig. 6. 27-26); i. e., forms with "evolute, nearly planispiral coiling and narrowly discoidal shape", and to the illustration of Lys, 1988 (pl. 1, fig. 2) erroneously denominated *Asteroarchaediscus gregorii*.

Occurrence. ?Early Brigantian of Ireland. Mikhailovsky, Serpukhovian-early Moscovian (Vereisky) of Russian Platform, Kazakhstan and "Central Asia". $C_1^{\gamma}g$ (B7 and B11 limestones)-C_2m (K1 limestone) of Donets Basin. Ladeininsky-Siuransky; or Venevsky-late Bashkirian of Southern Urals (including the Bashkirian stratotype). MFZ 14 (upper part) to MFZ16 of Belgium. ?V3bγ-V3c (Crenistria to Spirale zone) of Germany. Late Brigantian of Ireland. Late Brigantian-Serpukhovian of Morocco. Late Serpukhovian-early Bashkirian of Algeria (Bechar Basin). Latest Viséan-earliest Bashkirian of Iran (central and Eastern Alborz). Serpukhovian of Tien-Shan. Latest Viséan-late Bashkirian of NE Thailand. Ichinotani Formation, Akiyoshi Group and Hina Group (late Serpukhovian) of Japan. Latest Viséan-early Serpukhovian of Windsor Group (Canada). Early-late Serpukhovian, Morrowan-base of Atokan of Idaho (USA). Late Serpukhovian-early Bashkirian of Alaska. Bashkirian of Bolivia.

Asteroarchaediscus baschkiricus (Krestovnikov and Teodorovich, 1936)
Pl. 43, figs. 16-18.

1936 *Archaediscus baschkiricus* n. sp. Krestovnikov and Teodorovich, p. 87-89, text-fig. 2.
1953 *Archaediscus baschkiricus* var. *baschkiricus* Krestovnikov and Teodorovich - Grozdilova, p. 100-101, pl. 3, fig. 12.
1956a *Archaediscus baschkiricus* Krestovnikov and Teodorovich - Malakhova, p. 40, pl. 3, fig. 3.
1960 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Grozdilova and Lebedeva, p. 97, pl. 11, fig. 9.
?1967 cf. *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Conil and Paproth, p. 66 (no illustration).
1970 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Mamet, n° 7 of text-fig. 3 p. 4-5, p. 8, p. 30 (with references), n° 4? (of the group) of text-fig. 14 p. 28-29, p. 31, pl. 7, fig. 19? (of the group), 20.
1970 *Asteroarchaediscus* of the group *A. baschkiricus* (Krestovnikov and Teodorovich) - Skipp and Mamet, p. B121, B122 (no illustration).
1972 *Asteroarchaediscus baschkiricus* (Krestovnikov et Theodorovich) - Malakhova, p. 43, pl. 9, fig. 1.
v. 1973b *Nodosarchaediscus* aff. *ovoides* (Rauzer-Chernousova) - Perret, p. 306, pl. 4, figs. 1-2.
1973 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Popova and Reitlinger in Einor, p. 56, pl. 9, figs. 16-19 (with synonymy).
1973 *Archaediscus* (*Asteroarchaediscus*) *baschkiricus* Krestovnikov and Teodorovich - Bozorgnia, p. 136-137, pl. 30, figs. 17, 21-24.
1975 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Grozdilova et al., p. 62, pl. 14, fig. 8.
v. 1977 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Perret and Vachard, p. 90 (no illustration).
v. 1977 *Asteroarchaediscus* cf. *pustulus* (Grozdilova and Lebedeva) - Perret and Vachard, p. 90 (no illustration).
1978 *Asteroarchaediscus baschkiricus* (Krest. et Theod.) - Sultanaev et al., p. 100, pl. 8, fig. 14.
1979 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Bensaïd et al., pl. 15, figs. 10-11.
1979 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Wagner et al., pl. 3, figs. 23-24.
1981 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Mamet et al., p. 28, 29? (of the group) (no illustration).
1982 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Baxter and Brenckle, p. 145 (no illustration).
1983 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Aizenverg et al., p. 14-15 (no illustration).
? 1983 *Nodosarchaediscus (Asteroarchaediscus)* cf. *baschkiricus* (Krestovnikov and Teodorovich) forme sigmoïdale - Conil and Paproth, fig. 3. 5.
1985 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Adachi, p. 123, pl. 21, figs. 14-15 (with synonymy).
1985 *Asteroarchaediscus baschkiricus* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1985 *Astroarchaediscus* (sic) *baschkiricus* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1985 *Asteroarchaediscus* of the group *A. baschkiricus* (Krestovnikov and Teodorovich) - Skipp et al., pl. 2, figs. 1-4.
1987 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Sinitsyna and Sinitsyn, pl. 5, fig. 25, pl. 8, fig. 18, pl. 11, fig. 19, pl. 14, fig. 22, pl. 16, fig. 15.
1988 *Asteroarchaediscus* ex gr. *baschkiricus* (Krestovnikov and Teodorovich) - Groves, fig. 11. 8-14.
1988 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Kulagina, p. 25, pl. 4, fig. 23.
1988 *Asteroarchaediscus baschkiricus* (Krest. et Theod.) - Kulagina and Pazukhin, p. 42 (no illustration).
1988b *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Ivanova, pl. 2, fig. 19, pl. 3, fig. 21.
v. 1990 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Vachard, pl. 2, fig. 8.
1991 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Brenckle, fig. 6. J-O.
1991 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Gibshman and Akhmetshina, pl. 3, figs. 16-17.
1993 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Mamet et al., pl. 15, figs. 19-27, 29.
v. non 1993 *Asteroarchaediscus* ex gr. *baschkiricus* (Krestovnikov and Teodorovich) - Perret, pl. F.IX, figs. 16, 18-20, pl. F.X, fig. 6, pl. F.XI, fig. 5.
v. 1996 *Asteroarchaediscus baschkiricus* (Krestovnikov & Theodorovich) - Vachard, pl. 1, fig. 16.
v. 1996 *Asteroarchaediscus* du groupe *baschkiricus* (Krestovnikov & Theodorovich) - Proust et al, p. 349, pl. fig. 1, pl. 4, fig. 9.
1996b *Asteroarchaediscus* of the group *A. bashkiricus* (sic) (Krestovnikov and Teodorovich) - Mamet, pl. 1, fig. 6.
1997 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Gallagher and Somerville, fig. 9 O.

?1997 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Harris et al., fig. 6. 11-12 (maybe *A. subbaschkiricus*).
1997 *Asteroarchaediscus* ex gr. *baschkiricus* (Krestovnikov and Teodorovich) - Mizuno and Ueno, tabl. 2, pl. 2, figs. 21-22.
2001 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Vdovenko, tabl. 1 p. 169, pl. 4, fig. 4? (aff.).
2002 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
2002 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Marfenkova, p. 196 (no illustration).
2002 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Pazukhin et al., p. 221 (no illustration).
2002 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Shcherbakova and Shcherbakov, p. 308, 310, 311, 312, 313, 314 (no illustration).
2003 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Kulagina et al., text-fig. 7 p. 180 (no illustration).
2003 *Asteroarchaediscus baschkiricus* (Krestovnikov and Theodorovich (sic) - Brenckle and Milkina, pl. 5, fig. 17.
2004 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Sebbar, pl. 11, fig. 20.
2004 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Cózar et al., fig. 3. 10, 12.
? 2004 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Cózar and Somerville, fig. 10. 26-27.
? 2005a *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Cózar and Somerville, fig. 13. 9.
2005 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Orlov-Labkovsky, p. 23, 25 (no illustration).
? 2005 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Somerville and Cózar, pl. 1, fig. 20 (or another *Asteroarchaediscus*, because of a transverse section).
? 2005c *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Cózar et al., fig. 11. 13.
2006 *Asteroarchaediscus baschkiricus* (Krestovnikov and Teodorovich) - Gallagher et al., fig. 14. 21-23.

Description. Diameter (D) = 0.280-0.530 mm; width (w) = 0.150-0.380 mm; ratio w/D = 0.50-0.72; proloculus diameter = 0.020-0.040 mm; number of whorls: 4-6; height of the last whorl = 0.015-0.020 mm; thickness of wall at the last whorl = 0.020-0.040 mm.

Remarks. The true *A. baschkiricus*, as indicated since long time by Mamet in its monolithic work, are probably earliest Serpukhovian in age, according to the implicite idea of Orlov-Labkovsky (2005, p. 24, 25), the misinterpreted forms, reported to its species in the latest Viséan, are most probably *Nodasperodiscus saleei* (Conil and Lys, 1964).

Occurrence. As for the genus. Late Serpukhovian of Ardengost area: Areng (MFP.AH14), Col de Frechet (MFP.Bar1) (Perret, 1973b).

Family Eosigmoilinidae Vachard, 1980 nomen translat. Vachard in Vachard et al., 2003b
Subfamily Eosigmoilininae Vachard, 1980
Genus *Eosigmoilina* Ganelina in Kiparisova et al., 1956.

Type species. *Eosigmoilina explicata* Ganelina in Kiparisova et al., 1956.

Diagnosis. Test ellipsoidal at the angulatus/tenuis stage. Peculiar coiling: plagiosigmoid with polar superposition of whorls. Nodosities absent. Wall pseudo-fibrous. Simple terminal aperture.

Remarks. *Brenckleina* Zaninetti and Altiner, 1979 which differs only in the presence of nodosities belongs necessarily to the same family as *Eosigmoilina*, contrary to the classification of Brenckle et al. (1987). Contrary to Loeblich and Tappan (1987), the name Eosigmoilinidae Brazhnikova and Vdovenko in Vdovenko, 1977 is a nomen nudum, the unpublished report of Vdovenko 1977 was in fact published in 2001. In the material of Ardengost, a possible ancestral form was discovered (Pl. 43, figs. 19-20).

Occurrence. Serpukhovian of rare localities: Donets basin, Russian Platform, Pyrenees (very rare), Libya, Algeria (Reggan, Tindouf and Bechar), Iran (Alborz), England, Scotland, Central Afghanistan, Pamir, central Tien-Shan and North America (Idaho, Wyoming, Tennessee). The Turkish reference of Argyriadis et al. (1976) cannot be confirmed (Pille et al., submitted-b).

Eosigmoilina explicata Ganelina in Kiparisova et al., 1956
Pl. 43, figs. 21-22.

? 1876 *Trochammina Robertsoni* n. sp. Brady, p. 80, pl. 3, figs. 6-7.
1956 *Eosigmoilina explicata* n. gen. n. sp. Ganelina in Kiparisova et al., p. 18, pl. 2, figs. 6-8.
1964 *Eosigmoilina explicata* Ganelina forma typica - Brazhnikova, p. 9-10, pl. 1, figs. 8, 10-12, 16-18, pl. 2, figs. 8-15.
1964 *Eosigmoilina explicata* Ganelina forma lata - Brazhnikova, p. 11, pl. 1, figs. 14-15, pl. 2, figs. 1-6, 11-14.
1964 *Eosigmoilina explicata* Ganelina forma evoluta - Brazhnikova, p. 11-12, pl. 1, figs. 19-20, pl. 2, figs. 12-13, 19-20.
1964 *Eosigmoilina explicata* Ganelina forma compacta - Brazhnikova, p. 12, pl. 2, fig. 18.
1964 *Eosigmoilina* sp. - Brazhnikova, pl. 1, figs. 1-4.
1964 *Eosigmoilina explicata* Ganelina - Brazhnikova, pl. 1, figs. 5-7.
?1964 *Eosigmoilina namuriensis* Ganelina - Brazhnikova, pl. 1, fig. 9.
?1964 *Quasiarchaediscus pamirensis* Miklukho-Maklay - Brazhnikova, pl. 1, fig. 13.
v. 1973b *Eosigmoilina* sp. - Perret, p. 306-307, pl. 3, fig. 12.
v. 1977 *Eosigmoilina* sp. - Perret and Vachard, p. 90 (no illustration).
1979 *Eosigmoilina explicata* Ganelina - Wagner et al., pl. 5, figs. 1-3, pl. 9, figs. 1-2.
1977 Eosigmoilinids (= "*Trochammina"robertsoni*) - Brenckle et al., p. 113 (no illustration).
1982a *Eosigmoilina robertsoni* (Brady) – Brenckle et al. , text-figs. 2-6 (no illustration).
1982 *Eosigmoilina robertsoni* (Brady) (= *E. explicata* Ganelina) - Baxter and Brenckle, p. 143, 149 (no illustration).
1983 *Eosigmoilina explicata* Ganelina - Aizenverg et al., p. 16-17 (no illustration).
1984 *Eosigmoilina explicata* Ganelina - Vachard and Massa, pl. 1, fig. 3.
1985 *Eosigmoilina robertsoni* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1985 *Eosigmoilina robertsoni* (Brady) - Skipp et al., pl. 1, figs. 3, 4 ?, 5-6.
1989 *Eosigmoilina robertsoni* (Brady) - Fewtrell et al., p. 66, pl. 3. 12, fig. 22.
1990 *Eosigmoilina explicata* Ganelina - Vdovenko et al., pl. 1, fig. 21.
1991 *Eosigmoilina explicata* Ganelina - Gibshman and Akhmetshina, pl. 3, fig. 3.
v. 1993 *Eosigmoilina explicata* Ganelina - Perret, pl. F.VIII, figs. 1-2.
1996 *Eosigmoilina explicata* Ganelina - Reitlinger in Einor, pl. 2, fig. 29, pl. 34, figs. 7, 9 , 11.
v. 1996 *Eosigmoilina explicata* Ganelina - Vachard and Montenat, text-fig. 4 p. 469, pl. 2, figs. 23-25.
1997 *Eosigmoilina explicata* Ganelina - Kulagina, p. 61 (no illustration).
1997 *Eosigmoilina robertsoni* (Brady) - Kulagina, p. 61 (no illustration).
1997 *Eosigmoilina explicata* Ganelina - Kulagina and Sinitsyna, p. 83 (no illustration).
1997 *Eosigmoilina robertsoni* (Brady) - Harris et al., fig. 6. 18.
2001 *Eosigmoilina* sp. ex gr. *explicata* Ganelina - Vdovenko, tabl. 1 p. 170, pl. 4, fig. 11.
2002 *Eosigmoilina explicata* Ganelina - Marfenkova, p. 196, 197 (no illustration).
2002 *Eosigmoilina explicata* Ganelina - Ponomareva et al., p. 240 (no illustration).
2005 *Eosigmoilina explicata* Ganelina - Orlov-Labkovsky, p. 24, 25, 26 (no illustration).

Description. Diameter (D) = 0.150-0.475 mm; width (w) = 0.070-0.225 mm; ratio w/D = 0.30-0.53; proloculus diameter = 0.020-0.022 mm; number of whorls: 4 or 6; height of the last whorl = 0.017-0.030 mm; thickness of wall at the last whorl = 0.005-0.008 mm.

Occurrence. FAD: early Serpukhkovian (C5 limestone) of Donets Basin; LAD: Zapaltiubinsky (Aizenverg et al., 1983; Vachard and Maslo, 1996) or basal Bashkirian (Kulagina, 1997). Serpukhovian of Kazakhstan and Talass Alatau (Tien-shan). Early-late Serpukhovian of Afghanistan. Serpukhovian of Mississippi Valley and Alaska. Late Serpuhkhovian of Southern Urals and England. Late Serpukhovian of Ardengost area: Bois de Gertous, Col de Frechet (Perret, 1973b); CasB, Ger1 (Perret, 1993); ?MFP.AH18, ?AH20E, AH20'F (this study).

Eosigmoilina sp. 2
Pl. 43, fig. 23.

v. 1973b ?*Rugosoarchaediscus* sp. - Perret, pl. 4, fig. 5.
v. 1993 *Eosigmoilina* sp. - Perret, pl. FVIII, fig. 3.

Description. The initial eosigmolinoid coiling is followed by two sigmoidally coiled last whorls at the tenuis stage. Diameter (D) = 0.400 mm; width (w) = 0.240 mm; ratio w/D = 0.60; proloculus diameter = 0.015/0.020 mm; number of whorls: 7.5/8; height of the last whorl =0.100 mm; thickness of wall at the last whorl = 0.007 mm.

Occurrence. Late Serpukhovian of Ardengost area: Ger5c (Perret, 1993).

7.7. Lasiodiscoids

Superfamily Lasiodiscoidea Reitlinger, 1956
nomen translat. Reitlinger in Vdovenko et al., 1993 (ex family)
Family Howchiniidae Martini and Zaninetti, 1988 emend. here

Synonym. Vissariotaxidae Reitlinger in Vdovenko et al., 1993 (pars).

Emended diagnosis. Test tubular undivided, helicoidally arranged, in low spire or high spire. Wall basically dark microgranular, often bilayered with additional clear pseudofibrous layer, overlying the dark layer and filling the umbilical depressions, rarely passing to pseudo-pillar. Simple terminal aperture.

Composition. *Howchinia* Cushman, 1927a, *Vissariotaxis* Mamet, 1970, *Planohowchinia* Cózar and Mamet, 2001, "*Monotaxinoides*" Brazhnikova and Yartseva, 1956 sensu Kulagina, 2001**.**

Remarks. I admit the phylogenies proposed by Vachard and Beckary (1991) and Cózar and Mamet (2001), but not the one of Kulagina (2001), i.e. I do admit the unidirectional character of all the monolayered forms and that of the bilayered forms, because in the populations of *Howchinia* and *Hemidiscus* (see Vachard and Krainer, 2001a) specimens with or without two layers are present. The monolayered or bilayered character seems to be individual or specific, eventually generic, but never characterizes families (as defined for Turrispiroididae orth. mut. or Vissarotaxidae), but is variable between a species, for instance *Hemidiscus carnicus* (see Vachard and Krainer, 2001a).

Occurrence. Late Viséan-Serpukhovian, from Cf6α to Cf8 (MFZ 13 to post-MFZ16), Palaeotethyan. According to Cózar and Somerville (2004, fig. 15) *H. bradyana* appears in the top of Asbian, whereas the FAD of *H. gibba* is situated in the early Brigantian.

Genus *Howchinia* Cushman, 1927a

Type species. *Patellina bradyana* Howchin, 1888.

Synonym. *Monotaxis* Vissarionova, 1948.

Diagnosis. Test conical. The undivided tubular chamber is coiled in a high spire. The umbilicus is filled with pseudo-fibrous calcite sometimes organized in pseudo-pillars (*H. beleutensis*). The wall of the tubular chamber is bilayered: a thick microgranular layer , with an external thin pseudofibrous layer in continuity with the umbilical filling. Simple terminal aperture, supplementary sutural apertures located externally and internally.

Remarks. *Vissariotaxis* was described as an ancestor of *Howchinia* limited in time to the early Asbian (Conil et al., 1991), but as indicated by Sebbar (2000, pl. 13, fig. 1) this genus is still present in the early Serpukhovian. In general, *Vissariotaxi*s appears as individual variation of the wall structure of *Howchinia* and not as a really characterized genus (see "*Vissariotaxis* transitional to *Howchinia*" of Cózar, 2004, pl. 1, fig. 20).

Occurrence. ?MFZ13 of Belgium with "primitive *Howchinia*" (Devuyst et al., 2005, text-fig. 13). Latest Asbian to Bogdanovsky. Western Palaeotethys (rarely reported in Germany and always in open nomenclature, see Conil and Paproth, 1967, p. 74, 76; and 1983, tabl. 1 p. 34), Urals, Yukon and Alaska.

Howchinia bradyana (Howchin, 1888) emend. Davis, 1951
Pl. 44, figs. 1-17.

1888 *Patellina bradyana* n. sp. Howchin, p. 544, pl. 9, figs. 22-25.
1951 *Howchinia bradyana* (Howchin) - Davis, p. 248-253, pl. 10-11.
1956 *Monotaxis bradyana* (Howchin) - Reitlinger, pl. 1, figs. 5-7.
1956 *Monotaxis gibba* (Moeller) var. *longa* n. var. Brazhnikova, p. 57-58, pl. 10, fig. 17, pl. 13, fig. 3.
1956 *Monotaxis gibba* (Moell.) var. *longa* n. var. Brazhnikova - Brazhnikova and Yartseva, pl. 1, figs. 1, 7, 12? (aff.).
p. 1956 *Howchinia* - Reitlinger, pl. 1, figs. 1, 4? (non figs. 2-3? = *H. gibba*).
p. 1956 *Howchinia bradyana* (Howchin) - Reitlinger, pl. 1, figs. 5-7
1970 *Howchinia bradyina* (sic) (Howchin) - Mamet, n° 31 of text-fig. 14 p. 28-29, p. 40 (no illustration).
1972 *Howchinia bradyana* (Howchin) - Mamet, p. 3 (no illustration).
v. non 1973b *Howchinia bradyana* (Howchin) - Perret, p. 325-326, pl. 1, figs. 26-27.
v. p. 1974b *Howchinia bradyana bradyana* (Howchin) - Vachard, p. 372-374, pl. 27, fig. 2 non figs. 1, 9 (= *H. gibba*) (with synonymy).
v. 1974b *Howchinia bradyana longa* (Brazhnikova) - Vachard, p. 374, pl. 27, fig. 3 (with synonymy).
p. 1975 *Howchinia gibba* - Ivanova, pl. 1, fig. 14 (non fig. 15 = truly *H. gibba*).
v. non 1977 *Howchinia bradyana* (Howchin) - Perret and Vachard, p. 90 (no illustration).
v. 1977b *Howchinia bradyana bradyana* (Howchin) - Vachard, p. 158, pl. 6, fig. 9.
v. 1977b *Howchinia bradyana longa* (Brazhnikova) - Vachard, p. 158, pl. 6, fig. 13.
1978 *Howchinia bradyana* (Howchin) - Lys et al., pl. 1, fig. 20.
1979 *Howchinia gibba* var. *longa* (Brazhnikova) - Wagner et al., pl. 9, fig. 10.
1981 *Howchinia bradyana* (Howchin) - Strank, pl. 15, fig. 20, pl. 19, fig. 5..
1983 *Howchinia gibba* var. *longa* Brazhnikova (sic) - Aizenverg et al., p. 14 (no illustration).
1984 *Howchinia bradyana* (Howchin) - Herbig, pl. 7, figs. 12-15.
1985 *Howchinia gibba* f. *longa* Brazhnikova (sic: without parentheses) - Lys, pl. 1, fig. 3.
1985 *Howchinia* sp. - Adachi, p. 126-127, pl. 22, figs. 1-5 (with synonymy).
1988 *Howchinia bradyana longa* (Brazhnikova) - Kulagina, p. 26, pl. 4, fig. 27.
non 1989 *Howchinia bradyana* (Howchin) - Fewtrell et al., p. 58, pl. 3.9, fig. 13, pl. 3. 10, figs. 9-10 (= *H. gibba*).
1990 *Howchinia bradyana* (Howchin) - Strogen et al., fig. 11 B.
v. 1991b *Howchinia bradyana* (Howchin) - Vachard et al., pl. 1, fig. 6.
non 1992 *Howchinia bradyana* (Howchin) - Somerville et al., fig. 6 C (= *H. gibba*).
1992 *Howchinia bradyana longa* (Brazhnikova, 1962) (sic) - Somerville et al., fig. 6 C (= *H. gibba*).
1993 *Howchinia bradyina* (sic) Howchin (sic: without parentheses) - Mamet et al., pl. 12, figs. 9-11.
v. non 1993 *Howchinia bradyana* (Howchin) - Perret, p. 421, pl. F.5, fig. 11 (= *H. gibba*)(with synonymy).
1993 *Howchinia gibba* (von Möller) - Ueno and Nakazawa, p. 15-16, fig. 3. 25-26 (with 15 references in synonymy).
1997 *Howchinia bradyana* (Howchin) - Gallagher and Somerville, text-fig. 6 p. 321, text-fig. 7a-c p. 323, fig. 9i.
1997 *Howchinia bradyana longa* (Brazhnikova) - Kulagina et al., text-fig. 4 (no illustration).
1998 *Howchinia bradyana* (Howchin) - Gallagher, pl. 2, fig. 14.
1999b *Howchinia longa* (Brazhnikova) - Cózar and Rodríguez, pl. 2, fig. 6.
1999c *Howchinia bradyana* (Howchin) emend. Davis - Cózar and Rodríguez, pl. 2, fig. 1.
2000 *Howchinia bradyana longa* (Brazhnikova) - Sebbar, pl. 13, fig. 2.
2000 *Howchinia bradyana bradyana* (Howchin) - Sebbar, pl. 13, figs. 3-5.
2000b *Howchinia bradyana* (Howchin) - Cózar, p. 206, pl. 2, figs. 11, 15.
2001 *Howchinia bradyana* (Howchin) - Kulagina, tabl. 2 (pars) (no illustration).

2001 *Howchinia bradyana longa* (Brazhnikova) - Kulagina, tabl. 2 (pars) (no illustration).
2001 *Howchinia bradyana bradyana* (Howchin) - Vdovenko, tabl. 1 p. 170, pl. 4, figs. 24-25.
2001 *Howchinia bradyana longa* (Brazhnikova and Yartseva) (sic) - Vdovenko, tabl. 1 p. 170, pl. 4, figs. 26, 31-32.
2001 *Howchinia bradyana* (Howchin) - Kulagina et al., text-fig. 11 p. 37 (no illustration).
2002 *Howchinia bradyana* (Howchin) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
2002 *Howchinia bradyana* (Howchin) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
2002 *Howchinia longa* (Brazhn.) - Marfenkova, p. 197 (no illustration).
2002 *Howchinia bradyana* (Howchin) - Pazukhin et al., p. 221 (no illustration).
2003a *Howchinia bradyana* (Howchin) - Cózar, fig. 4 O.
2003b *Howchinia bradyana* (Howchin) - Cózar et al., fig. 7E.
v. p. 2003 *Howchinia bradyana* (Howchin) - Fontaine et al., pl. 7, figs. 6-11, pl. 9, fig. 6 (non pl. 8, fig. 8, nor pl. 9, fig. 2 = *H. beleutensis*, see below).
2004 *Howchinia bradyana* (Howchin) emend. Davis - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 15 p. 61, fig. 10.1-2.
2004 *Howchinia bradyana* (Howchin) emend. Davis - Cózar, text-fig. 6 p. 378 (pars), pl. 1, fig. 17.
2004 *Howchinia* - Flügel, pl. 67, fig. 6.
2005a *Howchinia bradyana* (Howchin) emend. Davis - Cózar and Somerville, text-fig. 6 p. 8, text-fig. 7 p. 10, text-fig. 8 p. 11, text-fig. 9 p. 12, text-fig. 10 p. 13, text-fig. 11 p. 15, text-fig. 16 p. 25, fig. 13. 23.
v. 2005 *Howchinia bradyana* (Howchin) - Saïd, p. 178, 180, 184 (no illustration).
2005 *Howchinia bradyana* (Howchin) - Devuyst et al., text-fig. 13 p. 12 (no illustration).
2005 *Howchinia gibba longa* - Orlov-Labkovsky, p. 23 (no illustration).
2005 *Howchinia bradyana* (Howchin) - Somerville and Cózar, pl. 1, fig. 3.
2006 *Howchinia bradyana* (Howchin) - Gallagher et al., fig. 14. 14.

Description. Height (H) = 0.340-0.480 mm; basal diameter (D) = 0.270-0.310 mm; ratio D/H = 0.91-1.70 ; proloculus diameter = 0.040 mm; number of whorls: 12-14.
Remarks. The compilation of Kulagina (2001) indicates that the holotypic *H. gibba* possesses a height of 0.28 mm for 7 whorls, *H. bradyana* 0.25-0.35 for 12 whorls, and *H. gibba longa* 0.24 for 11. Consequently, the synonymy of *H. bradyana* and *H. gibba longa* seems to be undisputable, and *H. gibba* differs from both species in less whorls for the same size. *H. bradyana* sensu Fewtrell et al. (1989) having "5-12 whorls" included probably *H. gibba*.
Occurrence. Venievsky-earliest Bashkirian (Bogdanovsky) of Southern Urals. Late Viséan of Uzbekistan. MFZ 14 (= Cf6γ) of Belgium (Devuyst et al., 2005, text-fig. 13). Late Viséan-early Serpukhovian of Algeria. $C_1^{v}f_2$-Serpukhovian of Donets Basin (up to the early Zapaltiubinsky: Aizenverg et al., 1983; Vachard and Maslo, 1996). Asbian and late Serpukhovian of Southwestern Spain. Late or latest Asbian-early Serpukhovian of Northern England. Latest Asbian-latest Brigantian of central Morocco. Latest Brigantian of Algeria (Bechar Basin, Reggan Basin). Brigantian of Ireland. V3c of Eastern Alborz (Iran). Early Serpukhovian of Tien-Shan. Late Brigantian of Malaysia. Ichinotani Formation of Japan. Latest Viséan of southeastern Alaska. Serpukhovian of Pyrenees (Arize area). Brigantian of Montagne Noire: Roquemaillère (DV133D, DV140A); Roc du Cayla (MA12.2, DV82B, DV82C, DV82F: 2 specimens, DV84B); Japhet (D126F); Roque Redonde (RR1, RR2, RR4, RR7, RR 45: 2 specimens; RR47: 2 specimens, RR48, RR49, RR 51, RR54, RR55, RR56, RR61: 4 specimens, RR62; RR65: 4 specimens; RR69: 2 specimens, RR72, RR87); Vailhan-Roque de Loup (DV313, DV327B); Les Pascales (MA.PA9: 2 specimens, DV601E); Les Batailles (DV607D); Les Mentaresses (DV3284B, DV687A); Saint Rome (DV132D, DV132E); Roc de Murviel (MA32, MA34: 2 specimens, MA42).

Howchinia gibba (von Moeller, 1879)
Pl. 44, figs. 18-31.

p. 1879 *Tetrataxis conica* var. *gibba* n. var. von Möller, p. 73, pl. 7, fig. 3 only (non pl. 2, figs. 4a-c = a true *Tetrataxis*).
1956 *Monotaxis gibba* (Möller) - Brazhnikova, p. 56-57, pl. 2, fig. 8, pl. 10, fig. 16, pl. 13, fig. 5 (non 3 as indicated in the text).

1956 *Monotaxis* ex gr. *gibba* (Möller) - Brazhnikova and Yartseva, pl. 1, fig. 15.
p. 1956 *Howchinia* - Reitlinger, pl. 1, figs. 2-3? (non figs. 1, 4? = *H. bradyana*).
1956 *Monotaxis declivis* n. sp. Ganelina, p. 20-21 (French translation), pl. 5, fig. 2.
1963 *Howchinia gibba* (Möller) - Conil, pl. 1, fig. 5.
1964 *Howchinia gibba* (Möller) - Conil and Lys, p. 98, pl. 14, fig. 264.
1972 *Howchinia gibba* (Moeller) - Malakhova, p. 42, pl. 8, figs. 12-14.
1972 *Howchinia* sp. (Moeller) - Bertrand, pl. 5, figs. 1.
v. 1973b *Howchinia bradyana* (Howchin) - Perret, p. 325-326, pl. 1, figs. 26-27.
1973 *Howchinia gibba* (Moeller) - Bozorgnia, p. 139-140, pl. 19, figs. 5, 7-8.
v. p. 1974b *Howchinia bradyana bradyana* (Howchin) - Vachard, p. 372-374, pl. 27, figs. 1, 9 non fig. 2 (= true *bradyana*) (with synonymy of both *H. gibba* and *H. bradyana*)
1975 *Howchinia gibba* (Moeller) - Mikhno and Balakin, p. 50, pl. 15, figs. 1-3.
p. 1975 *Howchinia gibba* - Ivanova, pl. 1, fig. 15 (non fig. 14 = *H. bradyana*).
1976 *Howchinia* sp. - Bless et al., pl. 12, fig. 1.
v. 1977 *Howchinia bradyana* (Howchin) - Perret and Vachard, p. 90 (no illustration).
1979 *Howchinia gibba* (Möller) - Wagner et al., pl. 2, fig. 5, pl. 3, fig. 15.
1980 *Howchinia gibba longa* (Brady) (sic) - Skompski and Sobon-Podgorska, pl. 4, figs. 1, 3.
1985 *Howchinella* (sic) *gibba* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1988 *Howchinia gibba* (Moeller) - Kulagina, p. 25, 26, pl. 1, figs. 9-10, pl. 3, fig. 18.
1988 *Howchinia gibba* (Moeller) - Kulagina and Pazukhin, p. 39, 41(no illustration).
1988b *Howchinia gibba* (Moell.) - Ivanova, pl. 2, fig. 23.
1989 *Howchinia bradyana* (Howchin) - Fewtrell et al., p. 58, pl. 3.9, fig. 13, pl. 3. 10, figs. 9-10.
1992 *Howchinia bradyana* (Howchin) - Somerville et al., fig. 6C.
v. 1993 *Howchinia bradyana* (Howchin) - Perret, p. 421, pl. F.5, fig. 11.
non 1993 *Howchinia gibba* (von Möller) - Ueno and Nakazawa, p. 15-16, fig. 3. 25-26 (= *H. bradyana*).
1993 *Howchinia* sp. - Ueno and Nakazawa, p. 16, fig. 3. 20
1996 *Howchinia gibba* (von Moeller) - Marfenkova in Einor, pl. 41, fig. 27.
? 1997 *Howchinia* sp. - Harris et al., fig. 8. 16.
2000 *Howchinia* sp. - Sebbar, pl. 13, fig. 6.
2001 *Howchinia gibba* (Moeller) - Kulagina, tabl. 2 (pars) (no illustration).
2001 *Howchinia gibba* (Moeller) - Kulagina et al., text-fig. 11 p. 37 (no illustration).
v. 2002 *Howchinia gibba* (von Moeller) - Krainer and Vachard, p. 17, pl. 4, figs. 5-8 (with synonymy).
2002 *Howchinia gibba* (von Moeller) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
2002 *Howchinia gibba* (von Moeller) - Pazukhin et al., p. 221 (no illustration).
2004 *Howchinia gibba* (von Moeller) - Cózar and Somerville, text-fig. 15 p. 61,
fig. 10.3-5.
2004 *Howchinia gibba* (von Moeller) - Cózar et al., fig. 3. 8.
v. 2005 *Howchinia gibba* (Howchin) - Saïd, fig. X. 1. 1.
? 2005 *Vissariotaxis* sp. - Somerville and Cózar, pl. 1, fig. 2.
non 2005 *Howchinia gibba* (von Moeller) - Somerville and Cózar, pl. 1, fig. 4 (= *H. subconica*).
2005 *Howchinia gibba* (von Moeller) - Sanz-Lopez et al., pl. 6, fig. 18, pl. 8, fig. 16.
? 2005c *Vissariotaxis* sp. - Cózar et al., fig. 11. 14.
? 2006 *Vissariotaxis* spp. - Gallagher et al., fig. 14. 6-7.

Description. Height (H) = 0.105-0.360 mm; basal diameter (D) = 0.135-0.320 mm; ratio H/D = 0.70-1.45; proloculus diameter = 0.015-0.020 mm; number of whorls: 5-10 (generally 7); height of the last whorl = 0.050-0.060 mm; thickness of wall at the last whorl = 0.015-0.025 mm.

Remarks. According to Kulagina (2001), Krainer and Vachard (2002), and Cózar and Somerville (2004), I have distinguished *H. gibba* from *H. bradyana* equivalent to *H. gibba longa* (see above). According to D. Vachard (pers. comm.), the dimensions indicated by Krainer and Vachard (2002) are overestimated and multiplicated by two.

Occurrence. Late Viséan of Uzbekistan, Kazakhstan and Ukraine (Galitsie-Volyn). Mikhailovsky of Moscow Syneclise. Venevsky-Bogdanovsky of Southern Urals. Houthem borehole (the Netherlands). Asbian, late Serpukhovian of Southwestern Spain. Late Serpukhovian of Austria. Mikhailovsky-Bogdanovsky of Urals. Asbian-Brigantian of Ireland. Early-late Brigantian of Northern England. Early Brigantian of Morocco. V3b of central

Alborz (Iran). ?Alaska (Harris et al, 1997). Brigantian-early Serpukhovian of Montagne Noire: Roquemaillère (DV133D, DV140A); Roc du Cayla (MA12.2, DV82B, DV82C, DV82F: 2 specimens, DV84B); Japhet (D126F); Roque Redonde (RR81: 2 specimens; RR86: 2 specimens; RR87: 2 specimens); Vailhan-Roque de Loup (DV313, DV327B); Les Pascales (MA.PA9: 2 specimens, DV601E); Les Batailles (DV607D); Les Mentaresses (DV3284B, DV687A); Saint Rome (DV132D, DV132E); Roc de Murviel (MA32, MA34: 2 specimens, MA42). La Serre (DV226C). Late Serpukhovian of Ardengost area: Bois de Caussihour (MFP.Be15), Hechet (Perret, 1973b); Cro7 (Perret, 1993); MFP.MAR19 (this study).

Howchinia subconica (Brazhnikova and Yartseva, 1956)
Pl. 44, figs. 35-36.

1956 *Monotaxis subconica* n. sp. Brazhnikova and Yartseva, p. 63-64, pl. 1, figs. 13-14, 16.
v. 1974b *Howchinia subconica* (Brazhnikova and Yartseva) - Vachard, p. 374-375, pl. 27, figs. 4-5.
1975 *Howchinia subconica* (Brazhnikova and Yartseva) - Mikhno and Balakin, p. 50, pl. 15, figs. 18-20.
p. 1975 *Howchinia subplana* i *H. subconica* - Ivanova, pl. 1, fig. 16 (non fig. 17 = *H. subplana*).
v. 1977b *Howchinia subconica* (Brazhnikova and Yartseva) - Vachard, p. 158 (no illustration).
1979 *Monotaxinoides subconica* (Brazhnikova & Jarzeva) - Wagner et al., pl. 3, fig. 16 ? (cf.), pl. 9, fig. 6.
1983 *Monotaxinoides* aff. *subconica* (Brazhnikova and Yartseva) - Aizenverg et al., p. 14-15 (no illustration).
1985 *Monotaxinoides subconica* (Brazhnikova and Yartseva) - Adachi, p. 126, pl. 21, fig. 32 (with synonymy).
1988 *Howchinia subconica* (Brazhnikova and Jarzeva) - Kulagina, p. 26, pl. 3, fig. 19.
1989 *Monotaxinoides* sp. - Skompski et al., pl. 6, fig. 20.
1993 *Monotaxinoides*? aff. *subconica* (Brazhnikova and Yartseva) (transition between *Monotaxinoides* and *Howchinia*) - Mamet et al., pl. 12, figs. 16-17.
v. 1993 *Howchinia* cf. *subconica* (Brazhnikova and Yartseva) - Perret, p. 422, pl. F.V, figs. 2-3, 5 (with synonymy).
1996 *Monotaxinoides subconica* Brazhnikova and Yartseva (sic: without parentheses) - Marfenkova in Einor, pl. 41, fig. 26.
? 1997 *Howchinia* transitional *Monotaxinoides* - Gallagher and Somerville, text-fig. 7B p. 323, text-fig. 8 p. 325, fig. 9F.
p. 2000 *Monotaxinoides subconicus* (Brazhnikova and Yartseva) - Sebbar, pl. 13, figs. 11, 13 (non fig. 12 = *Eolasiodiscus* or *Mesolasiodiscus*).
2001 *Monotaxinoides subconicus* (Brazhnikova and Yartseva) - Kulagina, tabl. 2 (pars) (no illustration).
2001 *Howchinia subconica* Brazhnikova and Yartseva (sic: without parentheses) forma minima - Vdovenko, tabl. 1 p. 170, pl. 4, figs. 42-43.
2002 *Howchinia subconica* (Brazhnikova and Yartseva) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
2003 *Howchinia subconica* (Brazhnikova and Yartseva) - Kulagina et al., text-fig. 7 p. 180 (no illustration).
non v. 2003 *Howchinia* cf. *subconica* (Brazhnikova and Yartseva) - Fontaine et al., pl. 9, fig. 10 (= *H. beleutensis*).
2005 *Howchinia gibba* (Howchin) - Somerville and Cózar, pl. 1, fig. 4.

Description. Test wide and low. Height (H) = 0.110-0.210 mm; Diameter (D) = 0.270-0.340 mm; ratio H/D = 0.40-0.62; proloculus diameter = 0.025-0.040 mm; number of whorls: 5-7.5; thickness of wall at the last whorl = 0.020 mm.

Remarks. My specimens are similar to those illustrated by Sebbar (2000), i. e., probably macrospheric with a proloculus wider than the whorl.

Occurrence. Late Viséan of Uzbekistan. $C_1^{v}g$ and suite C_1^{4} of Donets Basin. Late Viséan to earliest Bashkirian of Algeria. Early Serpukhovian of Poland. Zapaltiubinsky of Urals. Late Brigantian of Ireland. Serpukhovian of Kazakhstan. Late Serpukhovian of southeastern Alaska. Ichinotani Formation of Japan. Late Brigantian of Montagne Noire: Roque Redonde (RR65); Les Pascales (DV602A). Late Serpukhovian of Ardengost area: ArdRC2, Mar19, AL (Perret, 1993).

Howchinia beleutensis Vdovenko, 1962
Pl. 44, fig. 37.

1962 *Howchinia beleutensis* n. sp. Vdovenko, p. 44, pl. 4, figs. 7-8.
v. 1973b *Howchinia* aff. *subconica* (Brazhnikova and Yartseva) - Perret, p. 325, pl. 1, fig. 25.
1978 *Howchinia* n. sp. (à pseudotubes) - Lys et al., pl. 2, fig. 8.
1985 *Howchinia* sp. 2 (with tubular lower apophyses and buttresses chambers) - Lys, pl. 1, figs. 4, 7, pl. 2, fig. 5.
1989 *Howchinia* à tubulures ombilicales - Skompski et al., pl. 6, fig. 16.
v. 1993 *Howchinia* sp. 2 Lys, 1985 - Perret, p. 423-424, pl. F.V, figs. 7-8, 10 (with synonymy).
v. 1993 forme de passage *Howchinia subconica-Howchinia bradyana* - Perret, pl. F.5, fig. 4.
v. 1993 *Howchinia subplana* (Brazhnikova and Yartseva) - Perret, p. 422-423, pl. F.5, figs. 6, 9.
2000 "*Howchinia*" sp. 2 - Sebbar, pl. 13, fig. 16.
v. p. 2003 *Howchinia bradyana* (Howchin) - Fontaine et al., pl. 8, fig. 11, pl. 9, fig. 2 (see above).
v. 2003 *Howchinia* cf. *subconica* (Brazhnikova and Yartseva) - Fontaine et al., pl. 9, fig. 10.
2003 *Howchinia* sp. - Brenckle and Milkina, pl. 5, fig. 29.
2003a "*Howchinia*" sp. - Cózar, fig. 5L.
2005 *Monotaxinoides belutensis* (sic) (Vdovenko) - Brenckle, p. 65-66, pl. 11, fig. 8.

Description. Characterized by pseudopillars in the umbilicus. Diameter (D) = 0.325-0.410 mm; width (w) = 0.125-0.200 mm; ratio w/D = 0.42-0.48; number of whorls: 5-9; thickness of wall at the last whorl = 0.030 mm.

Occurrence. Late Viséan-Protvinsky of Kazakhstan. Early Serpukhovian of Poland and eastern Iran. Late Serpukhovian-earliest Bashkirian of Algeria (Bechar Basin). Serpukhovian of Malaysia. Late Serpukhovian of SW Spain. Late Serpukhovian of Ardengost area: Areng (AH14) (Perret, 1973b), Bar1C, Mar19, ArdRC21, CasP1, Cas15bis, AH14 (Perret, 1993).

Howchinia subplana (Brazhnikova and Yartseva, 1956)
Pl. 44, fig. 39.

1956 *Monotaxis subplana* n. sp. Brazhnikova and Yartseva, p. 64, pl. 1, figs. 9-11.
v. 1973b *Howchinia* aff. *subplana* (Brazhnikova and Yartseva) - Perret, p. 324-325, pl. 1, fig. 24.
non 1974b *Howchinia* cf. *subplana* (Brazhnikova and Iartseva) - Vachard, p. 374-375 (no illustration; see above *Planohowchinia*? *rara* n. sp.).
p. 1975 *Howchinia subplana* i *H. subconica* - Ivanova, pl. 1, fig. 17 (non fig. 16 = *H. subconica*).
v. 1977 *Howchinia* aff. *subplana* (Brazhnikova and Yartseva) - Perret and Vachard, p. 90 (no illustration).
1979 *Howchinia* ex gr. *subplana* (Brazhnikova & Jarzeva) - Wagner et al., pl. 2, fig. 6.
?1979 *Monotaxinoides subplana* (Brazhnikova & Jarzeva) - Wagner et al., pl. 9, fig. 4.
1983 *Monotaxinoides subplanus* (Brazhnikova and Yartseva) - Aizenverg et al., p. 14 (pars) (no illustration).
1985 *Monotaxinoides subplana* (Brazhnikova and Yartseva) - Adachi, p. 125-126, pl. 21, figs. 30-31 (with synonymy).
1988 *Monotaxinoides subplanus* (Brazhnikova and Jarzeva) (sic) - Kulagina, p. 26, pl. 2, fig. 23, pl. 3, figs. 20-21.
1990 *Monotaxinoides subplana* (Brazhnikova and Yartseva) - Vdovenko et al., pl. 1, fig. 30.
1991 *Monotaxinoides subplana* (Brazhnikova and Yartseva) - Gibshman and Akhmetshina, pl. 3, figs. 18, 19 ?
1993 *Monotaxinoides transitorius* Brazhnikova and Yartseva - Mamet et al., pl. 12, figs. 16-17.
v. non 1993 *Howchinia subplana* (Brazhnikova and Yartseva) - Perret, p. 422-423, pl. F.5, figs. 6, 9 (with synonymy) (= *H. beleutensis*).
1997 *Monotaxinoides subplanus* Brazhnikova and Yartseva - Kulagina, p. 61 (no illustration).
1997 *Monotaxinoides subplanus* Brazhnikova and Yartseva - Kulagina and Sinitsyna, p. 83 (no illustration).
1997 *Monotaxinoides subplanus* Brazhnikova and Yartseva - Kulagina et al., text-fig. 2 (pars), text-fig. 4 (pars) (no illustration).
2001 *Monotaxinoides subplanus* (Brazhnikova and Yartseva) - Kulagina, tabl. 2 (pars) (no illustration).
2001 *Howchinia subplana* Brazhnikova and Yartseva (sic: without parentheses) forma minima - Vdovenko, tabl. 1 p. 170, pl. 4, figs. 44-46.
2001 *Monotaxinoides subplanus* gr. - Kulagina et al., text-fig. 11 p. 37 (no illustration).
2002 *Monotaxinoides subplana* (Brazhnikova and Yartseva) - Kulagina and Gibshman, text-fig. 3 p. 186, pl. 1, fig. 12.
?2002 *Monotaxinoides subplanus* (Brazhnikova and Yartseva) - Marfenkova, p. 194, 195, 196, 197 (no illustration).

2002 *Monotaxinoides subplanus* (Brazhnikova and Yartseva) - Pazukhin et al., p. 221 (no illustration).
2002 *Monotaxinoides subplanus* (Brazhnikova and Yartseva) - Ponomareva et al., p. 240 (no illustration).
2003 *Monotaxinoides subplanus* (Brazhnikova and Yartseva) - Kulagina et al., text-fig. 7 p. 180 (no illustration).
2003 *Monotaxinoides* cf. *subplanus* (Brazhnikova and Yartseva) - Brenckle and Milkina, pl. 5, fig. 25.
2005 *Monotaxinoides subplana* (Brazhnikova and Yartseva) - Orlov-Labkovsky, p. 24 (no illustration).

Description. Diameter (D) = 0.260-0.480 mm; width (w) = 0.080-0.130 mm; ratio w/D = 0.26-0.35; number of whorls: 7-8; thickness of wall at the last whorl = 0.020 mm.

Occurrence. C_1^vg-late Serpukhovian (Protvinsky) of Donets Basin. Serpukhovian of Southern Urals and Kazakhstan. Ichinotani Formation of Japan. Late Serpukhovian of southeastern Alaska. Brigantian of Montagne Noire: Roque Redonde (RR54?: transitional from *H. bradyana to H. subplana*; RR61: 5 specimens; RR66: 2 specimens, RR78). Late Serpukhovian of Ardengost area: Col d'Aspin (MFP.Asp.1) (Perret, 1973b); MFP.AH18, MFP.MAR19 (this study).

Howchinia? sp.
Pl. 44, figs. 40-42.
1974b *Howchinia* cf. *subconica* (Brazhnikova and Yartseva) - Vachard, pl. 27, figs. 10-12.

Remarks. Several small forms with few whorls but in relatively high trochospire and a proportionnally broad proloculus. They can correspond to immature *Howchinia* or *Vissariotaxis*.
Description. Height = 0.050-0.060 mm; wide = 0.080-0.125 mm; wall thickness = 0.002-0.003 mm; wide = 0.050-0.060 mm; proloculus diameter = 0.033-0.040 mm, number of whorls: 2-2.5; height of last whorl = 0.015-0.020 mm.
Occurrence. Latest Asbian of Lentilles de la Route (LR1), and late Asbian of Les Jeantels (DV 690A).

Genus *Planohowchinia* Cózar and Mamet, 2001
Type species. *Planohowchinia espilensis* Cózar and Mamet, 2001.
Diagnosis. Howchinidae plane to oscillating to sligthly trochospiral evolute. Wall bilayered with an outer pseudofibrous layer covering all the whorls. Terminal, principal, simple aperture. Secondary apertures in the sutures of the last whorls.
Remarks. All or almost all Viséan *Monotaxinoides* and/or *Eolasiodiscus* must attributed to *Planohowchinia*; the *Hemidiscopsis* excepted. Initially, *Eolasiodiscus* has been considered as a Bashkirian-Moscovian genus (see Vachard and Beckary, 1991), and *Monotaxinoides* as its Serpukhovian ancestor. According to Kulagina (2001, p. 179) or Kulagina and Gibshman (2002, text-fig. 3 p. 186), its appearance is at the base of the Serpukhovian in Southern Urals (maybe latest Viséan in Belgium; where the FAD of *Eolasiodiscus* might be early Serpukhovian; Devuyst et al., 2005, text-fig. 13). As previously indicated *Monotaxinoides donbassicus* Brazhnikova and Yartseva and *Eolasiodiscus transitorius* Reitlinger, 1956 (type species of *Eolasiodiscus*) might be synonyms. Consequently *Monotaxinoides* is prioritary upon *Eolasiodiscus*. *Monotaxinoides* sensu Groves, 1984, pl. 4, figs. 10-17 is probably a Porcelaneous foraminifer related to the true *Turrispiroides*, and not a lasiodiscoid. These *Turrispiroides* are mentioned as soon as the upper Chesterian in North America (Brenckle et al., 1982a). Early Permian *Monotaxinoides* of South China (Lin, 1978, p. 38, pl. 8, fig. 4-5) correspond respectively to a *Minojapanella* and a *Lasiodiscus* (Vachard pers. comm., january 2006).

Occurrence. Late Asbian of Southwestern Spain. Latest Asbian of Montagne Noire. ?Middle Brigantian of Eastern Morocco. ?Upper MFZ15 of Belgium. ?Serpukhovian of Donets Basin. ?Serpukhovian-Bashkirian Palaeotethyan and North American. ?Serpukhovian-Bogdanovsky of Southern Urals. ?Atokan of Idaho and Texas (Groves, 1984, 1992).

Planohowchinia espilensis Cózar and Mamet, 2001

? v. 1973b *Eolasiodiscus* du type *Monotaxinoïdes* (sic) *gracilis* (Dain) - Perret, pl. 1, fig. 23.
? v. 1993 *Monotaxinoides*? *gracilis* (Dain) - Perret, pl. V, fig. 1.
2000b *Monotaxinoides* sp. A - Cózar, p. 206-207, pl. 2, figs. 17-18.
2003a *Planohowchinia espilensis* Cózar and Mamet - Cózar, fig. 4 J.
2004 *Planohowchinia espilensis* Cózar and Mamet - Cózar, text-fig. 5 p. 376 (pars), text-fig. 6 p. 378 (pars), pl. 1, fig. 19.

Description. Diameter (D) = 0.237-0.750 mm; width (w) = 0.077-0.192 mm; ratio w/D = 0.20-0.34; proloculus diameter = 0.020-0.048 mm; number of whorls: 3.5-6.5; height of the last whorl = 0.033-0.085 (0.140) mm.
Occurrence. Late Asbian of Southwestern Spain. ?Late Serpukhovian of Ardengost.

Planohowchinia? rara n. sp.
Pl. 44, fig. 43.

1968 cf. *Monotaxinoides* sp. - Mamet, (p. 125), pl. 4, fig. 2 (pars), pl. 5, fig. 7.
1974b *Howchinia* cf. *subplana* (Brazhnikova and Yartseva) - Vachard, p. 375-376 (no illustration).
?1979 *Monotaxinoides* sp. 1 - Wagner et al., pl. 5, figs. 8-9.
? 2005 cf. "*Monotaxinoides*" sp. - Somerville and Cózar, pl. 1, fig. 1.

Etymology. Latine rarus because it is very rare in the collections of thin sections of Montagne Noire.
Locus typicus. "Lenses of the road", near Roquessels, Hérault France.
Stratum typicum. Assemblage SF1 (= latest Asbian).
Diagnosis. *Planohowchinia* with a strongly trochoidal spire.
Description. Diameter (D) = 0.700 mm; width (w) = 0.220 mm; ratio w/D = 0.31; proloculus diameter = 0.010 mm; number of whorls: 8; height of the last whorl = 0.070 mm; thickness of wall at the last whorl = 0.007 mm.
Holotype. Thin section DV314D (Pl. 44, fig. 43).
Type material. 2 specimens (and the specimen illustrated by Mamet, 1968)
Repository of the types. Collection of Palaeontology of Lille.
Comparison. This taxon differs from *Howchinia subplana* Brazhnikova and Yartseva, 1956 in the nature of wall, and it from *Planohowchinia espielensis*, which has a similar wall, in the conical test.
Occurrence. ?Boundary early/late Brigantian SE Ireland. Latest Asbian of the Montagne Noire (assemblage SF1): Lenses of the road, near Roquessels (DV314D) to late Brigantian (i. e., "calcaires stratiformes de Vailhan" of Mamet, 1968).

Family Lasiodiscidae Reitlinger, 1956 emend. herein

Synonym. Turrispiroidae (sic) Mamet and Pinard, 1992.

Emended diagnosis. Test tubular undivided, plane or plano-convex. Wall similar to Howchinidae (the yellow layer is eventually lacking). Simple terminal aperture, frequently, with additional sutural apertures which can be simple or protected by various appendices especially in the Permian genera.

Composition. *Lasiodiscus* Reichel, 1946; *Mesolasiodiscus* Rauzer-Chernousova and Chermykh, 1990; *Eolasiodiscus* Reitlinger, 1956; *Hemidiscus* Schellwien, 1898;

Hemidiscopsis n. gen., *Monotaxinoides* Brazhnikova and Yartseva, 1956 (pars?), "*Turrispiroides*" auctorum non Reitlinger in Voloshinova, Dain and Reitlinger, 1959 (which is for me a Miliolina and not a Fusulinina Lasiodiscoidea).

Occurrence. Late Viséan (*Hemidiscopsis*), Serpukhovian-Late Permian of Palaeotethys.

Genus *Hemidiscopsis* n. gen.

Type species. *Monotaxinoides*? *caprariensis* Vachard, 1977b.

Etymology. Comparable with *Hemidiscus* Schellwien, 1898 emend Vachard and Krainer, 2001a, because of the microgranular wall, and ending *opsis* = almost.

Synonyms. *Monotaxinoides*? sensu Vachard, 1977b excluded of the genus *Monotaxinoides* by Pinard and Mamet (1998, p. 101), *Monotaxinoides* (pars: sensu Kulagina et al., 1997 or Sebbar, 2000), *Ammodiscus* (pars), *Turrispiroides* (pars).

Diagnosis. Test free small planispirally evolute with a proloculus proportionally broad. Wall unilayered, microgranular. Simple terminal aperture, secondary sutural apertures with very small protruding, oblique appendices.

Composition. *Monotaxinoides*? *caprariensis*, *Monotaxinoides priscus* Brazhnnikova and Yartseva, 1956; *Ammodiscus subcarbonicus* Dain in Bykova et al., 1958 =? *Turrispiroides subcarbonicus* (Dain) sensu Brenckle and Milkina (2003), *Ammodiscus regularis* Dain in Voloshinova et al., 1959, pl. 3, fig. 4 (nomen nudum); ? *Monotaxinoides* spp. sensu Harris et al. (1997, fig. 8. 13, 15). ?*Turrispiroides* sp. sensu Skipp et al. (1985, pl. 3, fig. 20-22).

Comparison. It differs from *Hemidiscus* in the small spines of the test, from *Monotaxinoides* in a different wall and coiling (*Monotaxinoides* is considered here as a foraminifer similar to *Howchinia*, but in low cone, and devoid of the appendices on the external supplementary sutural apertures of *Eolasiodiscus*), from V*issariotaxis* in the plane spire, from *Eolasiodiscus* in the absence of hyaline wall, and smaller sutural protuberances; and from *Planohowchinia* in a more regular growth of the spire and the absence of clear outer layer.

Remarks. For the authors which admit the phylogenetic lineage *Vissariotaxis* and *Eolasiodiscus* reconstructed by Kulagina (2001), *Hemidiscopsis* might appear as a missing link between these two genera.

Occurrence. Brigantian of Montagne Noire and central Morocco (very rare: Idmarrach Formation, Saïd, 2005). ? Brigantian of Ireland. Serpukhovian of Kazakhstan. Namurian of Ukraine. ?Serpukhovian of Southern Urals and ?Alaska, ?Arkansas, ?Nevada.

Hemidiscopsis caprariensis (Vachard, 1977b) n. gen.
Pl. 45, figs. 1-24.

? p. 1973 *Monotaxinoides* - Browne and Pohl, pl. 26, figs. 6-7 (or *Turrispiroides*) (non figs. 4-5 = true *Monotaxinoides*).
v. 1974b *Monotaxinoides subcarbonicus* (Dain) - Vachard, p. 376, pl. 27, figs. 6-8 (with synonymy).
v. ? 1974b *Howchinia* cf. *subconica* (Brazhnikova and Yartseva) - Vachard, p. 375, pl. 27, figs. 11-12.
v. 1977b *Monotaxinoides*? *caprariensis* n. sp. Vachard, p. 158-159, pl. 6, figs. 18-20 (with 2 references in synonymy).
v. 2005 *Eolasiodiscus* cf. *caprariensis* (Vachard) - Saïd, p. 184 (no illustration).
?2005c *Howchinia* sp. (aff. "*H. cummingsi*" Hallett) - Cózar et al., figs. 11. 15, 16?

Description. Diameter (D) = 0.150-0.200 mm; width (W) = 0.030 mm; proloculus diameter = 0.020-0.045 mm; number of whorls: 6-8.

Remarks. *Hemidiscopsis caprariensis* (Vachard, 1977b) n. gen. differs from *H. priscus* in the smaller proloculus, less chambers and small apertural skeletons.

Occurrence. Questionable in latest Asbian, then in all the Brigantian of Montagne Noire: ?Lenses of the road, near Roquessels (DV.LR1); ?Roquemaillère (DV133, DV133C, DV 139C); Roque Redonde (RR58: 1 specimen, RR61: 1 specimen, RR64: 2 specimens, RR65: 1 specimen; RR66: 1 specimen; RR67: 15 specimens, RR 68: 2 specimens; RR 69: 5 specimens; RR7: 2 specimens; RR73: 2 specimens; RR74: 1 specimen; RR80: 26 specimens; RR81: 3 specimens; RR83: 6 specimens; RR84: 3 specimens; RR86: 1 specimen; RR87: 4 specimens); Vailhan-Château (DV248E); Tourière (DV341B, ?DV341C); Les Batailles (DV609, DV612A); Les Pascales (MA.PA9: 5 specimens, MA.PA11: 3 specimens, MA.PA15.2: 1 specimen, DV601F: 1 specimen, DV602A: 1 specimen, DV602B: 1 specimen, DV602C: 2 specimens); Les Mentaresses (DV328A, DV328E); Saint Rome (DV132E); Jeantels (DV690A: 4 specimens); Roc de Murviel (MA44). ?Late Serpukhovian of Ardengost area: MFP.AH. G/81.

7.8. Tournayelloids

Order Tournayellida Dain, 1953 nomen translat. Hohenegger and Piller, 1975
Superfamily Tournayelloidea Dain, 1953 nomen translat. Dain in Rauzer-Chernousova and Fursenko, 1959 (ex family) nom. correct.
Loeblich and Tappan, 1984 orth. mut. herein (ex Tournayellacea)
Family Forschiidae Dain, 1953
nomen translat. Grozdilova and Lebedeva, 1954 (ex subfamily)

Genus *Forschia* Mikhailov, 1935

Type species. *Spirillina subangulata* von Möller, 1879.

Diagnosis. Test planispiral, evolute. Proloculus followed by a undivided tubular chamber. Terminal cribate aperture. Wall brownish, granular, occasionally with a calcareous agglutinate (Reitlinger, 1950, pl. 1, fig. 8).

Occurrence. Late early or early middle Viséan (mid Chadian) to late Serpukhovian, Palaeotethyan (until Sumatra: Fontaine and Vachard, 1981) and Uralian.

Forschia mikhailovi Dain, 1953
Pl. 46, figs. 1-7.

1953 *Forschia mikhailovi* nom. nov. Dain, p. 39, pl. 5, figs. 1-2 (with synonymy).
1960 *Forschia mikhailovi* Dain - Grozdilova and Lebedeva, p. 50, pl. 2, fig. 1.
1962 *Forschia mikhailovi* Dain - Bogush and Juferev, p. 117, pl. 1, fig. 28 (with synonymy).
v. 1974b *Forschia subangulata* (von Moeller) - Vachard, p. 241-242, pl. 11, fig. 13 (with synonymy).
1975 *Forschia mikhailovi* Dain - Mikhno and Balakin, p. 30, pl. 2, figs. 25-26.
1975a *Forschia mikhailovi* Dain - Malakhova, p. 16, pl. 4, figs. 22-25, pl. 5, figs. 1-2.
1975 *Forschia mikhailovi* Dain - Grozdilova et al., p. 30, pl. 2, fig. 2.
v. 1977b *Forschia subangulata* (von Moeller) - Vachard, p. 139, pl. 2, fig. 6.
1978 *Forschia subangulata* (von Moeller) - Sultanaev et al., p. 102, pl. 1 fig. 11.
1985 *Forschia mikhailovi* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
?1989 *Forschia* sp. - Fewtrell et al., p. 58, pl. 3. 10, fig. 4.
?1998 *Forschia* sp. - Gallagher, pl. 1, fig. 11.
2000c *Forschia mikhailovi* Dain - Cózar, p. 321-322, pl. 1, fig. 1.
2000c *Eoforschia moelleri* Dain - Cózar, p. 322, pl. 1, figs. 2-3.
2001 *Forschia mikhailovi* Dain - Vdovenko, tabl.1 p. 171, pl. 9, figs. 3, 8.
2003 *Forschia subangulata* (von Möller) - Brenckle and Milkina, pl. 4, fig. 4.
2004 *Forschia mikhailovi* Dain - Cózar and Somerville, text-fig. 9 (pars) (no illustration).
2004 indeterminate Forschiidae - Brenckle, pl. 5, figs. 13, 20.
2005 *Forshia* (sic) *mikhailovi* Dain - Orlov-Labkovsky, p. 23, 25 (no illustration).

Description. Diameter (D) = 0.640-1.100 mm; width (w) = 0.220-0.500 mm ; w/D = 0.25-0.37; number of whorls: 3.5-5; proloculus diameter = 0.020-0.080 mm; height last chamber = 0.150-0.270 mm; wall thickness = 0.040-0.100 mm.

Remarks. *F. subangulata* has a trapezoidal outline at the last whorl, in axial section (see Termier et al., 1975). Hence, my material, with its rounded periphery, is more narrowly related with *F. mikhailovi*.

Occurrence. Aleksinsky and Mikhailovsky of Moscow Basin. Gubashkinsky-Ladeininsky of Urals. Early late Viséan of Uzbekistan and North China. $C_1^vf_1$, $C_1^vf_2$, C_1^vg of Donets Basin. Cf6 (= MFZ13-15) Belgium, Ireland and Spain. Late Viséan of Urals, Bulgaria, Turkey, Kazakhstan and South China. Brigantian-early middle Serpukhkovian of Tien-Shan. Late Asbian-early Brigantian of England. Holkerian-Brigantian of central Morocco. Boundary Asbian/ Brigantian and earliest Brigantian of the Montagne Noire (assemblages SF2-3): Castelsec (MA10I, MA10.50); Roquemaillère (DV137B, DV137G); Roc du Cayla (DV462C); Japhet (DV164A).

Genus *Forschiella* Mikhailov, 1939

Type species. *Forschiella prisca* Mikhailov, 1939.

Diagnosis. Forschiidae with an initial stage similar to *Forschia*, and a secondary stage uncoiled rectilinear. Aperture simple to cribrate in all the uncoiled stage.

Remarks. The generic distinction with *Forschia* is generally difficult.

Occurrence. Viséan-Serpukhovian, Palaeotethys and Urals.

Forschiella prisca Mikhailov, 1939

Pl. 46, figs. 8-9.

1939 *Forschiella prisca* n. sp. Mikhailov, p. 50, pl. 2, figs. 3-4.
1953 *Forschiella prisca* Mikhailov - Dain , p. 40-41, pl. 5, figs. 5-6.
1956 *Forschiella prisca* Mikhailov - Ganelina, p. 10-11 (French translation), pl. 11, fig. 9.
1959 *Forschiella prisca* Mikhailov - Voloshinova et al., pl. 4, fig. 5.
1960 *Forschiella prisca* Mikhailov - Grozdilova and Lebedeva, p. 51, pl. 2, fig. 4.
1963 *Forschiella prisca* Mikhailov - Conil, pl. 1, fig. 13.
1963 *Forschiella prisca* Mikhailov - Conil and Pirlet, pl. 1, fig. 3.
1964 *Forschiella prisca* Mikhailov - Conil and Lys, p. 71, pl. 9, figs. 159-160.
1967 *Forschiella prisca* Mikhailov - Conil and Paproth, p. 60? (cf.), 70, 72 (no illustration).
1973 *Forschiella prisca* Mikhailov - Bozorgnia, p. 63-64, pl. 8, fig. 3.
v. 1974b *Forschiella prisca* Mikhailov - Vachard, p. 242-243, pl. 11, fig. 12 (with synonymy).
1975 *Forschiella prisca* Mikhailov - Grozdilova et al., p. 30, pl. 2, fig. 1, pl. 3, fig. 1.
1976 *Forschiella prisca* Mikhailov - Bless et al., pl. 11, fig. 14.
1977 *Forschiella prisca* Mikhailov - Paproth et al., p. 67 (no illustration) .
1977 *Forschiella* aff. *prisca* Mikhailov - Conil et al., pl. 2, fig. 24.
v. 1977b *Forschiella prisca* Mikhailov - Vachard, p. 139, pl. 2, fig. 5.
1978 *Forshiella* (sic) *prisca* Mikhailov - Sultanaev et al., p. 102, pl. 1 fig. 10.
1981 *Forschiella prisca* Mikhailov - Strank, pl. 9, fig. 1? (aff.), pl. 17, fig. 15.
1988 *Forschiella prisca* Mikhailov - Kulagina, p. 25, pl. 1, fig. 8.
1989 *Forschiella prisca* Mikhailov - Fewtrell et al., p. 41, p. 62, pl. 3. 3, fig. 11, pl. 3. 11, fig. 9.
1991 *Forschiella prisca* Mikhailov - Sánchez et al., p. 116, pl. 1, figs. 11-12.
?1996 *Forschia prisca* (sic) - Gallagher, fig. 2 p. 242 (no illustration).
1996 *Forschiella prisca* Mikhailov - Marfenkova in Einor, pl. 41, fig. 21.
v. 1999 *Forschiella prisca* Mikhailov - Fontaine et al., p. 464 (no illustration).
2001 *Forschiella prisca* Mikhailov - Vdovenko, tabl. 1 p. 171, pl. 1, fig. 4, pl. 9, figs. 7, 9, pl. 10, fig. 18.
2003 *Forschiella prisca* Mikhailov - Brenckle and Milkina, pl. 5, fig. 9.
2005 *Forschiella prisca* Mikhailov - Somerville and Cózar, text-fig. 3 p. 133, pl. 2, fig. 4.

Description. Total height = 1.600-2.400 mm; Diameter (D) = 0.900-1.500 mm; width (w) = 0.300-0.460 mm; w/D = 0.44; number of whorls = 4-5; proloculus diameter = 0.060-0.130 mm; height of uncoiled whorl = 0.600-1.200 mm; wall thickness = 0.060-0.120 mm.

Occurrence. ?Cf4β-Cf4δ-Cf5 (= MFZ10-12) of Belgium. $C_1^{v}d_2$-$C_1^{v}g$ of Donets Basin. Mid Chadian-early Serpukhovian of England. Late Viséan of Urals (Gubashkinsky-Ladeïninsky) and Moscow Basin (Mikhailovsky-Venevsky). Early Viséan of Alborz (Iran) and Ireland. Up to the early Brigantian in Ireland (Somerville and Cózar, 2005). V3a of central Morocco. V2b/V3 of Germany. Early Serpukhovian of Sahara and Urals. Late Viséan-Protvinsky of Kazakhstan. Late Viséan/Serpukhovian of Thailand. Brigantian of the Montagne Noire: Castelsec (MA11.9.1, MA11.11A); Roquemaillère (ML764); Les Mentaresses (DV687A).

Family Lituotubellidae Miklukho-Maklay, 1963
nomen translat. Lipina, 1989 (ex subfamily).
Genus *Lituotubella* Rauzer-Chernousova, 1948a

Type species. *Lituotubella glomospiroides* Rauzer-Chernousova, 1948a.

Synonyms. *Bogushella* Conil and Lys, 1977; *Glomospira* (pars) sensu Conil and Lys, 1964 (see *Glomospira brevispira* Conil and Lys, 1964).

Diagnosis. Streptospirally initial part followed by a rectilinear, uncoiled part. Pseudosepta are present in the uncoiled part. Aperture simple, basal in the coiled part; terminal, cribrate in the uncoiled part. Wall brownish, rather thick, granular, occasionally with a calcareous agglutinate.

Remarks. This genus is well known, stable and easy to determinate. Paradoxically, its ancestor *Pseudolituotubella* Vdovenko, 1967, possesses a well developed septation. This case of evolution, from septa to pseudosepta, is unique in the Mississippian, and constitutes a counter-example for the cladistic analyses. *Bogushella* is considered here as a peculiar growth of *Lituotubella* (teratogenic or neotenic), see also after *Mstinia* and "*Haplophragmella*" auctorum.

Occurrence. Rare in the late early Viséan (Cf4δ = MFZ11). Middle-late Viséan (Conil and Lys, 1977) MFZ12-MFZ14 (Devuyst et al., 2005, text-fig. 13). LAD probably located in the late Asbian (Cózar and Somerville, 2004, 2005a; but the genus has been mentioned up to the top of Viséan: Mamet, 1974a, p. 395; Fewtrell et al., 1989, p. 56; Somerville and Cózar, 2005, text-fig. 3 p. 133) or to the Protvinsky (Kulagina, 1988, p. 26). Palaeotethys and Urals.

Lituotubella magna Rauzer-Chernousova, 1948a
Pl. 46, figs. 10-16.

1948a *Lituotubella glomospiroides* var. *magna* n. var. Rauzer-Chernousova, p. 162-163, pl. 3, figs. 6-7.
1953 *Lituotubella magna* Rauzer-Chernousova - Dain, p. 44-45, pl. 6, figs. 7-8.
1959 *Lituotubella glomospiroides* var. *magna* Rauzer-Chernousova - Voloshinova et al., pl. 4, fig. 6.
1960 *Lituotubella glomospiroides* var. *magna* Rauzer-Chernousova - Grozdilova and Lebedeva, p. 47-48, pl. 3, fig. 1.
1963 *Lituotubella glomospiroides magna* Rauzer-Chernousova - Conil and Pirlet, pl. 1, fig. 5.
1964 *Lituotubella glomospiroides magna* Rauzer-Chernousova - Conil and Lys, p. 73, pl. 9, figs. 172-173.
1967 *Lituotubella glomospiroides* var. *magna* Rauzer-Chernousova - Conil and Paproth, p. 62, 65, 69 (no illustration).
1972 *Lituotubella glomospiroides* var. *magna* Rauzer-Chernousova - Bertrand, pl. 3, fig. 5.
v. 1974b *Lituotubella magna* Rauzer-Chernousova - Vachard, p. 244-245, pl. 11, figs. 9-10, 14 (with synonymy).
1975 *Lituotubella glomospiroides magna* Rauzer-Chernousova - Grozdilova et al., p. 31, pl. 2, fig. 7.
1976 *Lituotubella magna* Rauser - Conil, pl. 3, fig. 28.
1976 *Lituotubella glomospiroides magna* Rauser - Crousilles et al., pl. 38, fig. 9.
v. 1977b *Lituotubella magna* Rauzer-Chernousova - Vachard, p. 139, pl. 2, figs. 9, 12.

1978 *Lituotubella magna* Raus. - Sultanaev et al., p. 102, pl. 2, fig. 2.
1982 *Lituotubella glomospiroides magna* Rauzer-Chernousova - Fontaine and Vachard, p. 189, 194 (no illustration).
?1988 *Lituotubella glomospiroides magna* Rauzer-Chernousova - Kulagina, p. 25 (no illustration).
1989 *Lituotubella magna* (Rauzer-Chernousova) (sic for the parentheses) - Fewtrell et al., p. 48, pl. 3. 6, fig. 9.
1989 *Lituotubella* aff. *magna* (Rauzer-Chernousova) (sic for the parentheses) - Fewtrell et al., p. 56, pl. 3. 9, fig. 5.
1992 *Lituotubella magna* (Rauzer-Chernousova) (sic for the parentheses) - Somerville et al., fig. 5S.
1996 *Lituotubella glomospiroides magna* Rauser - Reitlinger in Einor, pl. 2, fig. 10.
1998 *Bogushella* sp. - Gallagher, pl. 1, fig. 10.
1998 *Lituotubella magna* (Rauzer-Chernousova) (sic for the parentheses) - Gallagher, pl. 1, fig. 12.
2000c *Lituotubella magna* Rauzer-Chernousova - Cózar, p. 322, 324, pl. 1, figs. 4-5.
2001 *Lituotubella magna* Rauzer-Chernousova - Vdovenko, tabl. 1 p. 172, pl. 10, figs. 1, 3.
v. 2002a *Lituotubella magna* Rauzer-Chernousova - Aretz, fig. 7. 13.
2004 *Lituotubella magna* Rauzer-Chernousova - Cózar and Somerville, text-fig. 4 p. 46, text-fig. 7 p. 47, text-fig. 15 p. 61 (no illustration).
2005a *Lituotubella magna* Rauzer-Chernousova - Cózar and Somerville, text-fig. 4 p. 5 (no illustration).
2005 *Lituotubella magna* Rauzer-Chernousova - Somerville and Cózar, pl. 2, fig. 6.
2005 *Lituotubella magna* Rauzer-Chernousova - Sanz-Lopez et al., pl. 6, fig. 5.

Description. Total length = (1.550) 2.400-3.200 mm, Diameter of coiled part (D) = 0.825-1.350 mm, width of coiled part (w) = 0.570-0.900 mm, number of coiled whorls = 3-5, number of pseudochambers: up to 8, proloculus diameter = 0.065-0.175 mm, height of uncoiled part = 1.400-3.000 mm, width of uncoiled part = 0.700-0.900 mm, wall thickness = 0.040-0.100 mm.

Occurrence. Aleksinsky-Venevsky (mainly Mikhailovsky) of Russian Platform and Urals (Gubashkinsky-Ladeininsky, rare in Ust-ilimsky). ?Early Serpukhovian of Southern Urals (Kulagina, 1988). C_1^vd-$C_1^v f_2$ of Donbass. Cf4δ–Cf5 (MFZ11-12) of Belgium. Late Viséan of Germany. Cf5-Cf6δ (= MFZ12-15) of Ireland. Late Holkerian-early Asbian of Southwestern Spain. Asbian-late Brigantian of England (late Asbian-earliest Brigantian of Northern England). Late Viséan of South China. Late Viséan of Viet-Nam and Laos. Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV 293D, DV293.2B, DV332E, DV.FB23); Castelsec (MA10.7.2, MA10.9, MA10.14, MA10.II.122, MA11.3, MA11.9.3, MA11.5.2); 500m de Vailhan (ML788); Vailhan-Château (DV246A, DV246D); Roc de Murviel (MA33.0, ?MA330.10).

Family Pseudolituotubidae Conil and Longerstaey in Conil et al., 1980

Genus *Pseudolituotuba* Vdovenko, 1971

Type species. *Lituotuba*? *gravata* Conil and Lys, 1965.

Diagnosis. Test attached, constituted of a huge streptospiral initial stage, followed by an uncoiled adult stage. Wall undivided or with faint pseudosepta. Simple terminal aperture. Wall microgranular, thick, brownish, with a calcareous agglutinate.

Occurrence. Rare in the late Tournaisian; all the Viséan, Palaeotethyan (see Conil and Lys, 1968; Termier et al., 1975; Vdovenko et al., 1993; and Vdovenko, 2001).

Pseudolituotuba gravata (Conil and Lys, 1965)

Pl. 47, figs. 1-10.

? 1964 *Glomospira*? *crassa* n. sp. Conil and Lys, p. 60, pl. 8, fig. 116.
1965 *Lituotuba*? *gravata* n. sp. Conil and Lys, p. B24-B25, pl. 1, figs. 2-3.
1966 *Lituotuba*? *gravata* Conil and Lys - Conil and Lys, pl. 1, fig. 8.
1967 *Lituotuba enormica* n. sp. Brazhnikova and Rostovceva in Brazhnikova et al., p. 140-141, pl. 9, fig. 4, pl. 42, figs. 1-4.

1968 *Lituotuba*? *gravata* Conil and Lys - Conil and Lys, p. 502, pl. 2, figs. 14-17 (with synonymy).
v. 1974b *Pseudolituotuba gravata* (Conil and Lys) - Vachard, p. 246-247, pl. 5, fig. 2, pl. 11, figs. 5-7.
v. 1975 *Pseudolituotuba gravata* (Conil and Lys) - Vachard in Termier et al., p. 36, pl. 4, fig. 3 (with synonymy).
1976 *Pseudolituotuba gravata* (Conil and Lys) - Bless et al., pl. 8, fig. 12.
1976 *Lituotuba? enormica* Brazhn. et Rost. - Crousilles et al., pl. 38, fig. 8.
1977 *Pseudolituotuba gravata* (Conil and Lys) - Vdovenko, pl. 5. 4, figs. 1-2.
1977 *Pseudolituotuba gravata* (Conil and Lys) - Paproth et al., p. 67, 73, 77 (no illustration).
1977 *Pseudolituotuba gravata* (Conil and Lys) - Conil et al., pl. 1, fig. 8.
v. 1977b *Pseudolituotuba gravata* (Conil and Lys) - Vachard, p. 139, pl. 5, fig. 2, pl. 2, figs. 7, 11.
1978 *Archaediscus magnus* Sosipatrova and Wan - Lin, p. 37, pl. 8, fig. 7.
v. 1980 *Pseudolituotuba gravata* (Conil and Lys) - Vachard, pl. 35, fig. 5.
1981 *Pseudolituotuba gravata* (Conil and Lys) - Mamet and Martínez, pl. 1, figs. 7-8.
1981 *Pseudolituotuba gravata* (Conil and Lys) - Strank, pl. 10, fig. 13.
1987 *Pseudolituotuba* cf. *gravata* (Conil and Lys) - Brenckle and Marchant, pl. 4, figs. 13-14.
1989 *Pseudolituotuba gravata* (Conil and Lys) - Fewtrell et al., p. 41, pl. 3. 3, fig. 18.
1990 *Pseudolituotuba gravata* (Conil and Lys) - Strogen et al., fig. 11 L.
v.1996 *Pseudolituotuba gravata* (Conil and Lys) - Vachard and Montenat, pl. 3, fig. 6.
1998 *Pseudolituotuba* encrusting *Ungdarella* - Gallagher, pl. 2, fig. 7.
v. 1999 *Pseudolituotuba gravata* (Conil and Lys) - Berkhli, p. 109 (no illustration).
1999b *Pseudolituotuba gravata* (Conil and Lys) - Cózar and Rodríguez, pl. 2, fig. 3.
2000b *Pseudolituotuba gravata* (Conil and Lys) - Cózar and Rodríguez, p. 97, pl. 1, fig. 19.
2001 *Pseudolituotuba gravata* (Conil and Lys) - Vdovenko, pl. 2, figs. 16, 26.
2003 *Pseudolituotuba gravata* (Conil and Lys) - Brenckle and Miklina, pl. 3, fig. 14.
2003 *Pseudolituotuba gravata* (Conil and Lys) - Kulagina et al., text-fig. 5 p. 178, ?text-fig. 6 p. 179 (cf.) (no illustration).
2004 *Pseudolituotuba gravata* (Conil and Lys) - Cózar and Somerville, text-fig. 6 p. 47 (pars), text-fig. 7 p. 48 (pars), text-fig. 9 p. 49 (pars) (no illustration).
2004 *Pseudolituotuba gravata* (Conil and Lys) - Brenckle, pl. 5, fig. 18.
v. 2005 *Pseudolituotuba gravata* (Conil and Lys) - Saïd, p. 193 (no illustration).
2005 *Pseudolituotuba gravata* (Conil and Lys) - Devuyst et al., text-fig. 12 p. 11 (no illustration).

Description. Length (L) = up to 6.000 mm; width (w) = 1.000-1.660 mm; number of whorls = 4-5; width of uncoiled part = 0.700-0.800 mm; wall thickness = 0.170-0.500 mm.

Occurrence. Late Ivorian (MFZ7), early-late Viséan of Belgium, England, Moravia, Donbass ($C_1^{v}e_2$-$C_1^{v}f_2$) and Russian Platform. Early Viséan of Precaspian Depression and Southern Urals. Holkerian-early Asbian of Morocco. V2b-V3b of Germany. Early Brigantian of Northern England. MFZ9 = Cf4α of Ireland. Early Tulsky of Kazakhstan. Late Viséan-early Serpukhovian of Southern Spain. Viséan of South China. Brigantian of the Montagne Noire: Roquemaillère (?ML.UM.ROQ); Roc du Cayla (MA12.25, DV82C, DV82D); Roque Redonde (RR47?, RR72?, RR81?, RR87); Les Boutinelles (MA.BOU25.1); Roc de Murviel (MA33.O, MA87).

Genus *Scalebrina* Conil and Longerstaey in Conil et al., 1980

Type species. *Scalebrina compacta* Conil and Longerstaey in Conil et al., 1980.

Diagnosis. Pseudolituotubidae of small dimensions.

Remarks. This poorly known genus can be important phylogenetically because in my samples, I see a possible filiation with the first Miliolina represented by *Calcitornella*? sp. (see below).

Occurrence. Viséan of Palaeotethys: England, Germany, Ireland, Spain, Donbass, Turkey, Morocco, Iran and South China.

Scalebrina sp.
Pl. 47, figs. 10-17.

v. 2005 *Scalebrina* sp. - Saïd, p. 185, fig. X. 1. 16.

Description. Height (H) = 0.180-0.570 mm; width (w) = 0.250-0.570 mm; w/H = 0.60-1.00; number of whorls: (2) 4-5; height last chamber = 0.100-0.140 mm; wall thickness = 0.017-0.060 mm.

Occurrence. Brigantian of Montagne Noire: Roquemaillère (DV140); Roque Redonde (RR1, RR65); Les Boutinelles (MA.BOU25.13.2, MA.BOU25.14, MA.BOU25.17); Les Pascales (DV601A); Roc de Murviel (MA33.O, MA330.5, MA330.11).

Family Septabrunsiininidae Conil and Lys, 1977 nomen translat. herein (ex subfamily)

Genus *Spinobrunsiina* Conil and Longerstaey in Conil et al., 1980

Type species. *Septabrunsiina* (*Spinobrunsiina*) *ramsbottomi* Conil and Longerstaey in Conil et al., 1980.

Diagnosis. Test involute, discoidal. First whorls deviated with chernyshinellid chambers. Adult whorls oscillating to planispiral with complete endothyroid chambers. Supplementary deposits well developed (nodes, arches, projections, and lateral thickenning). Wall dark, microgranular. Simple terminal aperture.

Occurrence. Tournaisian-Viséan of Western Europe, Russia, Canada and USA (Conil and Lys, 1977). The FAD is probably located of the top of MFZ5 = Cf2 (Hance, 1996); the LAD is poorly known, nevertheless, a transverse section of *Spinobrunsiina*, late Asbian in age, seems to be illustrated by Fewtrell et al. (1989: pl. 3.7, fig. 7, under the name *Planoendothyra* sp.), whereas the same authors indicate the presence of *Septabrunsiina* up to Asbian-Brigantian (p. 60, pl. 3. 11, fig. 2; observation confirmed by Somerville and Cózar, 2005). Latest Asbian-Brigantian of Montagne Noire.

Spinobrunsiina sp.
Pl. 47, figs. 18-20.

?2005 *Septabrunsiina* sp. 1 - Somerville and Cózar, pl. 2, fig. 2, 8?

Description. The absence of transverse section in our material does not permit to assign precisely the taxon to a species. Diameter (D) = 0.700 mm; width (w) = 0.150/0.220 mm; w/D = 0. 2.1/0.2.8; number of whorls: 6; proloculus diameter = 0.015 mm; height of last chamber = 0.130 mm; wall thickness = 0. 015mm.

Occurrence. ?Late Asbian of SE Ireland. Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV332E) and Roc de Murviel (MA7, MA33.9).

7.9. Haplophragmelloids

Superfamily Haplophragmelloidea Reitlinger
in Rauzer-Chernousova and Fursenko, 1959
nomen translat. herein (pro family)

Diagnosis. This superfamily is composed of taxa, similar to Endothyroidea or advanced Tournayelloidea, often initially coiled and secondary uncoiled, with complete septa, chernyshinelloid to endothyroid chambers, supplementary deposits generally absent or weakly

developed, wall coarse granular to calcareous-agglutinated, and apertures simple, median or cribrate.

Composition. Three families: Haplophragmellidae Reitlinger in Rauzer-Chernousova and Fursenko, 1959 emend. Lipina in Rauzer-Chernousova et al., 1996 (equivalent to Endotebidae Vachard, Martini, Rettori and Zaninetti, 1994; Endotriadidae Vachard, Martini, Rettori and Zaninetti, 1994); and Mstiniidae Lipina, 1989 nomen translat. and emend. herein.

Occurrence. Late Devonian to Triassic, probably cosmopolite up to the late Tournaisian. Paleotethyan since the Viséan.

Family Haplophragmellidae Reitlinger
in Rauzer-Chernousova and Fursenko, 1959
nomen translat. and emend. Lipina
in Rauzer-Chernousova et al., 1996 (ex subfamily)

Remarks. This family is essentially Tournaisian in age, but the organization seems to be similar to the one of the Viséan Endothyroidea. The Haplophragmellidae differ in the type of wall, and the absence of supplementary deposits. As many families of Tournayelloidea and Endothyroidea, they present more or less planispirally complete stages (e. g., *Granuliferella* = *Latiendothyra*), eventually followed by uniseriate (*Granuliferelloides*) or biseriate stages (e. g., *Rectogranuliferella*).The genus *Haplophragmella*, its type species *Endothyra panderi* von Möller, 1880, is probably different of the *Haplophragmella* sensu Rauzer-Chernoussova and Reitlinger, 1936 and auctorum, as correctly indicated by Conil and Lys (1977), but this species seems to be very similar to *Rhodesinella pansa* (Conil and Lys, 1965) or *Holkeria avonensis* (Conil and Longerstaey in Conil, 1980), and I consider *Haplophragmella* sensu stricto as a junior synonym of the genera *Rhodesinella* and *Holkeria*.

Composition. Three subfamilies: (a) Haplophragmellinae Reitlinger in Rauzer-Chernousova and Fursenko, 1959, with *Haplophragmella* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al., 1936 (= *Rhodesinella* Conil and Longerstaey in Conil, 1980 = *Holkeria* Strank, 1982); *Granuliferella* E.J. Zeller, 1957 (= *Latiendothyra* Lipina in Pojarkov, 1963); *Spiroplectamminoides* Skipp, 1969 (pars), *Rectogranuliferella* Conil and Lys in Mansy et al., 1989; *Granuliferelloides* McKay and Green, 1963; *Corrigotubella* Ganelina, 1966; *Birectoendothyra* Lipina, 1970; *Globispiroplectammina* Vachard, 1977 emend. herein; *Spireitlina* Vachard in Vachard and Beckary 1991; (b) Paraendothyrinae Lipina in Rauzer-Chernousova et al., 1996 with more complex structure: *Paraendothyra* Chernysheva, 1940; *Cribroparaendothyra* Lipina in Rauzer-Chernousova et al., 1996, *Rectoparaendothyra* Chermnykh, 1972; ? *Globochernella* Hance, 1983; (c) Endotebinae nomen translat. herein ex family (synonym: Endotriadidae), with *Endoteba* Vachard and Razgallah, 1988b, *Endotriada* Vachard, Martini, Rettori and Zaninetti, 1994 and *Malayspirina* Vachard in Fontaine et al., 1988. According to Brenckle and Hance (2005), *Granuliferelloides*, *Corrigotubella* and *Lipinellina* Loeblich and Tappan, 1985 (= *Rectochernyshinella* Lipina 1965 non 1960) are synonyms; according to Lane et al. (2005), *Rectogranuliferella* and *Spiroplectamminoides* are synonyms. These modifications are probably partially justified but remain very subjective (revisions of the holotypes are lacking).

Occurrence. Tounaisian (or ?Famennian) (with *Granuliferella*)-Permian (with *Spireitlina*)-Triassic (with *Endoteba* and *Malayspirina*).

Subfamily Haplophragmellinae Reitlinger in Rauzer-Chernousova and Fursenko, 1959

Genus *Globispiroplectammina* Vachard, 1977b
emend. herein (non emend. Vachard and Beckary, 1991)

Type species. *Globispiroplectammina mameti* Vachard, 1977b.

Diagnosis. Test biseriate, initially slightly deviated with faint development of endothyroid chambers, then uncoiled, rectilinear. Simple terminal aperture.

Remarks. Initially described with an initial globivalvulinoid stage (i.e, with some similarity with the Permian genus *Paradagmarita* Lys in Lys and Marcoux, 1978), *Globispiroplectammina* was further synonymized with the genus *Palaeospiroplectammina* sensu Michelsen (1971) (pars: p. 42-43 and text-fig. 5) non *Palaeospiroplectammina* Lipina, 1965 emend. Conil and Lys, 1977, by Vachard and Beckary (1991) (see also Fontaine et al., 1999, p. 464), with an multiseriate (triseriate) initial part. New data in my material of Montagne Noire and Pyrenees prove that *Globispiroplectammina* is in fact related to *Spireitlina*, and is homeomorph of the species of *Spireitlina* with a short initial part such as *S. tokmovensis* (Reitlinger, 1961) sensu Vachard and Krainer, 2001 (pl. 1, figs. 8, 11). The homeomorphy can be extended to other similar forms of the literature, namely, biseriate in the terminal stage and with a coarsely granular wall, i. e. the *Granuliferella* type of wall, and consequently assigned to the Granuliferellidae. These genera generally poorly known are *Spiroplectamminoides* Skipp, 1969 emended herein (i. e. reduced to the type species *Spiroplectammina parva* Chernysheva, 1940); *Rectogranuliferella* Conil and Lys in Mansy et al., 1989; *Birectoendothyra* Lipina, 1970. Finally, the biseriate Granuliferellidae seem to be the direct ancestors of the Palaeotextulariidae (by reduction and disappearance of the initial stage), that might explain the misinterpretation of Vachard and Beckary (1991). Nevertheless, Mamet and Pinard (1992, pl. 1, figs. 6-7 (8-9)) advocated another filiation, from *Eotextularia* Mamet in Mamet et al., 1970 to *Consobrinella* Mamet and Pinard, 1992. In my hypothesis, the complete phylogeny migth be: *Spiroplectamminoides-Consobrinella-Globispiroplectammina-Spireitlina*, where the character: coiling preceding a biseriate part, is successively primitive and advanced.

Comparison. *Globispiroplectammina* differs from *Spireitlina* in the short, deviated initial part; moreover, the chambers seem to be chernyshinellid and not endothyroid; from *Spiroplectamminoides* emend. (i. e., reduced to *S. parva*) it differs in the very small initial part (nevertheless *Palaeospiroplectammina parva* sensu Malakhova, 1975b might be a *Globispiroplectamina*; similarly, *Spiroplectammina*? *nana* Lipina in Grozdilova and Lebedeva, 1954, p. 73, pl. 8, figs. 14-15); *Globispiroplectammina* differs also from *Birectoendothyra* in the reduced initial part and the large biseriate part; and from *Rectogranuliferella* in the initial part and the small dimensions. In fact, *Rectogranuliferella* is almost homeomorph of *Spireitlina* (which differs in the absence of sutures and the small dimensions).

Occurrence. Early Viséan-early Bashkirian; Palaeotethyan and Uralian.

Globispiroplectammina mameti Vachard, 1977b
Pl. 48, figs. 1-9.

v. 1974b *Koskinotextularia* sp. - Vachard, p. 318, pl. 21, fig. 5.
v. 1974b *Globispiroplectammina mameti* n. sp. Vachard, p. 336-337, pl. 23, figs. 7-9, 13 (nomen nudum).
v. 1977b *Globispiroplectammina mameti* n. sp. Vachard, p. 157, pl. 6, figs. 21-24 (with 1 reference in synonymy).

Description. Height (H) = 0.320-0.470 mm; height of uncoiled part (h) = 0.180-0.340 mm; width (w) = 0.170-0.200 mm; number of uncoiled chambers: 2-7 (often 6); diameter of coiled part (d) = 0.100-0.240 mm, width (w') = 0.100 mm; ratio w'/d = 0.63; number of coiled whorls: 1-1.5; number of chambers: 4-5.

Occurrence. Brigantian-early Serpukhovian of Montagne Noire: Roquemaillère (DV137A, DV137F); Vailhan-Château (DV248E); Les Mentaresses (DV328'A, DV328'C, DV328'D); Jeantels (DV690); La Serre (DV226B). Late Serpukhovian of Ardengost area: MFP.AH18F.

Genus *Spireitlina* Vachard in Vachard and Beckary, 1991

Type species. *Spiroplectammina conspecta* Reitlinger, 1950.

Synonym. *Pseudopalaeospiroplectammina* Mamet and Pinard, 1992.

Diagnosis. First whorls more or less planispirally coiled with endothyroid chambers. Adult whorls bisseriate. Wall brownish, granular.

Remarks. See above *Globispiroplectammina*.

Occurrence. The first specimen of this taxa appears in the Brigantian of Montagne Noire (Les Boutinelles BOU25-6). A specimen exists also in the late Serpukhovian of Ardengost. Relatively common from the Bashkirian to the Middle Permian (Murgabian = Wordian) (Vachard and Beckary, 1991; Ueno and Sakagami, 1993, Ueno and Igo, 1993, Ueno et al., 1994, 1996: as *Spiroplectammina*).

Spireitlina minima n. sp.
Pl. 48, figs. 10-13.

Etymology. Latin *minimus*, small.

Locus typicus. Les Boutinelles (Hérault, France).

Stratum typicum. Late Brigantian.

Diagnosis. A species of *Spireitlina* characterized by the small size and the homeomorphy with *Endospiroplectammina venusta*, the granular wall excepted.

Holotype Les Boutinelles (BOU25.6) (Pl. 48, fig. 12)

Type material. 5 (maybe 6) specimens.

Repository of the types: Collection of Palaeontology of Lille University.

Comparison. The new species differs from *Globispiroplectammina mameti* in the developed endothyroid intial stage; it differs from the small size of all the other species of *Spireitlina*.

Remarks. *Globispiroplectammina* seems to be in fact a transition between *Consobrinella* and *Spireitlina*; just at the opposite of the probable modification giving the Palaeotextulariidae in the Tournaisian.

Description. Total height = 0.420 mm; Diameter of coiled part (D) = 0.170 mm; proloculus diameter = 0.020 mm; number of whorls: 2; number of chambers at the last whorl: 4.5; number of chambers in biseriate part: 4; height of biseriate part = 0.250 mm; width of biseriate part = 0.200 mm; thickness of wall at the last chamber = 0.010-0.015 mm.

Occurrence. Brigantian of Montagne Noire: Roque Redonde (RR50, RR150?, RR67: 2 specimens), Les Boutinelles (BOU25.6)**.** Late Serpukhovian of Ardengost area.

Family Mstiniidae Lipina, 1989 nomen translat. and emend. herein pro subfamily

Genus *Mstinia* Dain, 1953 emend. herein.

Type species. *Mstinia bulloides* Dain, 1953.

Synonyms. *Haplophragmella* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al., 1936 (not consistent with the selected type species *Endothyra panderi* von Möller, 1879: p 17-18, pl. 1, figs. 3a-c). *Georgella* Conil and Lys, 1977; *Nevillea* Conil and Lys in Conil et al., 1980; *Nevillella* Conil and Lys in Conil, 1980, ?*Endothyrina* Mikhailov in Mikhailov and Ryabinin, 1934 (nomen nudum); ?*Condrustella* Conil and Longerstaey in Conil and Lys, 1977, *Endothyra* auctorum (pars), ? *Mikhailovella* auctorum (pars).

Diagnosis. Early stage planispiral, involute, with chernyshinellid chambers, adult stage uncoiled uniseriate. Aperture simple basal followed by a cribrate aperture since the late coiled chamber. Wall brownish, granular, including a calcareous agglutinate.

Remarks. The arguments advocated against the name *Haplophragmella* are convincing. The illustration of *Endothyra panderi* von Möller does not correspond to the character of the species *Haplophragmella fallax*, *H. tetraloculi* or *H. irregularis*. The problem was firstly mentioned by Brazhnikova and Vdovenko (1973) which proposed to call the taxon *Endothyrina*, but as indicated by Loeblich and Tappan (1964, 1987), and accepted by Rauzer-Chernoussova et al. (1996), it is a nomen nudum. Conil and Lys have introduced many successive names because of nomenclatural priorities: *Georgella*, *Nevillea* and *Nevillella*. Loeblich and Tappan retain finally *Nevillea* which is now generally used. Nevertheless, I consider that previously established taxa as *Mstinia* and *Condrustella*, although defined upon incomplete, teratogenic or neotenic specimens (i. e., without uncoiled part), are synonyms of *Haplophragmella* auct. Hence, *Mstinia* Dain, 1953 has priority to designate the taxon, and must replace *Haplophragmella* auct. and *Nevillea*. Unfortunately, *Mstinia* is polygeneric since *M. ziganensis* Grozdilova and Lebedeva, 1960 corresponds to these teratogenic *Lituotubella* (and/or *Pseudolituotubella*) named *Bogushella* by Conil and Lys (1977) (see *Bogushella ziganensis* sensu Fewtrell et al., 1989, pl. 3. 7, fig. 10). Furthermore, supplementary studies could indicate a synonymy of *Endothyra panderi* and *Rhodesinella avonensis*, and a priority of *Haplophragmella* upon *Rhodesinella* (compare von Moeller, 1879, pl.1, fig. 3a and Fewtrell et al., 1989, pl. 3. 7, fig. 5). It would be better for the stability of the nomenclature.

Occurrence. All the Viséan-earliest Serpukhovian (with an acme in the Asbian/Brigantian), Palaeotethyan (until to Japan: Matsusue, 1992, text-fig. 2) and Uralian.

Mstinia tetraloculi (Rauzer-Chernousova, 1948a) emend. herein

Pl. 49, figs. 1-7.

?1879 *Endothyra globulus* Eichwald (sic) - von Möller, p. 15-17, text-figs. 3-4, pl. 1, figs. 1a-d-2.
1948a *Haplophragmella tetraloculi* n. sp. Rauzer-Chernousova, p. 161, pl. 3, figs. 1-3.
1956 *Haplophragmella tetraloculi* Rauzer-Chernousova - Brazhnikova, p. 32, pl. 3, fig. 3.
1956 *Haplophragmella tulica* n. sp. Ganelina, p. 12 (French translation), pl. 11, figs. 6-7.
1959 *Mstinia bulloides* Mikhailov - Voloshinova et al., text-fig. 115, pl. 4, fig. 7.
1959 *Endothyrina typica* Mikhailov - Voloshinova et al., pl. 4, fig. 8.
? 1968 *Haplophragmella tetraloculi* Rauzer-Chernousova - Mamet, p. 125 (no illustration).
1968 *Haplophragmella irregularis* Rauzer-Chernousova - Mamet, p. 125, pl. 2, fig. 5, pl. 3, fig. 4, pl. 5, fig. 12.
1972 *Haplophragmella tetraloculi* Rauzer-Chernousova - Malakhova, p. 38, pl. 2, fig. 1.
v. 1974b *Haplophragmella irregularis* Rauzer-Chernousova - Vachard, p. 248-249, pl. 6, fig. 4, pl. 12, fig. 15 (with synonymy).
v. 1974b *Haplophragmella tetraloculi* Rauzer-Chernousova - Vachard, p. 249-250, pl. 12, fig. 13 (with synonymy).
1975 *Mstinia ziganensis* Grozdilova and Lebedeva - Grozdilova et al., p. 31, pl. 2, fig. 6.
1976 *Haplophragmella fallax* Rauser-Chernoussova and Reitlinger - Conil, pl. 4, figs. 36-37.
1977 *Georgella dytica* n. gen. n. sp. Conil and Lys, p. 33, pl. 6, figs. 92-95 (with synonymy).

v. 1977b *Haplophragmella irregularis* Rauzer-Chernousova - Vachard, p. 139, pl. 2, fig. 15.
v. 1977b *Haplophragmella tetraloculi* Rauzer-Chernousova - Vachard, p. 139, pl. 2, fig. 17.
1978 *Haplophragmella tetraloculi* Raus. - Sultanaev et al., p. 102, pl. 1, fig. 9.
1978 *Haplophragmella fallax* Rauser-Chernoussova and Reitlinger - Lin, p. 34, pl. 6, fig. 23.
1983 Chernyshinellinae ("*Haplophragmella*" vel (sic) *Nevillella*) - Conil and Paproth, tabl. 1 p. 34, fig. 4. 15.
1985 *Haplophragmella fallax* Rauser-Chernoussova and Reitlinger - Adachi, p. 111, pl. 16, figs. 17-18.
1989 *Nevillea tetraloculi* (Rauzer-Chernousova) - Fewtrell et al., p. 46, pl. 3.5, figs. 3-4.
1989 *Nevillea dytica* (Conil and Lys) - Fewtrell et al., p. 48, pl. 3. 6, fig. 5.
1992 *Nevillea dytica* (Conil and Lys) - Somerville et al., fig. 6H.
1996 *Haplophragmella tetralocula* (sic) Rauser - Reitlinger in Einor, pl. 2, fig. 1.
1998 *Nevillea dytica* (Conil and Lys) - Gallagher, pl. 1, fig. 9.
2000 *Nevillella dytica* (Conil and Lys) - Sebbar, pl. 12, fig. 15.
2000 *Nevillella* aff. *N. dytica* (Conil and Lys) - Sebbar, pl. 13, fig. 26.
2001 *Haplophragmella* sp. ex gr. *tetraloculi* Rauzer-Chernousova - Vdovenko, tabl. 1 p. 174, pl. 16, figs. 13, 6-7, 10.
2002 *Haplophragmella tetraloculi* Rauzer-Chernousova - Kulagina and Gishman, text-fig. 3 p. 186 (no illustration).
v. 2002a *Haplophragmella irregularis* Rauzer-Chernousova - Aretz, fig. 7. 12.
2003 *Haplophragmella tetraloculi* Rauzer-Chernousova - Brenckle and Milkina, pl. 4, fig. 14.
2004 *Nevillea dytica* (Conil and Lys) - Cózar and Somerville, text-fig. 4 p. 46, text-fig. 7 p. 48, text-fig. 9 p. 49, text-fig. 15 p. 61 (pars), fig. 11. 1.
2005a *Nevillea dytica* (Conil and Lys) - Cózar and Somerville, fig. 13. 19.
2005 *Nevillea dytica* (Conil and Lys) - Somerville and Cózar, text-fig. 3 p. 133, pl. 2, fig. 9.
2006 *Nevillea dytica* (Conil and Lys) - Gallagher et al., fig. 14. 16.

Description. Diameter of coiled part (D) = 0.570-0.850 mm; width of coiled part (w) = 0.480 mm; proloculus diameter = 0.080-0.140 mm; number of whorls: 2; number of uncoiled chambers = 3-4; width of uncoiled part = 0.670-0.800 mm; height of uncoiled part = up to 1.600 mm; thickness of wall at the last whorl = 0.070-0.080 mm.

Remarks. I don't see any difference between the so-called *H. tetratoculi* and *H. irregularis* of Montagne Noire. Both species correspond exactly to *Nevillea dytica*.

Occurrence. Tulsky, rare in Aleksinsky (also in Mikhailovsky according to Grozdilova et al., 1975) of Russian Platform. $C_1^{v}f_2$ of Donets Basin. Arundian-Brigantian of England (late Asbian-early Brigantian of Northern England). MFZ14 = Cf6γ of Ireland and Moravia. Crenistria zone in Germany. Late-latest Viséan of Urals (Gubashkinsky-Ust-ilimky), Ukraine (Galitsie-Volyn) and Kazakhstan. Brigantian of Algeria (the presence of a *Mstinia* in the late Serpukhovian of Algeria, see Sebbar, 2000, pl. 13, fig. 26, seems to be a unique case; this specimen is probably reworked). Late Viséan of Laos (Ban Phit) and South China. Ichinotani Formation of Japan. Latest Asbian-Brigantian of the Montagne Noire: sommet 224-Valuzières (DV600E); Lenses of the road, near Roquessels (DV293A, DV293F, DV.FB18); Castelsec (MA10.7.2, MA10.9, MA10.14.2, MA10.II, MA11.VI); Roquemaillère (DV134C, DV134D, DV137B); Japhet (DV126A, DV126D, DV126G, DV127A, DV856A); ?Roque Redonde (RR3, RR65); Vailhan-Château (DV246A, DV246D, DV246E, DV246F); Vailhan-Roque de Loup (DV602A); Les Boutinelles (MA.BOU25.9B, ?MABOU25.1); Serre de Péret (MA.SP4, MA.SP26); Roc de Murviel (MA7, MA33.9, MA34, MA50, MA59, MA73.2, MA82, MA83, MA.330.3, MA330.5, MA330.9, MA330.11).

Mstinia minima (Brazhnikova, 1956)
Pl. 49, figs. 8-10.

1956 *Haplophragmella*? *minima* n. sp. Brazhnikova, p. 32-33, pl. 3, figs. 1, 4, 6.
v. 1974b *Haplophragmella minima* Brazhnikova - Vachard, p. 249, pl. 12, fig. 10.
v. 1977b *Haplophragmella minima* Brazhnikova - Vachard, p. 139, pl. 2, fig. 10.
1986 *Haplophragmella*? *minima* Brazhnikova - Vdovenko, pl. 3, fig. 5.
1999c *Haplophragmella tetraloculi* Rauzer-Chernousova - Cózar and Rodríguez, pl. 2, fig. 18.

2001 *Haplophragmella* sp. ex gr. *minima* Brazhnikova - Vdovenko, tabl. 1 p. 174, pl. 16, figs. 4-5, 9.
2001 *Nevillea cordobensis* n. sp. Cózar, p. 4, 6, 8, pl. 1, figs. 1-8.
? 2004 *Nevillea cordobensis* Cózar - Cózar, text-fig. 5 p. 376 (pars), text-fig. 6 p. 378 (pars) (no illustration).
?2005c *Biseriammina* sp. 1 - Cózar et al., fig. 11. 18 (or *Haplophragmina beschevensis*).

Description. Total height = 1.350 mm; diameter of coiled part (D) = 0.565-0.610 mm; proloculus diameter = 0.065-0.085 mm; number of whorls: 2; number of chambers at the last coiled whorl: 3; thickness of wall at the last whorl = 0.030-0.060 mm; height of uncoiled part = 0.740 mm; width of uncoiled part = 0.660 mm; number of uncoiled chambers: 2; wall thickness at the last chamber = 0.125 mm. All the parameters of *Nevillea cordobensis* seem to be identical to *Mstinia minima*.

Occurrence. $C_1^vf_2$-C_1^sa (limestone C1) of Donets Basin. ?Late Holkerian-Asbian from Southern Spain. Late Viséan of Galitsie-Volyn (Ukraine) and Bulgaria. Latest Asbian-Brigantian of the Montagne Noire: Lenses of the road, near Roquessels (DV332A, DV.FB22); Roc de Murviel (MA330.5).

Genus *Haplophragmina* Reitlinger, 1950

Type species. *Haplophragmina kashirica* Reitlinger, 1950.

Synonyms. *Chernobaculites* Conil and Lys, 1977, *Ammobaculites* (pars) sensu Malakhova, 1956a or Brazhnikova in Brazhnikova et al., 1967, ?*Tournayellina (*pars) sensu Cózar and Somerville, 2004.

Diagnosis. Test coiled with chernyshinellid chambers, later uncoiled. Aperture terminal, basal in the coiled stage, central and single in the uncoiled stage.

Remarks. Initial stages of late Viséan-Serpukhovian ages are probably often confused by the authors with *Tournayellina*, the ancestor of the group principally developed in the early Hastarian (= earliest Tournaisian) (e.g., Hance, 1996, text-fig. 2 p. 31). The carbonate agglutinate can be coarse (e. g., Maslov, 1973, pl. 25, fig. 2).

Occurrence. Viséan-Moscovian, Palaeotethyan (until Sumatra and Japan).

Haplophragmina beschevensis Brazhnikova in Brazhnikova et al., 1967

Pl. 50, figs. 1-14.

1967 *Ammobaculites sarbaicus* subsp. *beschevensis* n. subsp. forma typica Brazhnikova in Brazhikova et al., p. 141-142, pl. 43, figs. 1-2, 4-8, 10-11.
1967 *Ammobaculites sarbaicus* subsp. *beschevensis* n. subsp. forma angularis Brazhnikova in Brazhikova et al., p. 142-143, pl. 18, fig. 1, pl. 19, fig. 1, pl. 43, figs. 9, 12, pl. 44, figs. 1-6.
1973 *Ammobaculites sarbaicus* Malakhova subsp. *beschevensis* Brazhnikova forma typica - Popova and Reitlinger in Einor, p. 51-52, pl. 5, figs. 11-13.
v. 1973b *Haplophragmina* sp. - Perret, p. 294-295, pl. 1, figs. 13-14.
v. 1974b *Haplophragmina* ? sp. - Vachard, p. 250 (no illustration).
1975 *Ammobaculites sarbaicus* subsp. *beschevensis* (Brazhnikova) - Mikhno and Balakin, p. 32, pl. 3, figs. 6-7.
?1976 cf. *Tournayellina pentacamerata* Bozorgnia - Bless et al., pl. 12, fig. 17.
v. 1977 "*Ammobaculites*" ex gr. *sarbaicus* Malakhova - Perret and Vachard, p. 90 (no illustration).
1979 *Haplophragmina sarbaica beschevensis* (Brazhnikova) - Wagner et al. , pl. 4, fig. 11.
?1981 cf. *Condrustella* sp. - Strank, pl. 11, fig. 4.
?1981 *Tournayellina beata* (Malakhova) - Strank, pl. 14, fig. 14.
?1981 *Tournayellina* sp. - Strank, pl. 20, fig. 21.
?1981 *Condrustella modavensis* subsp. 1 - Strank, pl. 17, fig. 17.
1983 *Haplophragmina beschevensis* (Brazhnikova) - Aizenverg et al., p. 12 -13 (no illustration).
?1985 *Haplophragmella* sp. A - Adachi, p. 111, pl. 16, figs. 19-20.
1985 *Haplophragmella* sp. B - Adachi, p. 111, pl. 16, fig. 21.
?1985 *Haplophragmella* sp. C - Adachi, p. 112, pl. 16, figs. 22-23.

1985 *Haplophragmella* ? sp. D - Adachi, p. 112, pl. 16, figs. 24-25.
1987 *Haplophragmina beschevensis* Brazhnikova (sic) - Sinitsyna and Sinitsyn, pl. 3, fig. 7.
1988 *Haplophragmina beschevensis* Brazhnikova (sic) - Kulagina, p. 26, pl. 4, fig. 1.
?1989 *Condrustella* sp. - Skompski et al., pl. 7, fig. 27.
?1989 *Haplophragmina* sp. - Skompski et al., pl. 7, fig. 30.
?1989 *Tournayellina* aff. *beata* (Malakhova) - Skompski et al., pl. 7, fig. 35.
?1989 Chernyshinellinae - Skompski et al., pl. 7, fig. 36.
1991 *Haplophragmina beschevensis* (Brazhnikova) - Gibshman and Akhmetshina, pl. 1, figs. 11-14.
v. 1993 *Haplophragmina angularis* (Brazhnikova) - Perret, p. 453-454, pl. F5, figs. 12-16 (with synonymy).
v. 1993 Forme de passage? entre *H. angularis* et *Insolentitheca horrida* - Perret, pl. F5, fig. 17.
v. 1996 *Haplophragmina beschevensis* (Brazhnikova) - Proust et al., p. 347 (no illustration).
1996 *Haplophragmina beschevensis* (Brazhnikova) - Rumyantseva in Einor, pl. 33, fig. 4.
v. 1999 *Haplophragmina beschevnsis* (sic) (Brazhnikova) - Berkhli, pl. 3, fig. 4.
2001 *Haplophragmina beschevensis* (Brazhnikova) - Vdovenko, tabl. 1 p. 172, pl. 17, figs. 4-9.
? 2001 *Tournayellina (Eotournayellina) primitiva* Lipina - Vdovenko, tabl. 1 p. 172, pl. 10, figs. 5-6.
2003 *Haplophragmina beschevensis* (Brazhnikova) - Brenckle and Milkina, pl. 6, fig. 22.
v. 2003 *Haplophragmina* sp. - Fontaine et al., pl. 9, fig. 4.
?2004 *Tournayellina* - Cózar and Somerville, text-fig. 15 p. 61 (pars) (no illustration).
v. 2005 *Haplophragmina* sp. - Said, p. 175, 178, 185 (no illustration).
v. 2005 *Haplophragmina* cf. *beschevensis* (Brazhnikova) - Said, p. 175, 178 (no illustration).
v. 2005 *Nivellea* (sic) sp. - Said, fig. 10. 1.
?2005c *Biseriammina* sp. 1 - Cózar et al., fig. 11. 18 (or *Mstinia minima*).

Description. My material doesn't permit to separate the species *H. angularis*. Total height = 0.520-1.020 mm; diameter of coiled part (D) = 0.180-0.270 mm; width of coiled part (w) = 0.200-0.350 mm; proloculus diameter = 0.030-0.040 mm; number of whorls: 1-2; number of coiled chambers: 4-5; height of uncoiled part = 0.330-0.570 mm; height of last chamber = 0.100-0.190 mm; number of uncoiled chambers: 3-5; width of uncoiled part = 0.210-0.330 mm; wall thickness of uncoiled part = 0.040-0.050 mm

Occurrence. Brigantian (?$C_1^ve_1$-?$C_1^vf_1$-C1vf2)-early Bashkirian Donets Basin. Late Viséan of Uzbekistan. Zapaltiubinsky of Urals. Early Bashkirian of Southern Urals and Kazakhstan. ?Viséan of Maastricht-Kastanjelaan borehole (the Netherlands). ?Early Asbian of England. Latest Asbian-earliest Brigantian of Northern England. ?MFZ14-15 (= Cf6β-Cf6γ of Poland. Latest Asbian-late Brigantian of Central Morocco. Serpukhovian of Malaysia. Early Bashkirian of Tianshan. Akavassky (early Bashkirian) of Kazakhstan. Ichinotani Formation of Japan. Latest Asbian-early Serpukhovian of the Montagne Noire (assemblages SF 1, 2, 3, 5, 6): Lenses of the road, near Roquessels (DV.FB18); Castelsec (MA10.9); Roquemaillère (DV135C, DV137A); Japhet (DV350A); Roque Redonde (RR51; RR63); Les Boutinelles (?MA.BOU3-4, MA25-1A); Laurens (?ML.FSL.LAU2); Les Pascales (DV601F); Saint Rome (DV132E); Mounio (?DV605A); Roc de Murviel (MA32, MA48, MA59, MA330.4: false *Tournayellina*); La Serre (MA.Feldrand.54, DV165A, DV226A, DV227B). Late Serpukhovian of Ardengost area: Ruisseau d'Ardengost (MFP.Rui2), Bois de Gertous (MFP.Ger5) (Perret, 1973b); Cas32, AH14, Mail6, Mail16, Mail17' (Perret, 1993); MFP.AH.B/81.5 (this study).

7.10. Endothyroids

Order Endothyrida Fursenko, 1958

Suborder Endothyrina Fursenko, 1958 nomen translat. Bogush, 1985 (ex order)

Synonyms. Palaeotextulariina Hohenegger and Piller, 1975; Tournayellida Hohenegger and Piller, 1975 (pars; Archaediscina Haynes, 1981 (see the other synonyms in Loeblich and Tappan, 1984, p. 18 and 1987, p. 188).

Superfamily Endothyroidea Brady, 1884 nomen translat. Glaessner, 1945 (ex family)
Family Endothyridae Brady, 1884 nomen correct. Rhumbler, 1895 (pro family *Endothyrina*)

Remarks. This family is sudivided into three subfamilies: Endothyrinae Brady, 1884; Omphalotinae Vdovenko in Rauzer-Chernousova et al., 1996; Globoendothyrinae Reitlinger, 1959 nomen translat. Cózar, 2000c , with different types of walls

Subfamily Endothyrinae Brady, 1884

Genus *Endothyra* Phillips, 1846 sensu Brady, 1876 emend. China, 1965
Type species. *Endothyra bowmani* Phillips, 1846 sensu Brady, 1876 emend. China, 1965.

Synonyms. *Plectogyra* Zeller, 1950; *Similisella* Vdovenko in Rauzer-Chernousova et al., 1996, *Spirella* Vdovenko in Rauzer-Chernousova et al., 1996, *Priscella* Mamet, 1974b.

Diagnosis. Test small to medium-sized, irregularly coiled with constant deviations of plane of coiling and last whorl involute to semi-evolute ("endothyroid" coiling). Chambers hemispherical relatively few numerous. Sutures depressed. Secondary deposits on the floor of chambers are variable: as nodes, ridges and hooks. Wall typically homogenous, single, microgranular (with sometimes differentiations announcing *Semiendothyra* or *Omphalotis*). Terminal aperture, basal, low and simple.

Remarks. A good synthesis upon the genus was provided by Mamet (1970, p. 34-35). Three groups of species dominate: gr. *bowmani* (typical), gr. *similis* (asymmetrical and with important secondary deposits), and gr. *prisca* (smaller), but they cannot constitute distinct genera, due to the similarity of the wall microstructure. Some species are relatively distinct and useful, *E. obsolet*a (= *E. spira*) for example.

Occurrence. The FAD is not precisely established; it is located during the Tournaisian or latest Devonian (probably in the Df3ε according to Hance, 1996, text-fig. 3). In fact, the endothyroid coiling appears in several lineages, since the Strunian (latest Devonian). The LAD is Permian, but also imprecise due to confusions in the literature with *Neoendothyra* Reitlinger, 1965. The acme is Viséan to Moscovian. The genus is cosmopolite.

Endothyra ex gr. *bowmani* Phillips, 1846 sensu Brady, 1876 emend. China, 1965
Pl. 51, figs. 1-4.

1846 *Endothyra Bowmanni* (sic, see Brady, 1876) n. sp. Phillips, p. 277-279, pl. 7, fig. 1.
1876 *Endothyra Bowmani* Phillips - Brady, p. 92-94, pl. 5, figs. 1-4.
non 1878 *Endothyra Bowmani* Phillips - von Möller, p. 96-97, pl. 4, figs. 3a-3b, pl. 12, figs. 2a-b (an *Omphalotis*).
? 1879 *Endothyra Bowmani* Phillips - von Möller, p. 14-15 (no illustration).
1939 *Endothyra bradyi* n. sp. Mikhailov, p. 51-52, pl. 4, figs. 1-2, pl. 2, fig. 11.
1957 *Endothyra bowmani* Phillips - St. Jean, p. 23, pl. 1, figs. 2-3 (with synonymy).
1964 *Plectogyra blatoni* n. sp. Conil and Lys (whereas all the "*Plectogyra bradyi*" of these authors are one or several species of small *Omphalotis*).
1965 *Endothyra bowmani* Phillips sensu Brady - China, p. 37-39 (opinion 724, C.I.N.Z.).
1970 *Endothyra* of the group *E. bowmani* Phillips in Brown emend. Brady - Mamet, n° 23 of text-fig. 3 p. 4-5, p. 10, p. 34, n° 15 of text-fig. 14 p. 28-29, pl. 2, fig. 8, pl. 4, fig. 3, pl. 5, figs. 4-5, pl. 18, figs. 1-3.
1970 *Endothyra bowmani* Phillips in Brown emend. Brady - Petryk et al., n° 74 of text-fig. 4 p. 93 (no illustration).
1970 *Endothyra* of the group *E. bowmani* Phillips in Brown emend. Brady - Skipp and Mamet, p. B120, B121, B122 (no illustration).
v. 1973b *Endothyra volynica* Brazhnikova - Perret, p. 307, pl. 4, fig. 6.
v. 1973 *Endothyra* aff. *chariessa* (Conil and Lys) - Perret, p. 310, pl. 4, fig. 7.
1973 *Endothyra (Endothyra) bowmani* Phillips - Brenckle, p. 40, pl. 3, fig. 31, pl. 4, figs. 1-6.

1973 *Endothyra bowmani* Brown - Browne and Pohl, pl. 27, fig. 4 (refigured type material).
1973 *Endothyra bowmani* Phillips - Browne and Pohl, pl. 27, figs. 3, 5-10 (refigured type material).
1974 *Endothyra bowmani* Phillips - Conil and Lees, pl. 3, fig. 31, pl. 4, fig. 42? (ex gr.).
v. 1974b *Endothyra bowmani* Phillips emend. Brady emend. CINZ - Vachard, p. 261-264, pl. 4, fig. 5, pl. 13, figs. 9, 12 (with synonymy).
1976 *Endothyra* of the group *E. bowmani* Phillips emend. Brady - Sando et al., p. 470 (no illustration).
v. 1977 *Endothyra* ex gr. *bowmani* [Phillips] - Perret and Vachard, p. 90 (no illustration).
1977 *Endothyra (Endothyra) bradyi* Mikhailov - Vdovenko, pl. 5. 10, figs. 5-12.
1977 *Endothyra* of the group *E. bowmani* Phillips emend. Brady - Armstrong and Mamet, p. 67-68, pl. 31, figs. 14-16 (with synonymy).
v. 1977b *Endothyra bowmani* (Phillips) - Vachard, p. 143, pl. 3, fig. 11.
1978 *Endothyra bowmani* Phillips - Lys et al., pl. 2, fig. 16.
1978 *Endothyra* ex gr. *bowmani* Phillips - Lys et al., pl. 2, fig. 17.
1978 *Endothyra bowmani* subsp. - Lys et al., pl. 2, fig. 18.
1978 *Endothyra bowmani maxima* Br. et Potievskaya - Lys et al., pl. 2, fig. 19.
v. 1979 *Endothyra* ex gr. *bowmani* (Phillips) - Bensaïd et al., pl. 15, fig. 13.
1979 *Endothyra bradyi* Mikhailov - Wagner et al., pl. 3, figs. 2-3.
1979 *Endothyra bowmani* Phillips *bradyi* Mikhailov - Mansourian, p. 79-80, pl. 10, figs. 138-141, pl. 11, fig. 157 (with 6 references in synonymy).
1980 *Endothyra bowmani* Phillips emend. Brady - Rich, p. 20, pl. 6, figs. 1?, 4-5, 8 (with synonymy).
1981 *Endothyra* of the group *E. bowmani* Phillips in Brown emend. Brady - Mamet et al., p. 25, 26, 27, 28, 29 (no illustration).
1982 *Endothyra bowmani* Phillips - Rich, pl. 2, figs. 11, 12, 14.
1983 *Endothyra bowmani* Phillips - Aizenverg et al., p. 10-11 (no illustration).
v. 1983 *Endothyra* ex gr. *bowmani* Phillips - Fontaine et al., p. 14, pl. 1, fig. 15.
1985 *Endothyra bowmani* Phillips emend. Brady - Adachi, p. 105, pl. 15, fig. 9 (with synonymy).
1988 *Endothyra bowmani* Phillips - Kulagina, p. 26, pl. 1, fig. 1.
1989 *Endothyra bowmani* Phillips emend. Brady - Fewtrell et al., p. 36, pl. 3. 2, fig. 7.
1989 *Endothyra* ex gr. *phrissa* (D. Zeller) - Fewtrell et al., p. 46, p. 50, pl. 3. 5, fig. 6, pl. 3. 7, fig. 2.
1989a *Endothyra bowmani* Phillips - Nguyen Duc Tien, pl. 11, figs. 2-4.
v. 1991 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Vachard and Tahiri, pl. 2, fig. 8.
v. 1991 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. C.I.N.Z. - Vachard and Beckary, p. 326, pl. 3, fig. 3.
v. 1992 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Vachard and Berkhli, pl. 1, fig. 7.
1993 *Endothyra* of the group *E. bowmani* Phillips emend. Brady - Mamet et al., pl. 3, figs. 6-12, 17.
v. 1993 *Endothyra bowmani* Phillips - Perret, pl. F2, fig. 9.
v. 1996 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Proust et al., p. 347 (no illustration).
1996 *Endothyra bowmani* (Phillips emend. Brady) (sic for the parentheses) - Cózar-Maldonado, pl. 1, fig. 7.
v. 1996 *Endothyra* ex gr. *bowmani* (Phillips) (sic for the parentheses) - Vachard and Montenat, text-fig. 4 p. 469 (no illustration).
p. 1998 *Endothyra* du groupe *E. bowmani* Phillips? emend. Brady emend. CINZ - Pinard and Mamet, p. 70-72, pl. 33, figs. 11, 14-15, pl. 34, fig. 13, pl. 35, fig. 1?, 7 (with excessive synonymy).
1998 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Sebbar, pl. 1, fig. 14.
v. 1999 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. Cinz - Fontaine et al., p. 464 (no illustration).
v. 1999 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Berkhli, p. 103, 107 (no illustration).
1999b *Endothyra bowmani* Phillips? emend. Brady emend. China - Cózar and Rodríguez, pl. 3, fig. 6.
2000 *Endothyra bowmani* Phillips? emend. Brady emend. CINZ - Sebbar, pl. 7, figs. 1, 4, pl. 8, figs. 1-2.
2000c "*Endothyra*" ex gr. *bowmani* Phillips emend. Brady emend. China - Cózar, p. 325, pl. 1, figs. 9-13, 15-18, pl. 2, fig. 1.
2001 *Endothyra (Endothyra) bowmani* Phillips - Vdovenko, tabl. 1 p. 172, pl. 10, fig. 4, 10-12, 15, 20.
v. 2001a *Endothyra bowmani* Phillips emend. Brady emend. China - Vachard and Krainer, pl. 1, fig. 16, pl. 1, fig. 18? (ex gr.).
v. 2001b *Endothyra bowmani* Phillips emend. Brady emend. China - Vachard and Krainer, pl. 1, figs. 7-8, pl. 1, fig. 19 (ex gr.), pl. 2, fig. 11.
v. 2002b *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Berkhli et al. , p. 138 (no illustration).
v. 2002 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Krainer and Vachard, p. 15-16, pl. 3, fig. 9 (with synonymy).
2002 *Endothyra bowmani* Phyll. (sic) - Ponomareva et al., p. 240 (no illustration).
2003 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Cózar, pl. 3, fig. 4, pl. 2, fig. 3.

2003 *Endothyra phrissa* (Zeller) - Brenckle and Milkina, pl. 4, fig. 12.
2003b *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Cózar et al., fig. 7A.
2003a *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Krainer et al., pl. 4, figs. 18-25.
2004 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Brenckle, pl. 2, fig. 16.
v. 2005 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Saïd, p. 180, p. 184, p. 186, p. 187, p. 189, p. 190, p. 192 (no illustration).
2005 *Endothyra* ex gr. *bowmani* Phillips emend. Brady emend. China - Brenckle, p. 25, pl. 3, fig. 42.
2005 *Endothyra bowmani* Phillips - Orlov-Labkovsky, p. 26 (no illustration).
2006 *Endothyra* ex gr. *E. bowmani* Phillips emend. Brady - Groves and Beason, pl. 1, figs. 33-36.

Description. Tests medium-sized to large for the genus, sligthly asymmetrical, with chambers moderately numerous, hemispherical with deep sutures. Supplementary deposits constituted of moderately thick basal layers with regular nodosities directed towards the aperture and a long, thin and inclined terminal spine. Diameter (D) = 0.390-0.660 mm; width (w) = 0.220-0.245 mm; ratio w/D = 0.47-0.56; proloculus diameter = 0.025-0.060 mm; number of whorls: 3-4; number of chambers at the last whorl: 6.5-8.5; height of the last whorl = 0.105-0.140 mm; thickness of wall at the last whorl = 0.015-0.020 mm.

Occurrence. Viséan-Moscovian, cosmopolite (Pinard and Mamet, 1998); up to the Early Permian of the Carnic Alps (Vachard and Krainer, 2001b) and Sumatra (Nguyen Duc Tien, 1989a). Brigantian-early Serpukhovian of Montagne Noire: Castelsec (MA10-?, MA10.17, MA11.6); Roquemaillère (DV133, DV134C, DV134D); Japhet (DV126D); Vailhan-Roque de Loup (DV248C); Les Boutinelles (MA.BOU25.4, MA.BOU25.6); Les Pascales (DV601A, ?DV601F); Roc de Murviel (?MA4, ?MA5, MA24, MA33.1, ?MA33.2, ?MA33.3, MA50, MA61, MA83); La Serre (DV165E). Late Serpukhovian of Ardengost area: Ardengost village (MFP.AA2), Bois de Gertous (MFP.Ger2) (Perret, 1973b); CasQ (Perret, 1993); MFP.AH.18, AH18E, AH20 (= DV778A), CAS14.3 (this study).

Endothyra ex gr. *similis* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova, Belyaev and Reitlinger, 1936

Pl. 51, figs. 5-11.

1936 *Endothyra similis* n. sp. Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova, Belyaev and Reitlinger, p. 211-212 (in Russian), p. 227 (in German), pl. 6, figs. 5-6.
1970 *Endothyra* of the group *E. similis* Rauzer-Chernousova and Reitlinger - Mamet, n° 25 of text-fig. 3 p. 4-5, p. 11, n° 17 of text-fig. 14 p. 28-29, p. 35, pl. 6, figs. 6, 8.
1970 *Endothyra* of the group *E. similis* Rauzer-Chernousova and Reitlinger - Skipp and Mamet, p. B121(no illustration).
1972 *Plectogyra similis* (Rauser et Reiltinger) - Malakhova, p. 39, pl. 4, figs. 2-3.
1972 *Plectogyra similis* var. *magna* (Rauser) - Malakhova, p. 39, pl. 4, figs. 4-6.
v. 1973b *Endothyra maxima* (Zeller) - Perret, p. 308, pl. 4, fig. 9.
v. 1973 *Endothyra* aff. *paraprisca paraprisca* Schlykova - Perret, p. 309-310, pl. 4, figs. 10-11.
v. 1974b *Endothyra similis similis* Rauzer-Chernousova and Reitlinger - Vachard, p. 257-258, pl. 13, figs. 7-8 (with synonymy).
v. 1974b *Endothyra similis lenociniosa* Schlykova - Vachard, p. 259-260, pl. 13, figs. 10-11 (with synonymy).
1975 *Endothyra (Spinoendothyra) similis* Rauzer-Chernousova and Reitlinger - Grozdilova et al., p. 35, pl. 4, fig. 6.
1975a *Plectogyra similis* (Rauzer-Chernousova and Reitlinger) - Malakhova, p. 25, pl. 14, figs. 18-19.
v. 1975 *Endothyra similis* Rauzer-Chernousova and Reitlinger - Termier et al., p. 36-37, pl. 3, fig. 2-3.
1977 *Endothyra* ex gr. *similis* Rauzer-Chernousova and Reitlinger - Dil, pl. 6, fig. 94.
v. 1977 *Endothyra* ex gr. *similis* Rauzer-Chernousova and Reitlinger - Perret and Vachard, p. 90 (no illustration).
1977 *Endothyra* of the group *similis* Rauzer-Chernousova and Reitlinger - Armstrong and Mamet, p. 69, pl. 32, figs. 2-3 (with synonymy).
1977 *Endothyra similis* Rauzer-Chernousova and Reitlinger - Fomina, pl. 4, fig. 12.
1977 *Endothyra (Endothyra) similis* Rauzer-Chernousova and Reitlinger - Vdovenko, pl. 5. 10, figs. 26-30.
v. 1977b *Endothyra similis similis* Rauzer-Chernousova and Reitlinger - Vachard, p. 142, pl. 3, fig. 6.
v. 1977b *Endothyra similis lenociniosa* Schlykova - Vachard, p. 142, pl. 3, figs. 7-8.

1980 *Endothyra* aff. *similis* Rauzer-Chernousova and Reitlinger - Conil et al., pl. 29, fig. 4.
1980 *Endothyra similis* Rauzer-Chernousova and Reitlinger - Rich, p. 25, pl. 10, figs. 3-4, 9, 11, 13, pl. 11, figs. 1-3, 11 (with synonymy).
1980 *Endothyra similis* Rauzer-Chernousova and Reitlinger - Skompski and Sobon-Podgorska, pl. 3, fig. 9.
1982 *Endothyra similis* Rauzer-Chernousova and Reitlinger - Fontaine and Vachard, p. 193 (no illustration).
1982 *Endothyra similis* Rauzer-Chernousova and Reitlinger - Rich, pl. 3, figs. 9-10, 13-14, 16?, 17?
1983 *Endothyra similis* Rauzer-Chernousova and Reitlinger - Aizenverg et al., p. 10-11 (no illustration).
1985 *Endothyra similis* Rauzer-Chernousova and Reitlinger - Ross and Ross, text-fig. 1 p. 195 (no illustration).
? 1989 *Endothyra* sp. - Fewtrell et al., p. 54, pl. 3. 8, fig. 8 (according to me, it is a characteristic *E. similis*).
v. 1991c *Endothyra similis* Rauzer-Chernousova and Reitlinger - Vachard et al., p. 677 (no illustration).
1992 *Endothyra* ex gr. *similis* Rauzer-Chernousova and Reitlinger - Matsusue, text-fig. 2 p. 383, fig. 3. 3.
1993 *Endothyra* of the group *E. similis* Rauzer-Chernoussova and Reitlinger - Mamet et al., pl. 3, fig. 13.
v. 1993 *Endothyra* ex gr. *similis* (Rauzer-Chernousova and Reitlinger) - Perret, pl. F2, figs. 11-12.
v. 1993b *Endothyra* ex gr. *similis* (Rauzer-Chernousova and Reitlinger) - Vachard et al., pl. 3, fig. 18.
v. 1996 *Endothyra similis* Rauzer-Chernoussova and Reitlinger - Vachard and Maslo, text-fig. 1 p. 359.
v. 1996 *Endothyra* ex gr. *similis* Rauzer-Chernousova and Reitlinger - Vachard and Montenat, text-fig. 4 p. 469 (no illustration).
p. 1998 *Endothyra* du groupe *E. similis* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova, Belyaev and Reitlinger - Pinard and Mamet, p. 73-74, pl. 33, figs. 12-13, 16-17, pl. 34, fig. 14?, 17-18, pl. 35, figs. 6, 9, 11 (with synonymy).
v. 1999 *Endothyra* ex gr. *similis (*Rauzer-Chernousova and Reitlinger) (sic for the parentheses) - Berkhli, p. 112 (no illustration).
v. 1999 *Endothyra* ex gr. *similis* Rauzer-Chernousova and Reitlinger - Fontaine et al., p. 463, 464 (no illustration).
2000 *Endothyra* gr. *E. similis* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova, Belyaev and Reitlinger - Sebbar, pl. 7, figs. 2-3.
2000c *Endothyra* ex gr. *similis* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. - Cózar, p. 325, pl. 2, figs. 2-5.
2001 *Endothyra (Similisella) similis* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. - Vdovenko, tabl. 1 p. 172, pl. 11, figs. 18-22.
v. 2001b *Endothyra* ex gr. *similis* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. - Vachard and Krainer, pl. 4, fig. 5.
v. 2005 *Endothyra* ex gr. *similis* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. - Saïd, p. 182, p. 186, p. 187, p. 189, p. 192 (no illustration).
2005 *Endothyra similis* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. - Brenckle, p. 27, pl. 3, figs. 45-46.
2005 *Endothyra similis* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. - Orlov-Labkovsky, p. 23 (no illustration).

Description. Tests medium-sized for the genus, clearly asymmetrical, compressed in diameter, with chambers relatively numerous and rounded but not swollen. Supplementary deposits constituted of thick basal layers with irregular triangular nodosities and a short and thick terminal spine. Diameter (D) = 0.370-0.590 mm; width (w) = 0.250-0.270 mm; ratio w/D = 0.49-0.66; proloculus diameter = 0.025-0.060 mm; number of whorls: 3-4; number of chambers at the last whorl: 8-10; height of the last whorl = 0.050-0.120 mm; thickness of wall at the last whorl = 0.012-0.020 mm.

Occurrence. Late Tournaisan-Bashkirian, Early Permian (see Pinard and Mamet, 1998; Vachard and Krainer, 2001b), probably cosmopolite. Tulsky-Protvinsky of Russian Platform (this age is more probable). Viséan of Urals. MFZ12-13 (Cf5-Cf6α) of Belgium. C_1^{v}a-C_1^{v}g of Donbass. V2b-V3c of Morocco. Early Asbian of Libya. Late Viséan of Laos. Tournaisian-Late Early Viséan of Afghanistan. Late Viséan/Serpukhovian of Thailand. Late Viséan of Idaho (USA). Brigantian of Tien-Shan. Brigantian of Montagne Noire: Roquemaillère (DV138B, DV138C); Japhet (DV126C, DV857.2); Roque Redonde (RR3, RR52, RR54, RR59, RR63, RR70, RR73, RR76); Vailhan-Château (DV248A); Les Boutinelles (MA.BOU25.4); Les Pascales (? MA.PA13); Roc de Murviel (MA330.5). Late Serpukhovian

of Ardengost Limestone: Areng (MFP.AH10, AH14), Bois de Gertous (MFP.Ger5) (Perret, 1973b); Cas26 (Perret, 1993); MFP.AH20C: this study.

Endothyra ex gr. *prisca* Rauzer-Chernousova and Reitlinger
in Rauzer-Chernousova, Belyaev and Reitlinger, 1936
Pl. 51, figs. 12-16.

1936 *Endothyra prisca* n. sp. Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova, Belyaev and Reitlinger, p. 213 (in Russian), p. 227 (in German), pl. 6, figs. 7-8.
1956a *Endothyra prisca* Rauser et Reitlinger - Malakhova, p. 41-42, pl. 3, figs. 11-12.
1964 *Plectogyra agathis* n. sp. Conil and Lys, p. 164, pl. 23, figs. 454-459 (whereas all the "varieties" of "*Plectogyra prisca*" of these authors are *Endostaffella*).
p. 1970 *Endothyra* of the group *E. prisca* Rauzer-Chernousova and Reitlinger - Mamet, n° 24 of text-fig. 3 p. 4-5, n° 16 of text-fig. 14 p. 28-29, p. 35 (non pl. 1, fig. 7, pl. 3, fig. 8, pl. 4, figs. 15-16, pl. 18, figs. 1-3 = all transverse sections of *Endostaffella*).
?1970 *Endothyra* of the group *E. prisca* (Rauzer-Chernousova and Reitlinger) (sic for the parentheses) - Skipp and Mamet, p. B121(no illustration).
1972 *Plectogyra prisca* (Rauser et Reiltinger) - Malakhova, p. 39, pl. 4, fig. 1.
v. 1974b *Endothyra prisca* Rauzer-Chernousova and Reitlinger - Vachard, p. 255-257, pl. 13, fig. 5 (with synonymy).
1975a *Plectogyra prisca* (Rauzer-Chernousova and Reitlinger) - Malakhova, p. 25, pl. 14, figs. 15-17.
1976 *Priscella* of the group *P. prisca* (Rauzer-Chernousova and Reitlinger) - Sando et al., p. 469, 470 (no illustration).
1976 *Endothyra agathis* (Conil and Lys) - Bless et al., pl. 12, fig. 7.
1977 *Priscella prisca* (Rauzer-Chernousova and Reitlinger) - Armstrong and Mamet, p. 56, pl. 29, figs. 1-4, 7 (with synonymy).
1977 *Endothyra (Endothyra) prisca* Rauzer-Chernousova and Reitlinger - Vdovenko, pl. 5.10, figs. 16-19.
v. 1977b *Endothyra prisca* Rauzer-Chernousova and Reitlinger - Vachard, p. 142 (no illustration).
1978 *Endothyra obsoleta* Rauzer-Chernousova - Lys et al., pl. 1, fig. 19.
1980 *Priscella prisca* (Rauzer-Chernousova and Reitlinger) - Rich, p. 29-30, pl. 12, figs. 12-13, 15-18 (with synonymy).
?1981 *Endothyra* of the group *E. prisca* Rauzer-Chernousova and Reitlinger - Mamet et al., p. 26, 27, 28, 29 (no illustration).
1981 *Endothyra* cf. *prisca* Rauzer-Chernousova and Reitlinger - Strank, pl. 11, fig. 6.
1982 *Endothyra prisca* Rauzer-Chernousova and Reitlinger - Fontaine and Vachard, p. 193 (no illustration).
1982b *Priscella* of the group *P. prisca* (Rauzer-Chernousova and Reitlinger) - Brenckle et al., p. 55, pl. 2, figs. 10-19.
1982 *Priscella* of the group *P. prisca* (Rauzer-Chernousova and Reitlinger) - Baxter and Brenckle, text-fig. 3 p.140, p. 141.
1982 *Priscella*? sp. - Rich, pl. 3, fig. 15.
1982 *Priscella prisca* (Rauzer-Chernousova and Reitlinger) - Rich, pl. 5, figs. 6, 13-14.
?1985 *Priscella prisca* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
p. 1986 *Priscella* of the group *P. prisca* (Rauzer-Chernoussova and Reitlinger) - Mamet et al., p. 14-15, pl. 3, fig. 6 (with synonymy, but incorrect interpretation of *Endostaffella fucoides* sensu Termier et al., 1975).
1989 *Endothyra prisca* (Rauzer-Chernousova and Reitlinger) (sic for the parentheses) - Fewtrell et al., p. 41, pl. 3. 3, fig. 13.
v. 1992 *Endothyra prisca* Rauzer-Chernousova and Reitlinger - Vachard and Berkhli, pl. 1, figs. 3, 8, pl. 4, fig. 8.
1993 *Priscella* of the group *P. prisca* (Rauzer-Chernoussova) (sic) - Mamet et al., pl. 3, figs. 19-21.
v. 1993 *Endothyra* ex gr. *prisca* Rauzer-Chernousova and Reitlinger - Perret, pl. F2, fig. 8.
v. 1996 *Endothyra* ex gr. *prisca* Rauzer-Chernousova and Reitlinger - Vachard and Montenat, text-fig. 4 p. 469, pl. 1, fig. 11.
1996b *Priscella* of the group *P. prisca* (Rauzer-Chernousova and Reitlinger) – Mamet, pl. 1, fig. 13.
1997 "*Priscella*" sp. - Harris et al., fig. 7. 4-5.
1998 *Priscella* du groupe *P. prisca* (Rauzer-Chernousova and Reitlinger) - Pinard and Mamet, p. 65-66, pl. 33, figs. 5-6, pl. 34, figs. 11-12 (with synonymy).
2000c "*Endothyra*" ex gr. *prisca* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. - Cózar, p. 324-325, pl. 1, fig. 7.
2001 *Priscella prisca* (Rauser et Reitlinger) - Vdovenko, tabl. 1 p. 173.

2002 *Endothyra prisca* Rauzer-Chernousova and Reitlinger - Shcherbakova and Shcherbakov, p. 312 (no illustration).
non 2002 *Priscella* ex gr. *P. prisca* Rauzer-Chernousova and Reitlinger (sic, without brackets) - Van amerom et al., pl. 3, fig. 22 (= *Endostaffella*).
p. 2002 *Endostaffella* ex gr. *E. parva* (von Möller) - Van amerom et al., pl. 3, fig. 24 (non fig. 23 correctly determined).
2003a *Endothyra* ex gr. *prisca* Rauzer-Chernousova and Reitlinger - Krainer et al., pl. 3, fig. 11, pl. 4, fig. 24.
v. 2005 *Endothyra* ex gr. *prisca* Rauzer-Chernousova and Reitlinger - Saïd, p. 176, 177, p. 180, p. 182, p. 184, p. 186, p. 187, p. 189, p. 190, p. 192 (no illustration).
2005 *Endothyra prisca* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. - Brenckle, p. 26-27, pl. 3, figs. 38-39.

Description. Diameter (D) = 0.150-0.340 mm; width (w) = 0.090-0.240 mm; ratio w/D = 0.50-0.70; proloculus diameter = 0.020-0.040 mm; number of whorls: 2.5-3; number of chambers at the last whorl: 7-8; height of the last whorl = 0.050-0.070 mm; thickness of wall at the last whorl = 0.008-0.015 mm.

Remarks. *Priscella* Mamet, 1974b, typified by *Endothyra prisca*, is an usefulness creation, due to a mistaken interpretation of *Endostaffella* Rozovskaya, 1961, by Mamet; as an evidence, *Endostaffella fucoides* Rozovskaya, 1963 mentioned by Vachard in Termier et al. (1975), although perfectly consistent with the descriptions and illustrations of Rozovskaya (1963), was re-assigned to *Priscella* by Mamet et al. (1986) and Pinard and Mamet (1998). Inversely, all the *Endothyra prisca* of Conil and Lys (1964) correspond to *Endostaffella* (Conil et al., 1980, p. 89); see also *Priscella parva* (Conil and Lys) sensu Cózar and Rodríguez, 1999b, pl. 2, fig. 4). Brenckle, although agreeing nearly always with Mamet, finally does not admit *Priscella* (Brenckle, 2005). Similarly, all the varieties of "*Plectogyra prisca*" described by Conil and Lys (1964) are *Endostaffella*, as admitted in Conil et al., 1980. It is "*Plectogyra*" *agathis* Conil and Lys, 1964 which corresponds to *Endothyra prisca* among the Belgian microfaunas.

Occurrence. Late Tournaisian-Moscovian, cosmopolite (Pinard and Mamet, 1998; with the doubts due to the confusion with some *Endostaffella*); up to the Latest Pennsylvanian (Bursumian/Orenburgian) of New Mexico (Krainer et al., 2003a). Brigantian-early Serpukhovian of Montagne Noire: Roquemaillère (DV137G); Roc du Cayla (DV82C); Roque Redonde (RR50, RR51, RR56); Vailhan-Château (DV245B); Les Mentaresses (DV328'E = *E. similis* in Vachard, 1974b); Les Jeantels DV690A (in Vachard, 1974b); Mounio (DV431D); Roc de Murviel (MA24, MA33.0, MA33.1, MA59, ?MA61, MA83, MA330.5, MA330.11); La Serre (ML1054). Late Serpukhovian of Ardengost area: CAS15bis (Perret, 1993).

Endothyra obsoleta Rauzer-Chernousova, 1948c
Pl. 51, figs. 17-21.

1948c *Endothyra obsoleta* n. sp. Rauzer-Chernousova, p. 178, pl. 5, figs. 8-10.
1963 *Plectogyra spiralis* Conil and Lys - Conil and Pirlet, pl. 3, fig. 30.
1964 *Plectogyra spira* n. sp. Conil and Lys, p. 220, pl. 37, figs. 750-752.
1966 *Plectogyra spira* Conil and Lys - Conil and Lys, p. B214, pl. 3, figs . 20.
?1970 *Endothyra obsoleta* Rauzer-Chernousova - Mamet, p. 11 (no illustration).
1972 *Endothyra spira* (Conil and Lys) - Bertrand, p. 11, 55, pl. 2, fig. 12, pl. 4, fig. 16.
1972 *Endothyra bradyi* var. *obsoleta* Rauzer-Chernousova - Bertrand, p. 43-44, pl. 5, figs. 5-6 (with synonymy).
v. 1974b *Endothyra obsoleta* Rauzer-Chernousova - Vachard, p. 264-265, pl. 13, figs. 14-15 (with synonymy).
1977 *Endothyra spira* (Conil and Lys) - Dil, pl. 6, fig. 97.
1977 *Endothyra (Endothyra) spira* (Conil and Lys) - Vdovenko, pl. 5.12, figs. 10-13, pl. 2. 2, fig. 7 ? (ex gr.).
v. 1977b *Endothyra spira* (Conil and Lys) - Vachard, p. 143 (as *E. obsoleta*), pl. 3, fig. 12.
non 1978 *Endothyra obsoleta* Rauzer-Chernousova - Lys et al., pl. 1, fig. 19 (= *E. prisca*).
1980 *Endothyra obsoleta* Rauzer-Chernousova - Skompski and Sobon-Podgorska, pl. 4, fig. 7.

1983 *Endothyra spira* (Conil and Lys) - Conil and Paproth, tabl. 1 p. 35 (no illustration).
?1985 *Endothyra* aff. *E. obsoleta* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1989 *Endothyra* ex gr. *spira* (Conil and Lys) - Fewtrell et al., p. 50, pl. 3. 6, fig. 11.
1989 *Endothyra spira* (Conil and Lys) - Skompski et al., pl. 6, figs. 17-18.
1999c *Endothyra spira* (Conil and Lys) - Cózar and Rodríguez, pl. 2, fig. 5.
?2001 *Endothyra* (*Endothyra*) *obsoleta* Rauzer-Chernousova - Vdovenko, tabl. 1 p. 172, pl. 10, figs. 13-14, 16.
2001 *Endothyra (Spirella) spira* (Conil and Lys) - Vdovenko, tabl. 1 p. 172, pl. 1, figs. 11, 19, pl. 10, figs. 17, 21-23.
2002 *Plectogyra obsoleta* Rauzer-Chernousova (sic, without parentheses) - Sergeeva, p. 269 (no illustration).
2004 *Endothyra spira* (Conil and Lys) - Cózar and Somerville, fig. 11. 5.
v. 2005 *Endothyra* ex gr. *spira* (Conil and Lys) - Saïd, p. 177 (no illustration).
2005 *Endothyra obsoleta* Rauzer-Chernousova - Brenckle, p. 26, pl. 3, figs. 40-41.

Description. As indicated by Bertrand (1972), Vachard (1974b) and Brenckle (2005), *E. obsoleta* is clearly a prioritary synonym of *E. spira*. Surprinsingly, the taxa were attributed to two different subgenera by Vdovenko (2001). Diameter (D) = 0.340-0.390 mm; number of whorls: 2-3; number of chambers at the last whorl = 6.5-8.5; thickness of wall at the last whorl = 0.008-0.010 mm.

Occurrence. Aleksinsky-Venevsky of Moscow Basin. V2a-V3bα, V3bγ of Belgium. V2b-V3a of Turkey (Zonguldak Basin). Asbian-Brigantian of England. $C_1^vf_1$-C_1^vg of Donets Basin. V2-V3 of Moravia. Late Viséan of Poland and Kazakhstan. Crenistria zone of Germany. Late Asbian of central Morocco. Asbian of Southwestern Spain. Brigantian of Montagne Noire: Roquemaillère (DV134D, DV134F, DV139B, DV137G); Roque Redonde (RR1, RR56, RR73); Vailhan-Château (DV232, DV327A); Les Pascales (DV601A); Saint Rome (DV132A);Roc de Murviel (MA21- ?, MA64, MA67, MA330.1).

Genus ?*Semiendothyra* Reitlinger, 1980

Type species. *Semiendothyra surenica* Reitlinger, 1980.

Diagnosis. Relatively large Endothyridae, similar in shape with *Endothyra* ex gr. *bowmani*, but three-layered: outer, microgranular, median: granular and inner: microgranular.

Remarks. The apparent difference of wall compared to *E. bowmani*, can be due to a greater size as in *Earlandia* (see above). The assignment of Rauzer-Chernousova et al. (1996) to a subgenus of *Omphalotis* is not consistent with the specimen described here below.

Occurrence. Brigantian of the Montagne Noire. Early Bashkirian of Urals and Donets Basin. Pennsylvanian of Prebalkash.

Semiendothyra (?) *excellens* (Zeller, 1953)

Pl. 52, figs. 1-2

1953 *Plectogyra excellens* n. sp. Zeller, p. 198, pl. 28, figs. 8-9.
non 1969 *Endothyra* cf. *E. excellens* (Zeller) - Skipp, p. 201-202, pl. 17, fig. 26 (wall different).
1970 *Endothyra excellens* (Zeller) - Skipp and Mamet, p. B121, B122 (no illustration).
1973 *Endothyra* (*E.) excellens* (Zeller) - Brenckle, p. 40-41, pl. 4, figs. 7-9.
v. 1974b *Endothyra whitesidei* Galloway and Ryniker - Vachard, p. 265-266, pl. 13, figs. 13, 16 (with synonymy).
v. 1977b *Endothyra excellens* (Zeller) - Vachard, p. 143, pl. 3, figs. 9, 13 (with 12 references in synonymy).
1980 *Endothyra excellens* (Zeller) - Rich, p. 21, pl. 6, figs. 7, 10, 13 (with synonymy).
1981 *Endothyra* ex gr. *excellens* (Zeller) - Strank, pl. 6, fig. 5.
1981 cf. *Omphalotis* sp. - Strank, pl. 12, fig. 5.
1982 *Endothyra excellens* (Zeller) - Rich, pl. 2, figs. 16-17.
1984 *Plectogyra excellens* Zeller - Zhao et al., p. 105, pl. 18, figs. 19-20.
1985 *Endothyra bowmani maxima* (Brazhnikova and Potievskaya) - Lys , pl. 1, fig. 20.
1989 *Endothyra excellens* (Zeller) - Fewtrell et al., p. 48, p. 64, pl. 3. 6, fig. 8, pl. 3. 12, fig. 1.

1989 cf. *Omphalotis* sp. - Fewtrell et al., p. 52, pl. 3. 8, fig. 1.
1997 *Endothyra excellens* (Zeller) - Harris et al., fig. 8. 7.
2001 *Endothyra* (*Endothyra*) sp. ex gr. *excellens* (Zeller) - Vdovenko, tabl. 1 p. 172, pl. 11, figs. 23-25, 31.
? 2003 *Endothyra phrissa* (Zeller) - Brenckle and Milkina, pl. 4, fig. 12.

Description. Test large, probably inflated discoïdal, similar in internal and external skeletal organization to *E. bowmani*. Wall slightly differenciated. Diameter (D) = 0.875 mm; proloculus diameter = 0.020 mm; number of whorls: 3; number of chambers at the last whorl: 8; height of the last whorl = 0.220 mm; thickness of wall at the last whorl = 0.015 mm.

Remarks. According to Pinard and Mamet (1998, p. 71), this taxon belongs to the group *Endothyra bowmani*. Morphologically, it is true but the wall differs.

Occurrence. Late Viséan-late Serpukhovian of the USA (Nevada, Idaho, Georgia, Alaska). $C_1^vf_2$-C_1^sa of Donets Basin. Asbian-Serpukhovian of England. Late Serpukhovian of Algeria (Bechar Basin). Protvinsky of Kazakhstan. Late Viséan of Tarim (China). Early Brigantian of the Montagne Noire: Roquemaillère (DV139A).

Genus *Rectoendothyra* Brazhnikova in Aizenverg et al., 1983

Type species. *Endothyra* (*Rectoendothyra*) *donbassica* Brazhnikova in Aizenverg et al., 1983.

Synonyms. *Cribrothyra* Ueno in Ueno and Nakazawa, 1993; *Mikhailovella*? sensu Adachi, 1985 (pars); ? *Holkeria* sensu Groves and Beason, 2006, pl. 2, figs. 1-19.

Diagnosis. Test with an *Endothyra* initial stage, and a last whorl enlarging rapidly and tending to uncoil. Wall microgranular to coarsely granular. Simple aperture becoming cribrate in the last chamber.

Remarks. I consider *Cribrothyra* as a synonym, due to the same coiling and types of apertures, as well as *Mikhailovella*? sp. B sensu Adachi, 1985: p. 110, pl. 16, figs. 13-14. *Holkeria* sensu Groves and Beason (2006, pl. 2, figs. 1-19) seems to be more similar to this genus than to the true *Holkeria* due to the type of coiling and shape of septa.

Occurrence. Brigantian of Donets Basin (limestones B4 and B6: Vdovenko, 2001, tabl. 1 p. 172), Morocco and Montagne Noire. ?Late Viséan of Japan. Viséan/Serpukhovian boundary ? of Iowa (USA). ?Early Serpukhovian of Kazakhstan (as *Mikhailovella*? sp. Brenckle and Milkina, 2003, pl. 5, fig. 20). Serpukhovian (Protvinsky) of Donets Basin and middle and Southern Urals. Zapaltiubinsky of Urals. Ichinotani Formation of Japan.

Rectoendothyra japhetensis n. sp.
Pl. 52, figs. 3-5.

Etymology. From the Japhet hill, near Cabrières (Hérault, France).

Locus typicus. Japhet hill.

Stratum typicum. Earliest Brigantian (assemblage SF3).

Diagnosis. A species of *Rectoendothyra* characterized by an umbilicate test and relatively numerous volutions, faint supplementary deposits and a granular wall.

Description. Diameter (D) = 0.530- 0.780 mm; width (w) = 0.215 mm; ratio w/D = 0.28; proloculus diameter = 0.030 mm; number of coiled whorls: 2-3; number of cribrate chambers: 2-3; height of the last whorl = 0.130-0.170 mm; thickness of wall at the last whorl = 0.015-0.020 mm.

Holotype. Sample DV856, Photo 9.1/7; Pl. 52, fig. 5.

Type material. 5 specimens.

Repository of the types. Collection of Palaeontology of Lille.

Comparison. *Rectoendothyra japhetensis* differs from *R. donbassica* in the more umbilicated test and more volutions for the same size. It differs from *R. jeradaensis* nomen nudum (in Berkhli, 1993 = *Rectoendothyra* n. sp. sensu Berkhli et al., 1999, text-fig. 8 and Berkhli and Vachard, 2003, p. 10) in a wall more granular, coiling more regular and the shape of septa (*R. jeradaensis* is more similar to *R. latiformis* Brazhnikova in Aizenverg et al., 1983); and from *Melatoella* in the type of wall and the thinner supplementary deposits.

Occurrence. Japhet (DV126F, DV126G, DV856); Mounio (?DV431C).

Genus *Mikhailovella* Ganelina, 1956

Type species. *Endothyrina*? *gracilis* Rauzer-Chernousova, 1948a.

Diagnosis. Test endothyroid followed by uncoiled uniseriate chamber. Wall microgranular. Aperture simple, basal in the endothyroid stage, terminal, cribrate in the terminal stage.

Occurrence. Tulsky-Mikhailovsky, Venevsky of Russian Platform, Urals and Southern Timan. $C_1^{v}g$ (limestone B8) of Donets Basin. Late Arundian-Asbian of England **(**latest Asbian-early Brigantian and doubtful in late Brigantian of Northern England). Asbian-Brigantian of Southwestern Spain. Late Asbian of Ireland and Germany. Early-late Brigantian of central Morocco (Saïd, 2005, p. 181, 185) who it is very rare. Ichinotani Formation and Akiyoshi Limestone Group of Japan. ?Asbian-early Serpukhovian of Windsor Group (SE Canada). Latest Asbian-early Serpukhovian of Montagne Noire.

Mikhailovella gracilis (Rauzer-Chernousova, 1948a)

Pl. 52, figs. 6-9.

?1879 *Endothyra* sp. indeterminata - von Möller, p. 18, pl. 7, fig. 6.
1948a *Endothyrina*? *gracilis* n. sp. Rauzer-Chernousova, p. 163-164, pl. 3, figs. 8-9.
1948e *Cribrospira*? *rara* n. sp. Rauzer-Chernousova, p. 189, pl. 7, figs. 7-8.
1956 *Haplophragmella gracilis* (Rauser) - Brazhnikova, p. 34-35, pl. 10, figs. 13-14 (non pl. 2, fig. 1-2 = *Corrigotubellopsis* n. gen.).
1956 *Mikhailovella gracilis* (Rauzer-Chernousova) - Ganelina, p. 37-38 (french translation), pl. 8, fig. 3.
1957 *Endothyrina gracilis* Rauzer-Chernousova - Malakhova, p. 4-5, pl. 1, fig. 3.
1959 *Mikhailovella gracilis* (Rauser-Chernousova) - Voloshinova and Reitlinger, pl. 5, fig. 14.
1960 *Mikhailovella gracilis* Rauzer-Chernousova - Grozdilova and Lebedeva, p. 71-72, pl. 6, fig. 3.
?1970 *Endothyranella* sp. - Mamet, n° 26 of text-fig. 3 p. 4-5, p. 11, n° 18 of text-fig. 14 p. 28-29, pl. 1, figs. 9-10.
?1970 *Mikhailovella* sp. - Mamet, n° 40 of text-fig. 3 p. 4-5, p. 12, n° 34 of text-fig. 14 p. 28-29, pl. 5, fig. 7, pl. 18, fig. 1.
1972 *Mikhailovella gracilis* Rauzer-Chernousova (sic without prentheses) - Bertrand, pl. 5, fig. 8.
v. 1974b *Mikhailovella gracilis* (Rauzer-Chernousova) - Vachard, p. 276, pl. 15, figs. 4-5, 7 (with synonymy).
1975 *Mikhailovella gracilis* (Rauzer-Chernousova) - Grozdilova et al., p. 37, pl. 4, fig. 13.
v. 1977b *Mikhailovella gracilis* (Rauzer-Chernousova) - Vachard, p. 144-145, pl. 3, figs. 15, 20 (with 4 references in synonymy).
? 1989 *Cribrospira pansa* (Conil and Lys) - Fewtrell et al., p. 52, pl. 3. 7, fig. 9 (or another species of *Mikhailovella*).
1989 *Mikhailovella gracilis caledoniae* (Conil and Longerstaey) - Fewtrell et al., p. 54, pl. 3. 8, fig. 2.
1989 *Mikhailovella gracilis* (Rauzer-Chernousova) - Skompski et al., pl. 7, figs. 33-34.
2001 *Mikhailovella* sp. ex gr. *gracilis* (Rauzer-Chernousova) - Vdovenko, tabl. 1 p. 173, pl. 14, fig. 11.
?2003 *Cribrospira rara* Rauzer-Chernousova - Kulagina et al., text-fig. 3 p. 176 (no illustration).
2004 *Mikhailovella gracilis* (Rauzer-Chernousova) - Cózar and Somerville, fig. 11. 10.
2004 *Mikhailovella gracilis* (Rauzer-Chernousova) - Cózar, pl. 2, fig. 4.

2005 *Mikhailovella gracilis* (Rauzer-Chernousova) - Somerville and Cózar, pl. 2, fig. 11.

Description. The holotype of *M. gracilis* is difficult to interpretate; the taxon described here correspond exactly to *Cribrospira*? *rara* Rauzer-Chernousova 1948e and *Mikhailovella gracilis caledoniae* Conil and Longerstaey in Conil et al., 1980; i. e., with an initial part of *Endothyra bowmani*-type and a last part with 3 well sutured chambers. Total height = 0.590-0.900 mm; diameter of coiled part (D) = 0.315-0.530 mm; width of coiled part (w) = 0.460-0.530 mm; proloculus diameter = 0.060-0.070 mm; number of whorls: 2-3; number of chambers at the last whorl: 5-6; number of chambers in uncoiled part: 2-3; height of uncoiled part = 0.275-0.530 mm; width of uncoiled part = 0.270-0.390 mm; thickness of wall at the last whorl = 0.020 mm.

Occurrence. ?Tulsky-Mikhailovsky and rare in lower Venevsky of Moscow Basin. Aleksinsky-Mikhailovsky of Urals and Southern Timan. C_1^vg of Donets Basin. Late Viséan of Galitsie-Volyn (Ukraine). Late Viséan of Samara Bend. Late Asbian of England. Late Asbian-Brigantian of Ireland. MFZ14 = Cf6γ of Poland. ?Asbian-early Serpukhovian of Windsor Group (SE Canada). Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293H, ?DV332A, ?DV332C, ?DV332E); Les Mentaresses (DV328'A); Roc de Murviel (MA21-?, MA24, MA42).

Mikhailovella sp. 2

Pl. 52, figs. 10-14.

Description. This rare taxon is characterized by the absence of sutures in the uncoiled part. Total height: 1.100-1.590 mm; height of simple-apertured part (D) = 0.470 mm for 3 chambers); number total of chambers: 8; height of cribrate part = 1.120 mm; width of uncoiled part = 0.282 mm; thickness of wall at the last whorl = 0.020 mm.

Occurrence. Brigantian-early Serpukhovian of Montagne Noire: Castelsec (MA10.I); Roc de Murviel (MA21); La Serre (MA.LSI.top.2049, MA.LS.Feldweg.4.2, MA. LS.Feldweg.17, ?MA.LS.IVB.2015, ?MA.LS.V.2001).

Genus *Mikhailovellopsis* n. gen.

Type species. *Mikhailovellopsis irregulariformis* n. gen. n.sp.

Etymology. From *Mikhailovella*, similar genus, and ending *opsis* = almost.

Diagnosis. Initial endothyroidally coiled stage with rather numerous chambers, with simple aperture followed by a relatively long uncoiled stage with cribrate aperture. Wall simple, dark, microgranular.

Composition. Monospecific.

Comparison. *Mikhailovellopsis* differs from *Mikhailovella* in its larger dimensions, and from *Melatoella* in the long uncoiled part. It differs from *Haplophragmella* auctorum in the numerous chambers at the initial stage and the wall thin, microgranular, and from "*Endothyra" panderi* in the development of the terminal part. It differs from *Corrigotubella* in the type of apertures.

Remarks. Gallagher (1996, text-fig. 2) use *Haplophragmella*, *Condrustella* and *Nevillea*, as three different genera in his table, but the corresponding taxa are not explained nor illustrated.

Occurrence. Questionable in the "zone 16i" of Monteagle Limestone (USA).

Mikhailovellopsis irregulariformis n. gen. n.sp.
Pl. 52, figs. 15-18.

? p. 1956 *Haplophragmella gracilis* (Rauser) - Brazhnikova, p. 34-35, pl. 2, figs. 1-2 (non pl. 10, figs. 13-14 (= true *Mikhailovella gracilis*).
1968 No legend - Mamet, pl. 2, fig. 6.
?1976 cf. *Haplophragmella* sp. - Bless et al., pl. 11, fig. 17.
? 1980 *Ammobaculites*? cf. *attenuatus* Malakhova - Rich, p. 12, pl. 1, fig. 5 (or *Haplophragmina*).
? 2006 *Haplophragmella* spp. - Gallagher et al., fig. 14. 11 (or *Mikhailovella*?).

Etymology. Similar to *Mstinia irregularis*.

Locus typicus. Japhet (Cabrières, Hérault).

Stratum typicum. Earliest Brigantian.

Diagnosis. As for the genus.

Description. Total height = 1.570 mm. Diameter of coiled part (D) = 0.470mm; number coiled of whorls: 2-3; number of chambers at the last whorl = 5; thickness of wall at the last whorl = 0.020 mm; height of uncoiled part = 1.100 mm; width of uncoiled part = 0.400 mm.

Holotype. Sample MA.83; DV856C.2; Pl. 52, fig. 15.

Type material. Seven specimens.

Repository of the types. Köln University (Germany).

Comparison. It differs from *Mstinia* (emend. herein) *irregularis*, in generic characters (microgranular wall, numerous endothyroid chambers in the early stage).

Remarks. Some *Mikhailovella* of the literature can belong to *Mikhailovellopsis*.

Occurrence. ?Late Viséan of Galitsie Volyn (Ukraine) and Ireland. ?Houthem borehole (the Netherlands). Brigantian of Montagne Noire: Japhet (DV856C.2); Les Boutinelles (MA.BOU25.7, MA.BOU25.17); Serre de Péret (MA.LS26); Roc de Murviel (MA.83).

Genus *Endospiroplectammina* Lipina, 1970

Type species. *Spiroplectammina venusta* Vdovenko, 1954.

Diagnosis. Test endothyroid at the initial stage, latter uncoiled and biseriate. Wall microgranular. Simple terminal aperture.

Remarks. Many genera uncoiled and biseriate at the terminal stage differ in the initial stage. Here, the problem exists for *Endospiroplectammina* and *Globispiroplectammina*.

Occurrence. Late Ivorian (top of MFZ6)-early Viséan (MFZ11). Palaeotethyan and Uralian. The dating of my material allows to propose an *Endospiroplectammina* LAD occurring in the latest Asbian (see also Vdovenko, 2001, tabl. 1 p. 174, Cózar, 2004, text-fig. 5 p. 376 and Cózar and Somerville, 2005a, text-figs. 4-5).

Endospiroplectammina syzranica (Lipina, 1948)
Pl. 52, figs. 19-20.

1948 *Spiroplectammina*? *syzranica* n. sp. Lipina, p. 211, pl. 12, figs. 7-9.
1970 *Endospiroplectammina syzranica* (Lipina) - Lipina, p. 28, pl. 1, figs. 25-27.
1972 *Spiroplectammina*? *syzranica* Lipina - Malakhova, p. 41, pl. 8, figs. 1-2.
v. 1974b *Endospiroplectammina syzranica* (Lipina) - Vachard, p. 275, pl. 15, fig. 3 (with synonymy).
1976 *Endospiroplectammina syzranica* (Lipina) - Conil and Naum, pl. 1, fig. 16.
1981 *Endospiroplectammina syzranica* (Lipina) - Strank, pl. 9, fig. 19.
1983 *Endospiroplectammina syzranica* (Lipina) - Conil and Paproth, tabl. 1 p. 35 (no illustration).

?1984 *Endospiroplectammina*? *syzranica* (Lipina) - Somerville and Strank, fig. 5b (probably another species of *Endospiroplectammina*).
1989 *Palaeospiroplectammina syzranica* (Rauser-Chernoussova) - Fewtrell et al., p. 52, pl. 3. 7, fig. 14.
?2001 *Endospiroplectammina* sp. - Vdovenko, tabl. 1 p. 174, pl. 14, fig. 12.
? 2005 *Endospiroplectammina syzranica* (Lipina) - Devuyst et al., text-fig. 12 p. 11 (no illustration).
?2005 *Endospiroplectammina* sp. 1 - Somerville and Cózar, pl. 2, fig. 17.
?2006 *Endospiroplectammina* cf. *syzranica* (Lipina) - Devuyst, fig. 3.17.B. 14.

Description. Height of test = 0.170-0.360 mm; Diameter of uncoiled part (D) = 0.030-0.072 mm; width of coiled part (w) = 0.100-0.150 mm; ratio w/D = 0.40-0.50; proloculus diameter = 0.021-0.030 mm; number of chambers in biseriate part = 8-16; thickness of wall at the last chamber = 0.003-0.013 mm.

Occurrence. ?Early-middle Viséan of Belgium (MFZ10-MFZ12). Mikhailovsky-Venesky of Submoscovite Basin. Mikhailovsky of central Urals. ? Arundian of North Wales. Holkerian-Brigantian of England. Late Asbian-early Brigantian in Ireland. ?$C_1^ve_2$-$C_1^vf_1$ of Donets Basin. ?MFZ12 of South China. Schmidtianus zone of Germany. Latest Asbian in Montagne Noire: Lenses of the road, near Roquessels (DV293C, DV293.2A).

Subfamily Omphalotinae Vdovenko in Rauzer-Chernousova et al., 1996
Genus *Omphalotis* Schlykova, 1969 non Mamet, 1968

Type species. *Endothyra omphalota* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova and Fursenko, 1937.

Diagnosis. Medium to large Endothyridae with strong supplementary deposits, and rapid deviations of axis. Last hemiwhorl often semi-evolute. Wall bilayered with a black, thin tectum and a thick, grey inner layer, finely perforated if well-preserved (Reitlinger, 1950, pl. 1, fig. 2; Voloshinova and Reitlinger, 1959, pl. 4, fig. 13A-B; Maslov, 1973, pl. 25, fig. 5).

Remarks. Vachard (1974b, 1977b) indicated the invalidity of *Omphalotis* Mamet, 1968 due to a problem of invalidity of the selected type species. *Omphalotis* was attributed to Schlykova by Termier et al. (1975); Adachi (1985); Loeblich and Tappan, 1987; Sánchez et al. (1991) and Rauzer-Chernousova et al. (1996). However, this analysis was not admitted by Cózar (2000c) or Brenckle (2005). I confirm the interpretation of Vachard (1977b) as consistent with the articles of the Zoological Code concerning the validity, the intentions of the author of a taxon and those of the first revisor, and the subsequent designation of a paralectotype for *Omphalotis omphalota* by Brenckle (2005, pl. 12, fig. 1) firstly figured in Rauzer-Chernoussova and Fursenko (1937).

Occurrence. Late Ivorian of Belgium (MFZ 7). Early Viséan to early Serpukhovian (acmé in the late Viséan); Palaeotethyan (until Thailand and Sumatra). Up to the base of middle Serpukhovian of Tien-Shan (Orlov-Labkovsky, 2005). Protvinsky-earliest Bogdanovsky of Southern Urals (Kulagina, 1988; Kulagina et al., 2001; Pazukhin et al., 2002), Alaska (Mamet et al., 1993), and ?Japan (Mizuno and Ueno, 1997, pl. 4, fig. 8). Early Bashkirian of Uzbekistan (Rumyantseva, 1970, pl. 3, fig. 8). Bashkirian of Spitsbergen (Sosipatrova, 1978, pl. 3, figs. 15-16).

Omphalotis minima (Rauzer-Chernousova and Reitlinger
in Rauzer-Chernousova, Belyaev and Reitlinger, 1936)
Pl. 53, figs. 1-12.

1936 *Endothyra omphalota* var. *minima* var. nov. Rauzer-Chernoussova and Reitlinger in Rauzer-Chernousova et al., p. 210-211 (in Russian), 227 (in German), text-fig. 5.
1960 *Plectogyra omphalota* var. *minima* (Rauzer-Chernoussova and Reitlinger in Rauzer-Chernousova et al.) - Grozdilova and Lebedeva, p. 64, pl. 5, fig. 4.

1963 *Plectogyra omphalota minima* (Rauzer-Chernoussova and Reitlinger) - Conil and Pirlet, pl. 3, figs. 35-36.
1964 *Plectogyra omphalota* var. *minima* (Rauzer-Chernoussova and Reitlinger) - Conil and Lys, p. 198, pl. 32, figs. 635-642, pl. 33, figs. 643-645.
1967 *Endothyra omphalota* var. *minima* Rauzer-Chernoussova and Reitlinger - Conil and Paproth, p. 72, 74 (no illustration).
1972 *Plectogyra omphalota* (Rauser et Reitlinger) var. *minima* (Rauser) - Malakhova, p. 39, pl. 3, figs. 1-2, 4-8.
1972 *Endothyra omphalota* var. *minima* Rauzer-Chernoussova and Reitlinger - Bertrand, pl. 1, fig. 6.
1973 *Endothyra omphalota* var. *minima* Rauzer-Chernoussova and Reitlinger - Bozorgnia, p. 73-74, pl. 21, figs. 1, 3 (with synonymy).
? 1974a *Omphalotis circumplicata* (Howchin) (= *Endothyra omphalota minima* Rauzer-Chernousova and Reitlinger) - Mamet, p. 398 (no illustration; therefore, this hypothesis was never demonstrated).
v. 1974b *Omphalotis omphalota* (Rauzer-Chernousova and Reitlinger) - Vachard, p. 270-271, pl. 14, figs. 8-11 (with synonymy).
non 1974b *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Vachard, p. 272-273, pl. 14, figs. 5-7 (with synonymy) (= *O. parvula*, see below).
1975 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Vachard in Termier et al., p. 39-40, pl. 4, fig. 1 (with synonymy).
1976 *Endothyra omphalota minima* Rauzer-Chernoussova and Reitlinger - Bless et al., pl. 11, fig. 9.
v. 1977b *Omphalotis omphalota* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova and Fursenko) - Vachard, p. 144, pl. 3, fig. 16.
1978 *Omphalotis omphalota minima* (Raus. et Reitl.) - Sultanaev et al., p. 103, pl. 6, fig. 2.
1978 *Omphalotis omphalota minima* (R. et Reitl.) - Lys et al., pl. 1, fig. 18, pl. 2, figs. 13-14.
1980 *Endothyra omphalota minima* (Rauzer-Chernoussova and Reitlinger) (sic for the parentheses) - Skompski and Sobon-Podgorska, pl. 1, fig. 7.
1981 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Strank, pl. 12, figs. 4, 28, pl. 14, fig. 16 ? (aff.).
1983 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Conil and Paproth, tabl. 1 p. 35, fig. 4. 14.
1985 *Omphalotis omphalotus minimus* (sic) (Rauser & Reitlinger) - Lys, pl. 1, fig. 8.
non 1989 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Fewtrell et al., p. 44, pl. 3. 4, fig. 16 (too small).
1992 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Somerville et al., fig. 5T.
1996 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Cózar-Maldonado, pl. 1, fig. 4.
1998 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Gallagher, pl. 1, fig. 4.
v. 1999 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Berkhli, p. 103, 117, 118 (no illustration).
1999c *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Cózar and Rodríguez, pl. 2, fig. 11.
2000c *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Cózar, p. 326, 328, pl. 2, figs. 9, 12.
v. 2002b *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Berkhli et al. , p. 138 (no illustration).
2001 *Omphalotis* (*Omphalotis*) *minima* (Rauzer-Chernousova and Reitlinger) - Vdovenko, tabl. 1 p. 173, pl. 12, figs. 2-4, pl. 13, figs. 1-2.
2003 *Omphalotis circumplicata* (Howchin) - Brenckle and Miklina, pl. 3, fig. 18.
v. 2003 *Omphalotis* ex gr. *omphalota* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova and Fursenko) - Fontaine et al., pl. 7, fig. 10.
2004 *Omphalotis* ex gr. *circumplicata* (Brady) - Piecha et al. pl. 1, fig. 4.
2005 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Orlov-Labkovsky, p. 25 (no illustration).
2005 *Omphalotis omphalota* (Rauzer-Chernousova & Reitlinger) - Somerville and Cózar, pl. 2, fig. 21.

Description. Diameter (D) = 0.830-1.175 mm; width (w) = 0.660-0.860 mm; ratio w/D = 0.64-0.75; proloculus diameter = 0.040-0.050 mm; number of whorls: 2-4; number of chambers at the last whorl: 7.5-10; thickness of wall at the last whorl = 0.040-0.050 mm.

Remarks. *O. circumplicata* is supposed a prioritary synonym of *O. minima* (since Mamet, 1968) but no evidence are given. According to Cózar (2000c) the two species are distinct. *O. omphalota* is a little larger (see Brenckle, 2005, p. 71).

Occurrence. Aleksinsky-Mikhailovsky of Moscow Basin, Urals (Gubashkinsky-Ladeinindsky) and Kazakhstan. $C_1^{v}d$-$C_1^{v}f_2$ of Donbass. MFZ12-15 (Cf 5-Cf6) of Ireland. Late Asbian of England. Late Holkerian-early Asbian of Southwestern Spain. Late Viséan of Poland, Germany and Morocco. Early Serpukhovian of Algeria (Taoudenni Basin). Late Brigantian of Malaysia. V1b-V3b Belgium. V3a-late Serpukhovian of central and Eastern Alborz (Iran). Late Viséan-earliest Serpukhovian of Tien-Shan. Latest Asbian-Brigantian of

the Montagne Noire: Lenses of the road, near Roquessels (?DV293I, ?DV.FB16); Roquemaillère (ML.UM.ROQ, DV134E, DV134F, DV137C); Castelsec (?MA10.12, MA11.2); Roque Redonde (RR4, RR51, RR55, RR56); Vailhan-Château (DV246A, DV246B, DV246C, DV246D, DV246E, DV246F, DV246G); Les Boutinelles (MA.BOU25.5, ?MA.BOU25.19); Roc de Murviel (?MA33.3, MA82, MA330.4, MA330.5).

Omphalotis parvula (Bozorgnia, 1973)
Pl. 53, figs. 13-14.

1973 *Omphalotis omphalota* var. *parvula* n. var. Bozorgnia, p. 74-75, pl. 21, figs. 2, 4, 6-9.
v. 1974b *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Vachard, p. 272-273, pl. 14, figs. 5-7.
v. 1977b *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Vachard, p. 144, pl. 3, figs. 21-22.
? 1989 *Omphalotis minima* (Rauzer-Chernousova and Reitlinger) - Fewtrell et al., p. 44, pl. 3. 4, fig. 16.

Description. Diameter (D) = 0.430-0.630 mm; width (w) = 0.290-0.320 mm; w/D = 0.49; proloculus diameter = (0.020) 0.050-0.070 mm; number of whorls: 3-4; number of chambers at the last whorl: 7-8; height of last whorl = 0.140 mm; thickness of wall = 0.017 mm.

Occurrence. V2b (=Arundian) of central Alborz (Iran). ?Mid Chadian-Arundian of England. In the Montagne Noire, from middle Viséan to early Asbian (Vachard, 1974b under the name *O. minima*), latest Asbian-early Serpukhovian: Lenses of the road, near Roquessels (DV293C, DV.FB4); Vailhan-Roque de Loup (DV314A); Les Mentaresses (?DV330B); La Serre (?DV226A, DV227C).

Omphalotis callosa (Rostovceva in Reitlinger, 1964)
Pl. 53, figs. 15-16.

1964 *Endothyra omphalota* var. *callosa* n. var. Rostovceva in Reitlinger, p. 52, pl/figs. 7-10.
v. 1974b *Omphalotis callosa* (Rostovceva) - Vachard, p. 273-274, pl. 14, fig. 12 (with synonymy).
1976 *Endothyra* cf. *callosa* (Conil and Lys) - Conil and Naum, pl. 2, fig. 23.
v. p. 1977b *Omphalotis callosa* (Conil and Lys) - Vachard, p. 144 (no illustration).
2000 *Omphalotis callosa* (Rostovceva) - Sebbar, pl. 8, fig. 5.

Description. Diameter (D) = 0.520-0.560 mm; width (w) = 0.275 mm; ratio w/D = 0.51; number of whorls: 2.5-3; number of chambers at the last whorl: 9.

Occurrence. V2a of Belgium. Aleksinsky-Venevsky of Russian Platform. In Montagne Noire: Early Asbian (Vachard, 1974b), Asbian/Brigantian boundary: Roc de Cayla (82B, 82E).

Omphalotis samarica (Rauser-Chernousova, 1948c)
Pl. 53, figs. 17-18.

1948c *Endothyra samarica* n. sp. Rauzer-Chernousova, p. 179, pl. 5, figs. 14-16.
1956a *Endothyra* cf. *samarica* Rauser- Malakhova, p. 42-43, pl. 3, figs. 16-17.
v. 1974b *Omphalotis samarica* (Rauzer-Chernousova) - Vachard, p. 273, pl. 14, fig. 4 (with synonymy).
1975 *Omphalotis samarica* (Rauzer-Chernousova and Reitlinger) (sic) - Grozdilova et al., p. 38, pl. 5, fig. 4.
? 1976 *Endothyra* ex gr. *omphalota* Rauzer-Chernousova and Reitlinger - Bless et al., pl. 12, fig. 16.
v. 1977b *Omphalotis samarica* (Rauzer-Chernousova) - Vachard, p. 144, pl. 3, fig. 17.
1981 *Omphalotis samarica* (Rauzer-Chernousova) – Strank et al., pl. 10, figs. 2, 10 .
1983 *Yanischewskina* cf. *typica* Mikhailov - Metcalfe, pl. 3, figs. 21-22.
p. 1985 *Omphalotis omphalotus omphalotus* (sic) (Rauser & Reitlinger) - Lys, pl. 1, fig. 7 (non fig. 6 = truly *O. omphalota*).
1985 *Omphalotis samarica* (Rauzer-Chernousova) - Adachi, p. 109, pl. 16, figs. 5-6 (with synonymy).
1985 *Omphalotis samarica* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1989 *Omphalotis samarica* (Rauser-Chernoussova) - Fewtrell et al., p. 55, pl. 3. 8, fig. 12.
v. 1999 *Omphalotis samarica* (Rauser-Chernoussova) - Berkhli, p. 109 (no illustration).

2000 *Omphalotis samarica* (Rauzer-Chernousova) - Sebbar, pl. 7, fig. 7, pl. 8, fig. 13.
2001 *Omphalotis* (*Omphalotis*) sp. ex gr. *samarica* (Rauser) - Vdovenko, tabl. 1 p. 173, pl. 13, figs. 3-4.
v. 2002a *Omphalotis samarica* (Rauzer-Chernousova) - Berkhli et al., p. 193 (no illustration).
v. 2002b *Omphalotis samarica* (Rauzer-Chernousova) - Berkhli et al., p. 139 (no illustration).
2003 *Omphalotis samarica* (Rauzer-Chernousova) - Kulagina et al., text-fig. 3 p. 176.

Description. This species differs only of *O. minima* in the last whorl semi-evolute. Diameter (D) = 0.740-0.940 mm; width (w) = 0.500-0.590 mm; ratio w/D = 0.63-0.70; number of whorls: 3.5-5; number of chambers at the last whorl: 8-9; thickness of wall at the last whorl = 0.030-0.050 mm.

Occurrence. Aleksinsky-Venevsky of Russian Platform. Late Viséan of Urals and Samara Bend. $C_1^{v}f_2$-$C_1^{v}g$ of Donets Basin. Holkerian-Asbian of England. V3bβ/γ-V3bγ of Morocco. ?Mesch borehole (the Netherlands). Latest Brigantian of Algeria (Reggan Basin). Late Viséan of Malaysia. Ichinotani Formation of Japan. In Montagne Noire: early Asbian (Vachard, 1974b), Asbian-Brigantian: Castelsec (MA10-12); Roquemaillère (DV137A); Roque Redonde (RR72); Roc de Murviel (MA50, MA83, MA330.10).

Subfamily Globoendothyrinae Reitlinger, 1959 nomen translat. Cózar, 2000c (ex family)

Genus *Eogloboendothyra* Vdovenko, 1972

Type species. *Endothyra* (*Globoendothyra*) *aequiparva* Brenckle, 1973 nom. nov. pro *Endothyra globulus* var. *parva* Chernysheva, 1948b preoccupied by *Endothyra parva* von Möller, 1879.

Diagnosis. Ancestral form of *Globoendothyra* distinguished by a relatively small test, relatively compressed, and with a thinner and less complicate wall.

Remarks. See discussion in Brenckle, 2005.

Occurrence. Late Tournaisian-Moliniacian, probably cosmopolite. $C_1^{v}e_2$-$C_1^{v}f_1$ of Donets Basin (Vdovenko, 2001). Late Viséan of Spanish Pyrenees (Sanz-Lopez et al., 2005). Protvinsky of Urals (Shchberbakova and Shcherbakov, 2002, p. 308).

Eogloboendothyra sp.
Pl. 54, figs. 1-4.

v. 1974b *Globoendothyra* (*Eogloboendothyra*) sp. 1 - Vachard, p. 268, pl. 15, fig. 8, 11.

Description. Diameter (D) = 0.400-0.500 mm; width (w) = 0.370 mm; ratio w/D = 0.74; proloculus diameter = 0.035 mm; number of whorls: 4-5; number of chambers at the last whorl: 6; height of the last whorl = 0.130 mm; thickness of wall at the last whorl = 0.020 mm.

Occurrence. *G. (E.) parva ukrainica* (Vdovenko) is mentioned in the Asbian ($C_1^{v}f_1$-$C_1^{v}f_1$) of Donets Basin by Vdovenko (2001: pl. 14, fig. 3). Latest Asbian of Montagne Noire: Lenses of the road, near Roquessels (DV239B, DV239C); sommet 224-Valuzières (DV600A, DV600B).

Genus *Globoendothyra* Reitlinger in Rauzer-Chernousova and Fursenko, 1959

Type species. *Nonionina globulus* Eichwald, 1860 (see discussions in Rozovskaya, 1963, Loeblich and Tappan, 1987, and Brenckle, 2005).

Diagnosis. Large Endothyridae with a complex wall, with two brown layers with an intermediate luminotheca and an inner pseudofibrous layer. Lateral and basal supplementary deposits with a curved thin spine in the last chamber. Simple terminal aperture.

Occurrence. Early Viséan-earliest Serpukhovian, Palaeotethyan and Northamerican (Mamet, 1970, p. 38). Late Serpukhovian-early Bashkirian of Algeria (Sebbar, 2000) and Alaska (Mamet et al., 1993).

Globoendothyra globula (Eichwald, 1860)
Pl. 54, figs. 5-14, 16.

1860 *Nonionina globulus* n. sp . von Eichwald, p. 350, pl. 22, figs. 17 a-c.
?1876 *Endothyra globulus* (d'Eichwald) - Brady, p. 95-96, pl. 5, figs. 7-9.
1878 *Endothyra globulus* Eichwald (sic) - von Möller, p. 98-101, pl. 4, figs. 4a-e, pl. 13, figs. 1-4.
non 1879 *Endothyra globulus* Eichwald (sic) - von Möller, p. 15-17, text-figs. 3-4 (= ?*Mstinia tetraloculi*).
1948d *Endothyra globulus* Eichwald - Rauzer-Chernousova, p. 183, pl. 6, figs. 1-2, 4.
1950 *Endothyra globulus* (Eichw.) - Reitlinger, pl. 1, fig. 6.
1956a *Endothyra globulus* Eichwald - Malakhova, p. 43 (44), pl. 5, fig. 1, 2?-3? (ex gr.).
1959b *Globoendothyra pseudoglobulus* n. sp. Reitlinger in Voloshinova and Reitlinger, text-fig. 168A-B, pl. 4, fig. 14, pl. 5, fig. 13.
1960 *Globoendothyra globulus* (Eichwald) - Grozdilova and Lebedeva, p. 67-68, pl. 5, fig. 6.
?1970 *Globoendothyra* of the group *G. globulus* d'Eichwald (sic) - Mamet, n° 35 of text-fig. 3 p. 4-5, p. 11 (no illustration).
?1970 *Globoendothyra* of the group *G. globulus* (d'Eichwald) - Petryk et al., n° 90 of text-fig. 4 p. 93 (no illustration).
?1970 *Globoendothyra* of the group *G. globulus* (d'Eichwald emend von Möller) - Skipp and Mamet, p. B121 (no illustration).
1972 *Globoendothyra globulus* (Eichwald) - Malakhova, p. 39, pl. 4, figs. 7-8.
1972 *Globoendothyra* sp. - Bertrand, pl. 1, fig. 8.
1973 *Globoendothyra globulus* (Eichwald) - Maslov, pl. 25, fig. 6.
v. 1974b *Globoendothyra globulus* (d'Eichwald) - Vachard, p. 268-270, pl. 15, figs. 9-10 (with synonymy).
1975 *Globoendothyra globulus* (Eichwald) - Mikhno and Balakin, p. 41, pl. 8, figs. 4-5.
1975 *Globoendothyra globulus* (Eichwald) - Grozdilova et al., p. 38, pl. 5, fig. 3.
v. 1977b *Globoendothyra globulus* (d'Eichwald) - Vachard, p. 143-144 (no illustration).
?1981 *Globoendothyra* of the group *G. globulus* (d'Eichwald) - Mamet et al., p. 26 (no illustration).
1985 *Globoendothyra globulus* (Eichwald) - Adachi, p. 113, pl. 17, fig. 5 (with synonymy).
1985 *Globoendothyra globulus* (Eichwald) - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1988 *Globoendothyra globulus* (Eichwald) - Kulagina, p. 26 (no illustration).
1993 *Globoendothyra* of the group *G. globulus* (d'Eichwald) - Mamet et al., pl. 3, figs. 4, 9.
1996 *Globoendothyra globulus* (Eichwald) - Gallagher, text-fig. 2 (no illustration).
1996 *Globoendothyra globulus* (von Eichwald) - Reitlinger in Einor, pl. 2, fig. 4.
1997 *Globoendothyra globulus* (Eichwald) - Gallagher and Somerville, text-fig. 4 p. 318 (no illustration).
1999c *Globoendothyra pseudoglobulus* Reitlinger emend. Bogush and Juferev - Cózar and Rodríguez, pl. 2, fig. 14.
2000c *Globoendothyra* ex gr. *pseudoglobulus* Reitlinger - Cózar, p. 329, pl. 3, figs. 1-2.
2001 *Globoendothyra* (*Globoendothyra*) *globula* (Eichwald) - Vdovenko, tabl. 1 p. 173, pl. 14, figs. 1-2, 8.
2002 *Globoendothyra globula* (Eichwald) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
2003 *Globoendothyra globula* (Eichwald) - Brenckle and Milkina, pl. 3, fig. 21.
2003 *Globoendothyra globulus* (Eichw.) - Kulagina et al., text-fig. 3 p. 176 (no illustration).
2003 *Globoendothyra globula* (Eichwald) - Kulagina et al., text-fig. 7 p. 180 (no illustration).
2003a *Globoendothyra* ex gr. *globulus* (Eichwald) - Cózar, fig. 4 G.
2003b *Globoendothyra* ex gr. *pseudoglobulus* Reitlinger emend. Bogush and Juferev - Cózar et al., fig. 7C.
2004 *Globoendothyra* ex gr. *globulus* (d'Eichwald) - Piecha et al. pl. 1, fig. 2.
2005 *Globoendothyra globula* (d'Eichwald) - Brenckle, p. 50-52, pl. 8, figs. 13, 16-17 (with synonymy).
2005 *Globoendothyra globules* (sic) - Orlov-Labkovsky, p. 23 (no illustration).
2005 *Globoendothyra globulus* (d'Eichwald) - Somerville and Cózar, pl. 2, fig. 20.
2005 *Globoendothyra* ex gr. *globulus* (d'Eichwald) - Somerville and Cózar, pl. 2, fig. 19.
2006 *Globoendothyra globula* (Eichwald) - Gallagher et al., fig. 14. 13.

Description. Diameter (D) = 0.860-1.630 mm; width (w) = 0.630-0.830 mm; ratio w/D = 0.56-0.72; proloculus diameter = 0.050-0.150 mm; number of whorls: 3-6.5; number of chambers at the last whorl = 7-10; thickness of wall at the last whorl = 0.035-0.060 mm.

Occurrence. Early Viséan-Serpukhovian (Protvinsky) of Urals. Late Viséan of Russian Platform, Samara Bend, Kazakhstan, Uzbekistan and Morocco. $C_1^{v}e_2$-$C_1^{v}g$ of Donets Basin. Asbian of Ireland. Early Asbian, late Serpukhovian of Southwestern Spain. Viséan-Serpukhovian of Tien-Shan. Late Viséan-late Serpukhovian of Alaska. ?Asbian-early Serpukhovian of Windsor Group (SE Canada). Late Viséan of Alberta (Canada) and Idaho (USA). Ichinotani Formation of Japan. Latest Asbian -Brigantian of the Montagne Noire: Lenses of the road, near Roquessels (?DV293C, ?DV332E); Roquemaillère (DV134C); Castelsec (MA10.9, MA10.17, MA10.50); Vailhan-Château (DV246B, DV246D, DV 246F); Les Pascales (DV601A); Les Mentaresses (DV329B); Mounio (DV431D); Roc de Murviel (?MA2, MA83).

Family Endothyranopsidae Reitlinger, 1958
nomen translat Rauzer-Chernousova et al., 1996 (ex subfamily)
Subfamily Endothyranopsinae Reitlinger, 1958
Genus *Plectogyranopsis* Vachard, 1977b

Type species. *Endothyra convexa* Rauzer-Chernousova, 1948b.

Synonyms. *Endothyra* pars, *Endothyranopsis* (pars; especially Skipp, 1969).

Diagnosis. Endothyranopsinae with plectogyroid coiling. Chambers relatively large, not numerous. Chambers hemispherical. Septa more or less truncated at the base. Wall brownish, microgranular.

Remarks. Contrary to Rauzer-Chernousova et al. (1996), I think that *Latiendothyranopsis* Lipina, 1977 is a distinct genus, which links *Plectogyranopsis* to *Endothyranopsis*, during the middle Viséan.

Occurrence. Viséan, Palaeotethyan (questionable in late Tournaisian and early Serpukhovian, according to Rauzer-Chernousova et al., 1996). ?Meramecian of Arizona. ?Late Serpukhovian of Algeria (under the name *Endothyranopsis* sp., Sebbar, 2000, pl. 7, fig. 15).

Plectogyranopsis convexa (Rauzer-Chernousova, 1948b)
Pl. 55, figs. 1-5.

1948b *Endothyra convexa* n. sp. Rauzer-Chernousova, p. 169, pl. 4, figs. 8-10.
1963 *Plectogyra exelikta* Conil and Lys - Conil and Pirlet, pl. 3, fig. 33.
1964 *Plectogyra exelikta* n. sp. Conil and Lys, p. 185, pl. 27, figs. 555-563.
1967 *Endothyra exelikta* var. *exelikta* (Conil and Lys) - Conil and Paproth, p. 72, pl. 6, fig. 25.
1972 *Endothyra convexa exelikta* Conil and Lys - Bertrand, p. 11, p. 47-48, pl. 2, fig. 9, pl. 4, figs. 11-13, pl. 5, fig. 2 (with synonymy).
v. non 1973b *Endothyra convexa* Rauzer-Chernousova - Perret, p. 308-309, pl. 4, fig. 8 (perhaps *Bibradya*?).
1973 *Endothyra convexa exelikta* Conil and Lys (no parentheses) - Bozorgnia, p. 72, pl. 19, figs. 3-6, 8.
v. 1974b *Endothyranopsis* (?) *convexa convexa* (Rauzer-Chernousova) - Vachard, p. 290-291, pl. 17, fig. 5 (with synonymy).
1975 *Endothyranopsis convexa* (Rauzer-Chernousova) - Mikhno and Balakin, p. 42, pl. 8, figs. 6-7.
1975a *Endothyranopsis* aff. *convexus* Brazhnikova and Rostovceva (non Rauzer-Chernousova) (sic) - Malakhova, p. 30, pl. 22, figs. 1-2.
1976 *Plectogyranopsis convexa* (Rauser) - Conil and Naum, pl. 5, fig. 69.
1977 *Endothyra convexa* Rauser - Conil et al., pl. 4, figs. 43-44 .
v. 1977b *Plectogyranopsis convexa* (Rauzer-Chernousova) - Vachard, p. 147, pl. 4, fig. 1.
1981 *Plectogyranopsis convexa* (Rauzer-Chernousova) - Strank, pl. 11, fig. 5, pl. 17, fig. 7, pl. 18, fig. 2.
1983 *Plectogyranopsis convexa* (Rauzer-Chernousova) - Conil and Paproth, tabl. 1 p. 35 (no illustration).
1989 *Plectogyranopsis exelikta* (Conil and Lys) - Fewtrell et al., p. 40, pl. 3. 3, fig. 8.

1989 *Endothyra convexa* Rauzer-Chernousova - Fewtrell et al., p. 41, pl. 3. 3, fig. 16.
1991 *Plectogyranopsis convexa* (Rauzer-Chernousova) - Sánchez et al., p. 120, pl. 2, fig. 9.
1993 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Mamet et al., pl. 7, figs. 1-2 (= *Plectogyranopsis convexa*).
v. 1999 *Plectogyranopsis convexa* (Rauzer-Chernousova) - Berkhli, p. 103, 109 (no illustration).
2000c *Plectogyranopsis* ex gr. *convexa* (Rauzer-Chernousova) - Cózar, p. 330, 332, pl. 4, figs. 5-11.
v. 2002b *Plectogyranopsis convexa* (Rauzer-Chernousova) - Berkhli et al. , p. 138 (no illustration).
2003 *Plectogyranopsis convexa* (Rauzer-Chernousova) - Brenckle and Milkina, pl. 3, fig. 25.
2003 *Plectogiranopsis* (sic) *convexus* (Rauzer-Chernousova) - Kulagina et al., text-fig. 6 p. 179 (no illustration).
2005 *Plectogyranopsis convexa* (Rauzer-Chernousova) - Brenckle, p. 76, pl. 13, figs. 4, 7.

Description. Diameter (D) = 0.380-0.655 mm; width (w) = 0.190 mm; ratio w/D = 0.50-0.56; proloculus diameter = 0.040-0.060 mm; number of whorls: 2-3; number of chambers at the last whorl: 4-5; thickness of wall at the last whorl = 0.020-0.030 mm.

Occurrence. Late Chadian-late Asbian of England. V1b-V3bγ of Belgium. Early middle Viséan of Southern Urals. Tulsky-Aleksinsky, Venevsky Russian Platform. Late Viséan of Uzbekistan. Late Holkerian-early Asbian of Southwestern Spain. V2b/V3-Crenistria zone of Germany. Late Viséan of Kazakhstan and Morocco. V1b-V2a of central Alborz (Iran).?Late Serpukhovian of Alaska. Latest Asbian-Brigantian of the Montagne Noire: Lenses of the road, near Roquessels (DV293H, DV293I); Castelsec (MA10.50); Roc du Cayla (DV466B); Roque Redonde (RR56); Les Boutinelles (MA.BOU27-8, MA.BOU25.9); Les Pascales (MA.PA6); Roc de Murviel (MA24, MA33.9).

Plectogyranopsis regularis (Rauzer-Chernousova, 1948b)
Pl. 55, figs. 6-12.

1948b *Endothyra convexa* var. *regularis* n. sp. n. var. Rauzer-Chernousova, p. 189, pl. 4, figs. 11-12.
v. 1974b *Endothyranopsis* (?) *convexa regularis* (Rauzer-Chernousova) - Vachard, p. 291, pl. 17, figs. 3-4 (with synonymy).
1968 *Cribrospira* sp. (écrasé) - Mamet, pl. 2, fig. 6.
1973 *Endothyra convexa regularis* (Rauzer-Chernousova) - Bozorgnia, p. 75-76, pl. 21, figs. 10-11.
1975 *Endothyranopsis convexa regularis* (Rauzer-Chernousova) - Grozdilova et al., p. 40, pl. 5, fig. 7.
1975a *Endothyranopsis paraconvexus* Brazhnikova and Rostovceva - Malakhova, p. 30, pl. 21, figs. 6-7.
v. 1977b *Plectogyranopsis regularis* (Rauzer-Chernousova) - Vachard, p. 147, pl. 4, figs. 2-3.
? 1978 *Plectogyra pseudocrassa* (Wang) - Lin, p. 32, pl. 6, figs. 12-13 (or a related species of *Plectogyranopsis*).
? 1979 *Endothyra convexa* ssp. - Mansourian, p. 80-81, pl. 10, figs. 143-144 (or young *Latiendothyranopsis*).
1993 Transition between *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) and *E. hirosei* Okimura - Mamet et al., pl. 7, figs. 3-4.
v. 1999 *Plectogyranopsis regularis* (Rauzer-Chernousova) - Berkhli, p. 109 (no illustration).
? 2000 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger)-*E. hirosei* Okimura - Sebbar, pl. 8, figs. 4, 7.
2003 *Plectogyranopsis regularis* (Rauzer-Chernousova) - Brenckle and Milkina, pl. 3, fig. 26.
2005 *Plectogyranopsis regularis* (Rauzer-Chernousova) - Brenckle, p. 76-77, pl. 13, fig. 6.

Description. Diameter (D) = 0.460-0.660 mm; width (w) = 0.375 mm; ratio w/D = 0.61; proloculus diameter = 0.040 mm; number of whorls: 2.5-3; number of chambers at the last whorl: 5-7; height of the last whorl = 0.180-0.210 mm; thickness of wall at the last whorl = 0.015-0.040 mm.

Occurrence. Aleksinsky-Venevsky Russian Platform. ?Moliniacian of Germany. Late Viséan of Kazakhstan. Late Viséan of Alaska. V3bβ/γ of central Morocco. V2b-V3a of central Alborz (Iran). Viséan of South China. Latest Asbian-late Brigantian of the Montagne Noire: sommet 224-Valuzières (DV600C); Lenses of the road, near Roquessels (DV332B); Castelsec (MA10.I.2, MA11-VI); Roquemaillère (?DV137C); Vailhan-Castelas (?DV248E); Roc de Murviel (MA33.102, ?MA330.11).

Plectogyranopsis ampla (Conil and Lys, 1964)
Pl. 55, figs. 13-16.

1963 *Plectogyra exelikta*, grande variété - Conil and Pirlet, pl. 3, fig. 34.
1964 *Plectogyra exelikta* var. *ampla* n. sp. n. var. Conil and Lys, p. 184, pl. 28, figs. 553-554.
1972 *Endothyra convexa ampla* Conil and Lys (sic without parentheses) - Bertrand, p. 46, pl. 2, figs. 22, 24, pl. 5, fig. 4 (with synonymy).
v. 1974b *Cribrospira mira* (Rauzer-Chernousova) - Vachard, p. 295, pl. 17, figs. 8-9 (with synonymy, because synonymized with "*Plectogyra exelikta ampla*").
1976 *Plectogyranopsis* sp. nov. - Conil, pl. 3, fig. 33.
1976 *Plectogyranopsis ampla* (Conil and Lys) - Conil and Naum, pl. 5, figs. 67-68.
1976 *Plectogyranopsis ampla* (Conil and Lys) - Bless et al., pl. 8, fig. 5.
v. 1977b *Plectogyranopsis ampla* (Conil and Lys) - Vachard, p. 147, pl. 4, figs. 7-8.
1980 *Plectogyranopsis moraviae* n. sp. Conil and Longerstaey in Conil et al., p. 80, 82, pl. 7, fig. 23, pl. 10, fig. 4.
1980 *Plectogyranopsis settlensis* n. sp. Conil and Longerstaey in Conil et al., p. 110, pl. 8, fig. 2.
1981 *Plectogyranopsis ampla* (Conil and Lys) - Strank, pl. 11, fig. 2, pl. 14, fig. 8.
1981 *Plectogyranopsis* aff. *moraviae* Conil & Longerstaey - Strank, pl. 17, fig. 8.
1981 *Plectogyranopsis moraviae* Conil & Longerstaey - Strank, pl. 20, fig. 5.
1989 *Plectogyranopsis ampla* (Conil and Lys) - Fewtrell et al., p. 56, pl. 3. 9, fig. 6.
v. 1991 *Plectogyranopsis ampla* (Conil and Lys) - Vachard and Tahiri, pl. 1, fig. 3, pl. 2, fig. 13.
1991 *Plectogyranopsis ampla* (Conil and Lys) - Sánchez et al., p. 120-121, pl. 2, fig. 10.
?1993 *Endothyranopsis hirosei* Okimura - Mamet et al., pl. 7, figs. 5-9 (or another species of *Plectogyranopsis*).

Description. Diameter (D) = 0.810-1.180 mm; width (w) = 0.830 mm; ratio w/D = 0.70; number of whorls: 2.5-3; number of chambers at the last whorl: 5-5.5 or 7-8; height of the last whorl = 0.450-0.600 mm; thickness of wall at the last whorl = 0.040-0.050 mm.

Occurrence. Arundian (V2a)-early Asbian of Belgium, Moravia, Western France, England and Morocco. Arundian of North Wales. Early Asbian of Spain. Venevsky of Moscow Basin. ?Late Viséan of Alaska. Late Holkerian (Vachard, 1974b) and latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293.2B); sommet 224-Valuzières (DV600E); Castelsec (?MA10.12); Les Boutinelles (?MA.BOU25.1, ?MA.BOU25.7).

Genus *Endothyranopsis* Cummings, 1955a

Type species. *Involutina crassa* Brady in Moore, 1870 (fide Cummings, in fact. *Endothyra crassa* Brady, 1876).

Diagnosis. Test free, relatively large, almost planispiral and involute, compressed to spherical with numerous quadratic chambers, with very slight sutures, and separated by septa, truncated at the base. No supplementary deposit. Simple and basal terminal aperture. Wall brownish, granular, commonly with a calcareous agglutinate, and rarely finely perforated (material of Ardengost).

Remarks. In the specimens of Ardengost, another form exhibit the same perforated wall as *Endothyranopsis*, it is *Koskinotextularia perforata* n. sp. This perforations are in contact with the external environment, but lack of communications with the inner part so they are exactly inverse of the keriotheca of the fusulinids (e. g., Vachard et al., 2004b), the alveoles of *Bradyina* von Möller, 1878 or *Bradyinelloides* Mamet and Pinard, 1992 and the pores of *Cribrospira* von Möller, 1878 sensu stricto. They cannot as these ones be interpreted as harbouring endosymbiotic algae, maybe they can be useful to the exchanges of gases. Similar structures exist among the Permian *Dagmarita* (Altiner, submitted), and especially in the Mesozoic genus *Melathrokerion* Brönnimann and Conrad, 1966, where the structure of the wall is denominated "pseudo-alveolar" (see also Martini et al., 1995).

Occurrence. Middle Viséan-late Serpukhovian, Palaeotethyan, ?Northamerican (excepted the forms of Windsor Group, Canada (Mamet, 1970), the northamerican specimens belong more probably to *Eoendothyranopsis* Reitlinger and Rostovceva in Reitlinger, 1966). Earliest Bashkirian of Gostinskii, Russia (Ponomareva et al., 2002, fig. 2) and Southern Urals (Kulagina et al., 1992).

Endothyranopsis compressa (Rauzer-Chernoussova and Reitlinger, 1936)
Pl. 55, figs. 17-18.

1936 *Endothyra crassa* (Brady) var. *compressa* var. nov. Rauzer-Chernoussova and Reitlinger in Rauzer-Chernousova et al., p. 209 (in Russian), 226 (in German), pl. 6, figs. 1-2.
1948b *Endothyra crassa compressa* Rauzer-Chernoussova and Reitlinger - Rauzer-Chernousova, p. 166-167, pl. 4, figs. 5-7.
1960 *Endothyranopsis compressus* (Rauzer-Chernousova and Reitlinger) - Grozdilova and Lebedeva, p. 73-74, pl. 7, fig. 1.
1963 *Endothyranopsis compressus* (Rauzer-Chernousova and Reitlinger) - Rozovskaya, p. 57-58, pl. 10, figs. 3-9, pl. 11, figs. 1-2.
1964 *Endothyra crassa* (Brady) var. *compressa* Raus-Cern. - Conil and Lys, p. 150, pl. 22, figs. 436-437.
?1970 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Mamet, n° 27 of text-fig. 3 p. 4-5, p. 11, n° 19 of text-fig. 14 p. 28-29, p. 36 (no illustration).
?1970 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Petryk et al., n° 76 of text-fig. 4 p. 93 (no illustration).
non 1973 *Endothyranopsis* cf. *compressa* (Rauzer-Chernousova and Reitlinger) - Brenckle, p. 54, pl. 8, figs. 1-2 (= ?*Ninella*).
v. 1974b *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Vachard, p. 284-286, pl. 17, figs. 10-11 (with synonymy).
1975 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Grozdilova et al., p. 39, pl. 5, fig. 5.
1975a *Endothyranopsis compressus* (Rauzer-Chernousova and Reitlinger) - Malakhova, p. 30, pl. 21, figs. 2-5.
v. 1977b *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Vachard, p. 147, pl. 4, fig. 9.
1978 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Sultanaev et al., p. 101, pl. 5, fig. 8.
1978 *Endothyranopsis crassus* (Brady) - Lys et al. , pl. 1, fig. 10.
1978 *Plectogyra compressa* (Rauzer-Chernousova and Reitlinger) - Lin, p. 31, pl. 6, fig. 6.
? 1980 *Endothyranopsis* aff. *E. compressa* (Rauzer-Chernousova and Reitlinger) - Rich, p. 31, pl. 13, figs. 17-19, pl. 22, figs. 2-3, 5 (with synonymy).
?1981 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Mamet et al., p. 26 (no illustration).
v. 1982 *Endothyranopsis crassus compressa* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Fontaine and Vachard, p. 189, 193, 194 (no illustration).
non 1982 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Rich, pl. 4, figs. 20-21, 23, pl. 5, figs. 24-30 (= ?*Eoendothyranopsis* and ?*Globoendothyra*).
1982 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Rich, pl. 4, figs. 20-21, 23, pl. 5, figs. 24?-30?
1985 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1987 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Ouarache, p. 42, text-fig. 16 (pars).
1990 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Vdovenko et al., pl. 1, fig. 20.
1991 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Sánchez et al., p. 121-122, pl. 3, fig. 1.
v. 1991 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Vachard and Tahiri, pl. 1, fig. 9, pl. 2, fig. 14, 18, 21, pl. 3, figs. 8-9, pl. 5, fig. 15.
1992 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Matsusue, text-fig. 2 p. 383, fig. 3. 15.
non 1993 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Mamet et al., pl. 7, figs. 1-2 (= *Plectogyranopsis convexa*)
non 1993 Transition between *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) and *E. hirosei* Okimura - Mamet et al., pl. 7, figs. 3-4 (= *Plectogyranopsis regularis*).
1993 *Endothyranopsis* cf. *compressa* (Rauzer-Chernousova and Reitlinger) - Ueno and Nakazawa, p. 31, fig. 10. 10-12 (with 28 references in synonymy).
1996 *Endothyranopsis compressa* Rauser & Reitlinger (sic without parentheses) - Reitlinger in Einor, pl. 2, fig. 2.

1996 *Endothyranopsis compressa* (Rauser & Reitlinger) - Marfenkova in Einor, pl. 41, fig. 13.
v. 1999 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Berkhli, p. 103, 106, 109, 110, 114, 120? (ex gr.), 121? (cf.) (no illustration).
non 2000 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger)- *E. hirosei* Okimura - Sebbar, pl. 8, figs. 4, 7 (maybe *Plectogyranopsis regularis*).
2000c *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Cózar, p. 329-330, pl. 3, fig. 9.
2001 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Vdovenko, tabl. 1 p. 173, pl. 14, figs. 5-7, 9-10.
2002 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Sergeeva, p. 271, 275 (no illustration).
v. 2002b *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Berkhli et al., p. 138 (no illustration).
2003 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Brenckle and Miklina, pl. 3, figs. 1-2.
2003 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Kulagina et al., text-fig. 4 p. 177, text-fig. 6 p. 179 (no illustration).
2004 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Cózar and Somerville, text-fig. 7 p. 48 (pars), text-fig. 9 p. 49 (pars) (no illustration).
v. 2005 *Endothyranopsis* ex gr. *compressa* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Saïd, p. 176, p. 178, p. 184, p. 186, p. 188, p. 189, p. 191 (no illustration).
2005 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Brenckle, p. 28, pl. 4, figs. 3, 5.
2005 *Endothyranopsis compressa* (Rauzer-Chernousova and Reitlinger) - Orlov-Labkovsky, p. 24 (no illustration).

Description. Test rather small, nautiloid with deep, symmetrical, umbilical depressions, and broadly rounded periphery. Diameter (D) = 0.490-0.950 mm; width (w) = 0.310-0.530 mm; ratio w/D = 0.60-0.80; proloculus diameter = 0.055-0.110 mm; number of whorls: 3-3.5; number of chambers at the last whorl: 8-11; thickness of wall at the last whorl = 0.020-0.030 mm.

Occurrence. Middle Viséan-late Serpukhovian of Russian Platform (mainly Tulsky-Mikhailovsky), Urals (Ust-ilimsky-Ladeininsky), Kazakhstan, Donets Basin (C_1^va-C_1^vg), Austria, England, Belgium (MFZ12-14 = Cf5-Cf6γ), Southern France (Holkerian-Serpukhovian), Morocco (V2b-V3c), Spain, Viet-Nam and Laos. V3c of Eastern Alborz (Iran). Late Viséan of Thailand, Japan and Alberta (Canada). ?Asbian of Windsor Group (SE Canada). ?Middle to late Viséan of Idaho (USA). Early? Asbian of Tien-Shan. Late Holkerian-Asbian of Montagne Noire (Vachard, 1974b), latest Asbian-latest Brigantian in my material: Lenses of the road, near Roquessels (DV332F);); Castelsec (MA10.14, ?MA11.5.2); Roc du Cayla (DV83B); Japhet (DV126E, DV126F); Les Pascales (DV602C); Mounio (DV431C). Late Serpukhovian of Ardengost area: AH18.

Endothyranopsis lenticulata Ueno in Ueno and Nakazawa, 1993
Pl. 55, fig. 19, Pl. 56, fig. 1.

1993 *Endothyranopsis lenticulata* n. sp. Ueno in Ueno and Nakazawa, p. 29, 31, fig. 11. 1-14.
2006 *Endothyranopsis lenticulata* Ueno - Okuyucu and Vachard, fig. 7. 6.

Description. Similar to *E. compressa*, but with an acute, subcarinate periphery, this taxon can correspond only to a morphotype but I admit its specific status here. Diameter (D) = 0.700-1.000 mm; width (w) = 0.350-0.420 mm; ratio w/D = 0.42-0.50; proloculus diameter = 0.025 mm; number of whorls: 3-4; height of the last whorl = 0.200-0.250 mm; thickness of wall at the last whorl = 0.017-0.025mm.

Occurrence. Viséan of Japan (Omi Limestone Group). Late Viséan of Turkey (Okuyucu and Vachard, 2006). Early Brigantian of the Montagne Noire: Japhet (DV126E, DV126F).

Endothyranopsis crassa (Brady, 1876)

Pl. 56, figs. 2-15.

1876 *Endothyra crassa* n. sp. Brady, p. 97, pl. 5, figs. 15-17.
1878 *Endothyra crassa* Brady - von Möller, p. 93-95, pl. 4, figs. 2a-c, pl. 12, figs. 1a-b.
1879 *Endothyra crassa* Brady - von Möller, p. 14 (no illustration).
1948b *Endothyra crassa crassa* Brady - Rauzer-Chernousova, p. 167, pl. 4, fig. 2.
non 1956a *Endothyra* cf. *crassa* Brady - Malakhova, p. 43, pl. 4, figs. 3-4 (= *E. sphaerica*).
1959b *Endothyranopsis crassus* (Brady) - Voloshinova and Reitlinger, fig. 169A-B, pl. 5, figs. 16-17.
1960 *Endothyranopsis crassus* (Brady) - Grozdilova and Lebedeva, p. 72-73, pl. 7, fig. 3.
1963 *Endothyranopsis crassus* (Brady) - Conil and Pirlet, pl. 3, fig. 38.
1964 *Endothyranopsis crassus* var. *crassa* (Brady) - Conil and Lys, p. 150, pl. 21, figs. 432-434, pl. 22, fig. 435.
1970 *Endothyranopsis crassa* (Brady) - Mamet, n° 28 of text-fig. 3 p. 4-5, p. 11, n° 20 of text-fig. 14 p. 28-29, p. 34, pl. 5, fig. 3, pl. 15, fig. 3.
1970 *Endothyranopsis crassa* (Brady) - Petryk et al., n° 89 of text-fig. 4 p. 93 (no illustration).
1972 *Endothyranopsis crassa* (Brady) - Malakhova, p. 39, pl. 4, figs. 9-11.
1972 *Endothyranopsis crassus* var. *crassus* (Brady) - Bertrand, p. 13, pl. 1, fig. 5, pl. 3, fig. 9, pl. 5, figs. 3, 11.
v. non 1973b *Endothyranopsis crassus* var. *crassa* (Brady) - Perret, p. 311, pl. 5, fig. 1 (= *E. sphaerica*).
non 1973 *Endothyranopsis* cf. *crassa* Brady - Brenckle, p. 52-54, pl. 7, figs. 13, 15-16 (= ?*Ninella*).
1973 *Endothyranopsis crassa* - Maslov, pl. 28, fig. 1.
1973 *Endothyranopsis crassus* (Brady) - Maslov, pl. 29, fig. 7.
v. 1974b *Endothyranopsis crassa crassa* (Brady) - Vachard, p. 287-288, pl. 17, figs. 12-14 (with synonymy).
1975 *Endothyranopsis crassa* (Brady) - Mikhno and Balakin, p. 42, pl. 8, figs. 8-11.
1975 *Endothyranopsis crassa* (Brady) - Grozdilova et al., p. 39, pl. 5, fig. 10.
1976 *Endothyranopsis crassa* (Brady) - Bless et al., pl. 11, fig. 3.
1977 *Endothyranopsis crassus* (Brady) - Dil, pl. 7, fig. 101.
v. 1977b *Endothyranopsis crassa crassa* (Brady) - Vachard, p. 147, pl. 4, figs. 10-11.
1978 *Endothyranopsis crassa* (Brady) - Sultanaev et al., p. 101, pl. 6, fig. 5.
non 1978 *Endothyranopsis* ex gr. *crassa* (Brady) - Sultanaev et al., p. 101, pl. 5, fig. 3 (= ? *Latiendothyranopsis*).
non 1978 *Endothyranopsis crassus* (Brady) - Lys et al. , pl. 1, fig. 10 *(= Endothyranopsis compressa*).
1980 *Endothyranopsis crassa* (Brady) - Skompski and Sobon-Podgorska, pl. 4, fig. 9.
1981 *Endothyranopsis crassa* (Brady) - Mamet et al., p. 26 (no illustration).
1981 *Endothyranopsis* ex gr. *crassus* - Strank, pl. 5, fig. 19.
1981 *Endothyranopsis* ex gr. *crassa* - Strank, pl. 8, fig. 16, pl. 9, fig. 2, pl. 11, fig. 1, pl. 14, fig. 4, pl. 15, fig. 10.
1981 *Endothyranopsis crassa* - Strank, pl. 16, fig. 13, pl. 18, fig. 19, pl. 19, figs. 1, 16.
v. 1982 *Endothyranopsis crassus* (Brady) - Fontaine and Vachard, p. 189, 193, 194 (no illustration).
v. 1982 *Endothyranopsis crassa* (Brady) - Fontaine et al., p. 48 (no illustration).
?1983 *Endothyranopsis* ex gr. *crassa* (Brady) - Aizenverg et al., p. 12 (no illustration).
1983 *Endothyranopsis* ex gr. *crassa* (Brady) - Conil and Paproth, tabl. 1 p. 35 (no illustration).
1985 *Endothyranopsis crassa* (Brady) - Adachi, p. 112-113, pl. 17, figs. 1-2 (with synonymy).
1988b *Endothyranopsis crassa* (Brady) - Ivanova, pl. 1, fig. 5.
1988 *Endothyranopsis crassa* (Brady) - Kulagina, p. 25, 26, pl. 1, fig. 5.
non 1989 *Endothyranopsis crassa* (Brady) - Fewtrell et al., p. 41, pl. 3. 3, fig. 19 (= *Latiendothyranopsis*).
non 1989 *Endothyranopsis crassa* (Brady) - Fewtrell et al., p. 64, pl. 3. 12, fig. 4 (= *Endothyranopsis sphaerica* with some irregular chambers in the last whorl).
1989 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Fewtrell et al., p. 48, pl. 3. 6, fig. 3 (too regular for an *E. sphaerica*).
1989 *Endothyranopsis crassa* (Brady) emend. Cummings - Fewtrell et al., p. 50, pl. 3. 7, fig. 1.
1989 *Endothyranopsis crassa crassa* (Brady) - Skompski et al., pl. 7, fig. 25.
1991 *Endothyranopsis crassa* (Brady) - Sánchez et al., p. 122, pl. 2, fig. 12.
1992 *Endothyranopsis crassa* (Brady) - Matsusue, text-fig. 2 p. 383, fig. 3. 12.
1993 *Endothyranopsis crassa* (Brady) - Ueno and Nakazawa, p. 27-29, fig. 10. 13-15 (with 50 references in synonymy).
1994 *Endothyranopsis crassa* (Brady) - Herbig and Mamet, text-fig. 4 p. 101 (no illustration).
v. 1996 *Endothyranopsis crassa* (Brady) - Vachard and Maslo, text-fig. 1 p. 359.
1996 *Endothyranopsis crassa* (Brady) - Reitlinger in Einor, pl. 2, fig. 12.
1996 *Endothyranopsis crassa* (Brady) - Marfenkova in Einor, pl. 41, fig. 28.
1996 *Endothyranopsis crassa* (Brady) - Cózar-Maldonado, pl. 1, fig. 5.
?1996b *Endothyranopsis crassa* (Brady) - Mamet, pl. 1, fig. 12.
1997 *Endothyranopsis* ex gr. *crassa* (Brady) - Ueno and Igo, pl. 1, fig. 15.
1998 *Endothyranopsis crassa* (Brady) - Gallagher, pl. 1, fig. 6.

v. 1999 *Endothyranopsis crassa* (Brady) - Berkhli, p. 102, 105?, 109, 110, 112, 117 (no illustration).
v. 1999 *Endothyranopsis crassa* (Brady) - Fontaine et al., p. 464 (no illustration).
2000 *Endothyranopsis crassa* (Brady) - Sebbar, pl. 8, fig. 10.
2000c *Endothyranopsis crassa* (Brady) - Cózar, p. 330, pl. 3, figs. 12-13, pl. 4, figs. 1-2.
2001 *Endothyranopsis crassa* (Brady) - Vdovenko, tabl. 1 p. 173, pl. 15, figs. 1, 4.
2002 *Endothyranopsis* ex gr. *crassa* (Brady) - Pazukhin et al., p. 221 (no illustration).
2002 *Globoendothyra* (sic) *crassa* (Brady) - Shcherbakova and Shcherbakov, p. 307 (no illustration).
2002 *Endothyranopsis crassa* (Brady) - Shcherbakova and Shcherbakov, p. 312 (no illustration).
v. 2002a *Endothyranopsis* sp. - Aretz, fig. 7. 12.
v. 2002a *Endothyranopsis crassa* (Brady) - Berkhli et al., p. 192 p. 193? (ex gr.) (no illustration).
v. 2002b *Endothyranopsis crassa* (Brady) - Berkhli et al., p. 138, p. 139? (ex gr.) (no illustration).
2003 *Endothyranopsis crassa* (Brady) - Brenckle and Milkina, pl. 4, fig. 1.
2003a *Endothyranopsis crassa* (Brady) - Cózar, fig. 4 C.
2003b *Endothyranopsis crassa* (Brady) - Cózar et al., fig. 7D.
2004 *Endothyranopsis crassa* (Brady) - Cózar, text-fig. 5 p. 376 (pars), text-fig. 6 p. 378 (pars), pl. 2, fig. 2.
2004 *Endothyranopsis crassa* (Brady) transitional to *E. sphaerica* - Cózar, pl. 2, fig. 1.
2004 *Endothyranopsis crassa* (Brady) - Cózar and Somerville, text-fig. 3 (pars), text-fig. 6 (pars), text-fig. 7 (pars), text-fig. 9 (pars), text-fig. 15 (pars), fig. 11. 11.
2004 *Endothyranopsis crassa* (Brady) transition to *E. sphaerica* - Cózar and Somerville, text-fig. 3 (pars), text-fig. 4 (pars), text-fig. 6 (pars), text-fig. 7 (pars), text-fig. 15 (pars), fig. 11. 13-14, fig. 14. 16, 19.
2004b *Endothyranopsis crassa* (Brady) - Cózar et al., fig. 3. 2.
v. 2005 *Endothyranopsis crassa* (Brady) - Saïd, p. 180? (ex gr.), 184, 188 (no illustration).
2005 *Endothyranopsis crassa* (Brady) - Orlov-Labkovsky, p. 23, 24, 25, 26 (no illustration).
2006 *Endothyranopsis crassa* (Brady) - Gallagher et al., text-fig. 9 p. 74, fig. 14. 15.

Description. Test medium-sized, nautiloid, with regular chambers. Diameter (D) = 0.640-1.300 mm; width (w) = 0.570-1.050 mm; ratio w/D = 0.75-0.85; proloculus diameter = 0.050-0.080 mm; number of whorls: 2-3; number of chambers at the last whorl: 9-10; thickness of wall at the last whorl = 0.025-0.050 mm.

Occurrence. Late Viséan-Serpukhovian, Palaeotethyan. Possible FAD in the Ashfell Limestone (Late Holkerian) of England (Strank, 1981). Late Asbian-early Serpukhovian of Northern England (transitional forms to *E. sphaerica* since the Asbian/Brigantian Boundary: Cózar and Somerville, 2004**)**. Late Holkerian-Early Asbian of Ireland. Late Viséan of Morocco (FAD in the Cfm6 ("V3bβ/V3bγ" = MFZ13/14), Oued Amharess Formation, Berkhli, 1999, p. 109) and Poland (MFZ14 = Cf6δ). Tulsky (rare)-Aleksinsky-Venevsky-Tarussky Submoscovite Basin, Urals (Ust-ilimsky-Ust-sarbaisky) and Southern Timan (up to Protvinsky in both areas); MFZ13-15 = Cf6 of Belgium; late Viséan of Germany; latest Viséan of Uzbekistan; late Viséan-late Serpukhovian of Southwestern Spain, Donets Basin ($C_1^{v}f_2$-$C_1^{s}a$), Northern Urals and Kazakhstan. V3bγ of Turkey (Zonguldak). Late Viséan-base of middle Serpukhovian of Tien-Shan. ?Late Viséan-Serpukhovian of Viet-Nam (Da Mai), Laos (Ban Phit, Tham Heup) and Thailand (Chiang Dao, Chonburi area, Ban Sa Ngao). ?Bashkirian of Bolivia. Ichinotani Formation, Omi Limestone Group, and Akiyoshi Group of Japan. Asbian-early Serpukhovian of Windsor Group (SE Canada). Early Asbian of Alberta (Canada). Brigantian of Montagne Noire: Castelsec (MA10-?, MA10.7.2, MA10.14, MA10.17MA10.50); Roquemaillère (ML764,DV134C, DV134F); Roc du Cayla (DV466A: passing to *E. sphaerica*); Roque Redonde (RR 56?); Les Mentaresses (DV328'B, DV328'D, DV328'E, ?DV330B); Roc de Murviel (MA50, MA82, MA83, MA330.8).

Endothyranopsis sphaerica (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al., 1936)
Pl. 56, figs. 16-19.

1936 *Endothyra crassa* (Brady) var. *sphaerica* var. nov. Rauzer-Chernoussova and Reitlinger in Rauzer-Chernousova et al., p. 209-210 (in Russian), 226 (in German), pl. 6, fig. 4.

1948b *Endothyra crassa sphaerica* Rauzer-Chernoussova and Reitlinger - Rauzer-Chernousova, p. 168, pl. 4, fig. 1 (with synonymy).
1956a *Endothyra* cf. *crassa* Brady - Malakhova, p. 43, pl. 4, figs. 3-4.
1960 *Endothyranopsis crassus* (Brady) var. *sphaerica* (Rauzer-Chernoussova and Reitlinger) - Grozdilova and Lebedeva, p. 74-75, pl. 7, fig. 2.
?1970 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Mamet, n° 29 of text-fig. 3 p. 4-5, p. 11, n° 21 of text-fig. 14 p. 28-29, p. 34-35 (no illustration).
1970 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Skipp and Mamet, p. B122 (no illustration).
1972 *Endothyranopsis sphaerica* (Rauser et Reitlinger) - Malakhova, p. 39, pl. 5, figs. 3-4.
v. 1973b *Endothyranopsis crassus* var. *crassa* (Brady) - Perret, p. 311-312, pl. 5, fig. 1.
1973 *Endothyranopsis sphaericus* (Rauzer-Chernousova and Reitlinger) - Popova and Reitlinger in Einor, p. 53, pl. 6, figs. 10-12.
1975 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Grozdilova et al., p. 39, pl. 6, fig. 3.
v. 1977 *Endothyranopsis crassa sphaerica* (Rauzer-Chernousova and Reitlinger) - Perret and Vachard, p. 90 (no illustration).
1978 *Endothyranopsis sphaerica* (Raus. et Reitl.) - Sultanaev et al., p. 101, pl. 6, fig. 4.
v. 1979 *Endothyranopsis crassa sphaerica* (Rauzer-Chernousova and Reitlinger) - Bensaïd et al., pl. 15, fig. 13.
1979 *Endothyranopsis sphaerica* (Rauser & Reitlinger) - Wagner et al., pl. 2, fig. 1, pl. 3, fig. 1.
1983 *Endothyranopsis sphaerica* (Raus. et Reitl.) - Aizenverg et al., p. 12 (no illustration).
1985 *Endothyranopsis sphaericus* Rauser-Chernousova & Reitlinger (sic: no parentheses) - Lys, pl. 1, fig. 17.
1985 *Endothyranopsis sphaerica* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1988 *Endothyranopsis sphaerica* (Rauser et Reitlinger) - Kulagina, p. 25, 26, pl. 1, fig. 3.
1988b *Endothyranopsis* cf. *sphaerica* (Raus. et Reitl.) - Ivanova, pl. 3, fig. 4.
non 1989 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Fewtrell et al., p. 48, p. 56, pl. 3. 6, fig. 3, pl. 3. 9, figs. 2-3 (= *E. crassa*).
1989 *Endothyranopsis crassa* (Brady) - Fewtrell et al., p. 64, pl. 3. 12, fig. 4 (because of some irregular chambers in the last whorl).
1989 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Skompski et al., pl. 6, fig. 8.
1990 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Vdovenko et al., pl. 1, fig. 24.
1991 *Endothyranopsis* cf. *En. sphaerica* (Rauzer-Chernousova and Reitlinger) - Gibshman and Akhmetshina, pl. 1, fig. 15.
v. 1991b *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Vachard et al., pl. 1, fig. 1.
v. 1993 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Perret, pl. F 1, figs. 7-10.
1993 *Endothyranopsis* of the group *E. sphaerica* (Rauzer-Chernousova and Reitlinger) - Mamet et al., pl. 6, figs. 1-5, pl. 7, figs. 10-11.
v. 1996 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Vachard and Maslo, text-fig. 1 p. 359.
1996 *Endothyranopsis sphaerica* (Rauser & Reitlinger) - Reitlinger in Einor, pl. 2, fig. 11.
1997 *Endothyranopsis* ex gr. *sphaerica* (Rauser & Reitlinger) - Mazuno and Ueno, tabl. 2, pl. 4, figs. 1-3.
2000 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Sebbar, pl. 7, fig. 11, pl. 8, fig. 10.
2000c *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Cózar, p. 330, pl. 3, figs. 12-13, pl. 4, figs. 1-2.
2001 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Vdovenko, tabl. 1 p. 173, pl. 15, figs. 2-3, 5.
2001 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Kulagina et al., text-fig. 4 p. 15 (no illustration).
2002 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Kulagina and Gibshman, text-fig. 3 p. 186, pl. 1, fig. 21 (sic: *sphaericus*).
2002 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Marfenkova, p. 196 (no illustration).
2002 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Shcherbakova and Shcherbakov, p. 308, 312 (no illustration).
2003 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Kulagina et al., text-fig. 3 p. 176, text-fig. 7 p. 180 (no illustration).
2003 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Brenckle and Milkina, pl. 4, figs. 2-3.
2003a *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Cózar, fig. 5S.

2004 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Cózar and Somerville, text-fig. 4 p. 46 (pars), text-fig. 6 p. 47 (pars), text-fig. 15 p. 61 (pars), fig. 11. 15-17.
2004 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Cózar and Rodríguez, fig. 9. 6.
2005a *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger) - Cózar and Somerville, fig. 13. 25.
2005 *Endothyranopsis sphaerica* (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al.) - Brenckle, p. 28-29, pl. 4, fig. 6.
2005 *Endothyranopsis sphaerica* (Rauzer-Chernousova & Reitlinger) - Somerville and Cózar, pl. 3, fig. 5.

Description. Similar to *E. crassa* but with a spherical shape in axial section, and more irregularly arranged chambers in transverse section (consequently the section of Fewtrell et al., 1989 is truly an *E. crassa* and not an *E. sphaerica* as indicated by these authors). Diameter (D) = 0.850-1.370 mm; width (w) = 0.850-1.130 mm; ratio w/D = 0.89-1.0; proloculus diameter = 0.080-0.130 mm; number of whorls: 2.5-3; number of chambers at the last whorl: 14; thickness of wall at the last whorl = 0.040-0.060 mm. The wall is finely perforated as firstly indicated by Perret (1973b, p. 311; 1993, p. 436).

Occurrence. Venevsky -Tarussky of Submoscovite Basin. Mikhailovsky-Protvinsky of Urals. Mikhailovsky-Protvinsky of Southern Timan. Late Viséan (Ladeïninsky)-Serpukhovian (Ust-Sarbaïsky/Protvinsky)-?early Bashkirian of Urals. $C_1^{v}f_2$-Protvinsky (limestone C5) of Donets Basin. Late Viséan-Serpukhovian of Kazakhstan. Late Brigantian of Ireland. Early-late Serpukhovian of Southwestern Spain. Early Serpukhovian of Poland. Late Serpukhovian of central Morocco, Algeria (Bechar Basin), England and Donets Basin. ?Early Serpukhovian of Windsor Group (SE Canada). Late Serpukhovian of Idaho (USA) and Hina Group (Japan). Late Serpukhovian-early Bashkirian of Alaska. Early Bashkirian (first bed of Siuransky) of Southern Urals (Kulagina et al., 2001). Serpukhovian of Arize area (Pyrenees). Late Serpukhovian of Ardengost area: MFP.Areng AH10 (Perret, 1973b), MFP.AH18D, AH18F, AH.20B, AH20E, MFP.CAS14, CAS15, CAS22.2, CAS23.2 (this study).

7. 10. Bradyinoids

Superfamily Bradyinoidea Reitlinger, 1950
nomen translat Rauzer-Chernousova et al., 1996 (ex family)
Family Janischewskinidae Reitlinger in Rauzer-Chernousova et al., 1996

Diagnosis. Test free, involute nautiloid to slightly compressed, planispiral or weakly endothyroid in coiling. Volutions and chambers are few. Septa of forms varying from curvated foreward or backward, truncated or inflated at the end. Septa simple or complicated by umbilical lamellae or pre- and postseptal lamellae. Secondary deposits entirely absent. Last whorl generally rapidly enlarged with cribrate aperture. Last chamber with a cribrate aperture. Previous apertural faces resorbed or occasionnally preserved in the few ultimate chambers. Wall microgranular, varying from coarse microgranular, to porous with tectum, to limited to a dark tectum. Sutural secondary apertures present in *Janischewskina* as the most advanced character.

Composition. *Janischewskina* Mikhailov, 1935 (= *Parajanischewskina* Cózar and Somerville, 2006); *Rhodesinella* Conil and Longerstaey in Conil et al., 1980; *Bibradya* Strank, 1983; *Groessensella* Strank in Somerville and Strank, 1984; *Mirifica* Shlykova, 1969 emend. Rauzer-Chernoussova et al., 1996; *Cribrospira* von Möller, 1878

Remarks. The results summarized below confirm the composition and the validity of the family Janischewskinidae and its individuality from the family Bradyinidae Reitlinger, 1950 nomen translat. Reitlinger, 1958. The most ancestral group of Janischewskinidae is derived from the Endothyranopsidae *Plectogyranopsis* Vachard, 1977b (confirmying the transition

supposed by Vachard, 1977b). This ancestral group encompassed *Bibradya, Groessensella, Rhodesinella* and *Mirifica* (for us, *Bibradya* is not exactly synonym of *Mirifica*, as proposed by Rauzer-Chernousova et al. (1996), due to the type of coiling more regular and septation more developed). *Rhodesinella* gave rise to *Cribrospira* (Conil et al., 1980, p. 77; Laloux, 1987, p. 149), probably by the intermediate of *Rhodesinella* (?) *densecamerata* (Strank, 1983) initially described as *Cribrospira*. On the other hand, *Rhodesinella* might be a junior synonym of *Haplophragmella* non auctorum but as defined by its type-species *Endothyra panderi* von Möller, 1878 chosen by Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. (1936), whereas the genus *Holkeria* Strank, 1982, lately distinguished of *Rhodesinella*, is more closely related with *Corrigotubella* Ganelina 1966 and *Granuliferella* Zeller, 1957. Many species of *Samarina* sensu Ganelina, 1956, morphologically correspond to possible advanced forms of *Cribrospira?* Nevertheless, their wall is too poorly known as well as their precise distribution, compared to *Janischewskina*. This latter genus appears in the late Brigantian (Conil et al., 1991; Cózar and Somerville, 2006) or early Brigantian (Strank, 1981). However, it is evident that the type species of *Samarina*, i.e. *S. typica* is truly a *Janischewskina*. Hence, the "*Samarina*" sensu Ganelina, 1956, eventually might correspond to advanced *Cribropira?* or to an unamed genus.

The family Bradyinidae is probably generated by a mutation affecting *Bibradya* and giving directly *Bradyina* as soon as the latest Asbian (these FAD and LAD are indicated by Gallagher, 1998 and Cózar and Somerville, 2006). In fact, *Bradyina* and *Janischewskina* are two homeomorphs with different wall and different ancestors. The genus *Parajanischewskina* created as a transition between *Bradyina* and *Janischewskina* is a nom. superfl. *Parajanischewskina* only corresponds for us to these special *Janischewskina* which retain or resorpt incompletely the cribrate face of the antepenultimate (or very rarely more internal) chamber. Fragments of these cribrate faces were confused with remains of alveolar bradyinid wall by Cózar and Somerville (2006) whereas *Bibradya*, which exists probably since the early Asbian (Somerville and Strank, 1984), is probably the link between *Cribrospira* and *Plectogyranopsis* (it has the same deviation, truncated septa and granular wall as *Bibradya*). The FAD of true *Cribrospira* is suggested here as late Asbian, as indicated by Gallagher (1998, text-fig. 2 p. 191). All the Janischewskinidae disappeared rapidly (Serpukhovian) whereas the Bradyinidae have a great evolutive sucess with survivors *Bradyinelloides* and *Postendothyra* up to the PTB (Permian/Triassic boundary) (Gaillot, 2006).

Occurrence. Rare in latest Arundian (*Rhodesinella*). Holkerian-Serpukhovian (acme in late Viséan). Palaeo-Tethyan with rare forms in the North-American Craton.

Genus *Cribrospira* von Möller, 1878 emend.

Type species. *Cribrospira panderi* von Möller, 1878.

Diagnosis. Janischewskinidae globulose, planispirally coiled and involute, occasionally with an initial deviation. Whorls and chambers not numerous. Septa short, truncate at the base in the primitive forms (some *Bibradya*, *Janichewskina* and *Plectogyranopsis* auctorum), with rounded extremities and strongly curved backward in the type species considered here as an advanced species. Umbilical lamellae are present. Wall microgranular simple similar to *Janischewskina* or rarely, microgranular becoming porous. Simple aperture becoming cribrate in the last chamber.

Composition. *Cribrospira panderi* von Möller, 1878; *Cribrospira mira* Rauzer-Chernousova, 1948e; ?*Cribrospira mira* sensu Fewtrell et al., 1989; pl. 3. 6, fig. 2; *Cribrospira mikhailovi* Rauzer- Chernousova, 1948e; *Cribrospira tenella* Ye, Lin and Gu, 1987; ?*Cribrospira liaxianensis* Lin, 1981; ?*Cribrospira*? *perretae* Pille, Vachard and Argyriadis (submitted-b: nomen nudum); ?*Cribrospira? lebedevae* (nomen novum pro *Janischewskina compressa* Grozdilova and Lebedeva in Sultanaev et al., 1978 preoccupied by *Janischewskina compressa*

Sosnina in Sosnina and Nikitin, 1976); ?*Bibradya grandis* Strank, 1983, pl. 55, figs. 1-2; ?*B. inflata* Strank, 1983, pl. 54, figs. 6-7; ?*Samarina orbiculata* Ganelina, 1956, ?*Samarina minuscularia* Ganelina, 1956 (pars?), ?*Samarina rovnensis* Ganelina, 1956, ?*Samarina calceus* Ganelina, 1956, ?"*Janischewskina*?"sp. in Simonova, 1990 (pl. 3, fig. 7); ?*Janischewskina* sp. sensu Conil and Pirlet, 1963 (pl. 3, fig. 37) and Conil and Lys, 1964 (p. 153, pl. 23, fig. 446, pl. 42, fig. 872); ?*Endothyra exelikta* sensu Dvorak and Conil, 1969; ? *Plectogyra banphitensis* Saurin 1960 = *Samarina banphitensis* (Saurin) in Saurin, 1961, p. 221, pl. 4, fig. 17; *Bibradya* sp. sensu Somerville and Cózar (2005, pl. 2, fig. 16); ?*Endothyra exelikta* sensu Dvorak and Conil, 1969; ?*Plectogyra banphitensis* Saurin 1960 = *Samarina banphitensis* (Saurin) in Saurin, 1961, p. 221, pl. 4, fig. 17.

Discussion. *Cribrospira*? *rara* Rauzer-Chernoussova, 1948e is excluded of *Cribrospira*, and seems to be a synonym of *Mikhailovella gracilis* (Rauzer-Chernousova, 1948a) (see below). *Cribrospira denticulata* Strank, 1983 is probably an advanced form of *Rhodesinella*, due to its granular wall and the numerous chambers (7-8) at the last whorl. It was interpreted as a *Cribranopsis* by Fewtrell et al. (1989, p. 63, pl. 3.11, fig. 13). Some *Janischewskina* or *Samarina* of the literature belong to *Cribrospira*. They are generally easy to identify, due to the absence of septal lamellae. The problem of a *Janischewskina typica* sensu Mamet et al. 1993 is more complicated because the indicated magnification, x 25, is visibly underestimated (compare the crystallinity of the microsparitic filling of fig. 3 with that of figs. 5 and 6, indicated with the same magnification) and should correspond to a diameter of 2.400 mm. Second difficulty: this specimen is attributed to the early Bashkirian, as well as the true *Janischewskina* and the *Endothyranopsis sphaerica*, pl. 5, figs. 1-5; a late Serpukhovian maximal age seems to be more acceptable. *Janischewskina compressa* Grozdilova and Lebedeva in Sultanaev et al., 1978 preoccupied by *Janischewskina compressa* Sosnina in Sosnina and Nikitin, 1976 is re-named here *Cribrospira lebedevae* (nomen novum), because it has no characters of *Janischewskina*, and seems to be similar to *Cribrospira perretae* n sp. (Diameter of 0.420-0.630 mm versus 0.450-0.630 mm). The type material of *Samarina minuscularia* Ganelina, 1956 seems to link a *Cribrospira* (pl. 9, fig. 3) and a juvenile *Janischewskina* (pl. 9, fig. 4). The holotype of *Samarina rovnensis* constitutes the best illustration of the umbilical lamellae in *Cribrospira* emend., but it can be also as indicated by Ganelina (1956), a juvenile of a true *Janischewskina*. *Janischewskina*? sp. sensu Simonova (1990) can be *Cribrospira* emend.

Remarks. A recent revision of this genus (Pille et al., submitted-b) allowed to create the subspecies *Cribrospira panderi baliamadeni* Pille, Vachard and Argyriadis, observed in Turkey, which has truly a porous wall, more or less similar to that of the advanced species of *Protriticites*, i. e., similar to a primitive keriotheca (e.g., Rui Lin and Nassichuk, 1994; Vachard et al., 2003, 2004b), although the *Cribrospira* have a wall without porosity visible to the common magnifications of the binocular, or a porous wall limited to the last whorl. Similarly, the wall of *Janischewskina* was described as porous by the Russian micropaleontologists, but it is for me completely microgranular and homogeneous. The *Cribrospira* of Southern France have a homogenous dark wall, as such as *C. mira* Rauzer-Chernousova, 1948e. Nevertheless, in my material, a taxon shows a differentiation of the last part of the wall as in *C. mikhailovi* Rauzer-Chernousova, 1948e.

The type of development of *Cribrospira* (few whorls, few chambers and cribrate terminal aperture) exist in several lineages of Endothyrida foraminifers. *Cribrospira* itself is characterized by the great dimensions, the rapid expansion in height of the spire and the microgranular wall. The genus *Bibradya* Strank, 1983, from the Asbian of Great-Britain and Ireland, exhibits an endothyroid coiling, with hemispherical chambers, and sutures well defined. Sometimes, *Cribrospira* and *Bibradya* share the same FAD in Ireland (Gallagher and

Somerville, 1997, p. 318; Gallagher, 1998, text-fig. 2 p. 191 and p. 199). The septa are thick and bifurcated, the wall microgranular or very finely granular, and the terminal aperture described as cribrate. The species *Bibradya grandis* Strank, 1983, is evidently synonym of some *Plectogyranopsis ampla* of the literature, but the type-species, *B. inflata* is more difficult to interpretate, it can correspond to a teratogenic *Plectogyranopsis*, a *Janischewskina* with peculiarly narrow interseptal spaces, or a *Cribrospira* with double septation (it is nearly the case for the *C. mikhailovi* described below). The synonymy of *Bibradya* with *Mirifica* Schlykova, 1969, proposed by Rauzer-Chernousova et al. (1996), is not consistent with my interpretation, but corresponds exactly to the characteristics of the specimen illustrated as *Mirifica uchtovensis* (Durkina) by Brenckle and Milkina, 2003 (pl. 5, fig. 1). Hence, in this case, *Bibradya* should be an Omphalotinae and not a Bradyinoid.

Occurrence. Late Viséan-late Serpukhovian of Russian Platform (Tulsky, Aleksinsky and Mikhailovsky), Urals, Belgium, Spain, England, Ireland, Poland and Southern France: Pyrenees and Montagne Noire (Vachard, 1974, 1977b; Rauzer-Chernousova, 1948c; Perret, 1993), Donbass ($C_1^{v}e_2$-$C_1^{v}f_2$) (Vdovenko, 2001, tabl. 1 p. 174). “Central Asia”, China, Laos, Viet-Nam, (Rauzer-Chernousova et al., 1996; Cózar, 2004). Discovered in the Brigantian of Turkey. The FAD is late/latest Asbian with the type species and the Russian species from the Aleksinsky; some species of Fewtrell et al. (1989) are Holkerian in age. The occurrence indicated by Pinard and Mamet (1998): middle Viséan-earliest Serpukhovian, ?earliest Permian, is questionable, probably due to confusions with *Endothyra*, *Plectogyranopsis* or *Rhodesinella* (these authors indicate for *Cribrospira* a possibly trilayered wall, and a synonymy with *Rhodesinella*).

Cribrospira mira Rauzer-Chernousova, 1948e emend.
Pl. 57, figs. 1-13.

1948e *Cribrospira mira* n. sp. Rauzer-Chernousova, p. 188-189, pl. 7, figs. 5, 9, 11.
1956 *Samarina orbiculata* n. sp. Ganelina, p. 105, pl. 10, fig. 4.
1963 *Janischewskina* sp. - Conil, pl. 1, fig. 9.
1964 *Janischewskina* cf. *orbiculata* Ganelina - Conil and Lys, p. 153, pl. 23, fig. 445 (from Conil, 1963).
1973 *Cribrospira mira* Rauzer-Chernousova - Ivanova, pl. 12, fig. 4.
1973 *Cribrospira* cf. *mira* Rauzer-Chernousova - Ivanova, pl. 13, fig. 1.
non v. 1974b *Cribrospira mira* - Vachard, pl. 17, figs. 8-9 (= *Plectogyranopsis ampla*).
v. 1974b *Cribrospira panderi* von Moeller - Vachard, p. 296, pl. 18, figs. 8-10.
?1976 *Janischewskina orbiculata* Ganelina - Crousilles et al., pl. 38, fig. 15 (perhaps a true *Janischewskina*).
non v. 1976 *Janischewskina orbiculata* (Ganelina) - Argyriadis et al., p. 514 (= ?*Cribrospira panderi baliamadeni*).
v. 1977b *Cribrospira panderi* von Moeller - Vachard, p. 147, pl. 4, fig. 12.
1977 *Cribrospira mira* Rauzer-Chernousova - Vdovenko, pl. 5.24, figs. 8-10.
non 1977 *Janischewskina* ex gr. *orbiculata* Ganelina - Vdovenko, pl. 26, fig. 3, pl. 5.29, figs. 2-4 (true *Janischewskina*, perhaps juveniles of *J. operculata*).
? 1980 *Janischewskina* sp. (forme juvénile) - Conil et al., pl. 19, fig. 7.
?1981 *Cribrospira lianxianensis* n. sp. Lin, p. 20, pl. 6, fig. 12.
? 1981 cf. *Bibradya* sp. - Strank, pl. 14, fig. 3.
1983 *Cribrospira rara* Rauzer-Chernousova - Wang, pl. 2, figs. 1-2.
1986 *Cribrospira*? ex gr. *rara* Rauzer-Chernousova - Vdovenko, pl. 5, fig. 1.
1987 *Cribrospira mira* Rauzer-Chernousova - Ye et al., pl. 3, fig. 2.
1987 *Cribrospira rara* Rauzer-Chernousova - Ye et al., pl. 2, fig. 43, pl. 3, fig. 1.
?1989 *Cribrospira mira* Rauzer-Chernousova - Fewtrell et al., p. 48, pl. 3. 6, fig. 2 (although not described, the wall seems to be differentiated as in *Cribrospira panderi*).
?1991 *Janischewskina* sp. - Sánchez et al., p. 122-123, pl. 3, fig. 2.
1993 *Cribrospira mira* Rauzer-Chernousova - Makhlina et al., pl. 13, fig. 16.
1997 *Cribrospira mira* Rauzer-Chernousova - Gallagher and Somerville, fig. 9s.
1998 *Cribrospira* sp. - Sebbar, pl. 1, fig. 17.
?v. 1999 *Cribrospira* sp. - Berkhli, p. 110 (no illustration).

2001 *Cribrospira mira* Rauzer-Chernousova - Vdovenko, tabl. 1 p. 174, pl. 17, figs. 15, 17-18.
non 2001 *Janischewskina* sp. ex gr. *orbiculata* Ganelina - Vdovenko, tabl. 1 p. 174, pl. 19, figs. 3-4 (true *Janischewskina*, same photos as in 1977).
?2004 *Cribrospira panderi* von Moeller - Cózar, pl. 2, fig. 12.
?2004 *Janischewskina*? sp. - Cózar, pl. 2, fig. 13.
?2004 *Janischewskina* sp. (cf. *J. minuscularia* Ganelina) - Cózar and Somerville, fig. 11. 22.
?2004 *Janichewskina*? aff. sp. 2 (juvenile) - Cózar and Somerville, fig. 14. 22.
?2005a *Cribrospira panderi* von Moeller - Cózar and Somerville, fig. 13. 18 (or other species).
2006 *Cribrospira panderi* von Moeller - Cózar and Somerville, pl. 2, fig. 2.
2006 *Cribrospira* ? sp. - Cózar and Somerville, pl. 2, fig. 3.

Description. Diameter (D) = 0.600-1.120-1.700 mm; width (w) = 0.570-1.100-1250 mm; ratio w/D = 0.79-0.96; proloculus diameter = 0.080-0.110 mm; number of whorls: 2-2.5; number of chambers at the last whorl: 6-7 (and a total of 10-14); height of the last whorl = (0.200-0.400)-0.500-0.850 mm; thickness of wall at the last whorl = 0.028-0.060 mm; wall pore diameters = 0.004 mm; diameter of cribrate apertures = 0.070 mm.

Remarks. *Cribrospira mira* Rauzer-Chernousova, 1948c is apparently morphologically similar to *Samarina orbiculata*.

Occurrence. Aleksinsky of Moscow Basin (Russia). V3b of Campine Basin, Belgium (Conil and Lys, 1964). ?Robinson Limestone of England (Strank, 1981). ?Earliest Brigantian-?early Serpukhovian of Northern England (Conil et al., 1980; Cózar and Somerville, 2004). ?Late Viséan of Southwestern Spain (Crousilles et al., 1976; Sánchez et al., 1991). Brigantian of Montagne Noire: Roquemaillère (?DV134, D134E).

Cribrospira cf. *mikhailovi* Rauzer-Chernousova, 1948b
Pl. 57, fig. 14.

1948e *Cribrospira mikhailovi* n. sp. Rauzer-Chernousova, p. 187-188, pl. 7, figs. 2-4.
? 1956 *Cribrospira* aff. *mikhailovi* Rauzer-Chernousova - Brazhnikova, p. 46-47, pl. 13, figs. 1-2.
? 1972 *Cribrospira mikhailovi* Rauzer-Chernousova - Malakhova, p. 38, pl. 2, fig. 5.
? 1973 *Cribrospira* aff. *mikhailovi* Rauzer-Chernousova - Ivanova, pl. 13, fig. 3.
v. ? 1973 *Endothyra convexa* Rauzer-Chernousova - Perret, p. 308-309, pl. 4, fig. 8.
v. ? p. 1974b *Janischewskina* cf. *rovnensis* (Ganelina) - Vachard, p. 297, pl. 18, fig. 7 (non fig. 6 = true *Janischewskina*) (with synonymy).
? 1977 *Cribrospira* ex gr. *mikhailovi* Rauzer-Chernousova - Vdovenko, pl. 2.1, figs. 9-11, pl. 5. 24, figs. 1-7.
v. 1977b *Janischewskina* cf. *rovnensis* (Ganelina) - Vachard, p. 147 (no illustration).
? 1981 *Cribrospira* aff. *mikhailovi* Rauzer-Chernousova - Lin, pl. 6, fig. 13.
? 1981 cf. *Cribrospira panderi* Rauzer-Chernousova - Strank, pl. 14, fig. 2.
?1989 ?*Janischewskina minuscularia* (Ganelina) - Fewtrell et al., p. 63, pl. 3. 11, fig. 12 (one of the two illustrations of *Bibradya inflata* Strank, 1983).
? 1989 *Cribrospira mikhailovi* Rauzer-Chernousova - Skompski et al., pl. 7, fig. 29.
?1990 *Cribrospira mikhailovi* Rauzer-Chernousova - Lin et al., p. 192, pl. 19, fig. 9.
? 2001 *Cribrospira mikhailovi* Rauzer-Chernousova - Vdovenko, tabl. 1 p. 174, pl. 17, figs. 10-14, 16.

Description. The wall is initially compact and becomes porous at the last whorl as in the diagnosis of *C. mikhailovi*, but the dimensions are different and the cribrate aperture was not observed in our two specimens. Two groups of two septa are very closely spaced (i.e., more or less a septal structure of *Bidradya*). Diameter (D) = (0.690)-0.900-1.370 mm; width (w) = 0.950 mm; ratio w/D = 0.9-1.0; proloculus diameter = 0.075-0.200 mm; number of whorls: 2-3; number of chambers at the last whorl: (5) 7-8 (total number: 12-17); height of the last whorl = (0.300)-0.450-0.600 mm; thickness of wall at the last whorl = (0.034)-0.045-0.055 mm.
Remarks. Similar to *C. panderi*, but with another wall and more chambers, septa more curved backward and minor elevation of the last whorl. The axial section of *C. mikhailovi* is poorly known and could correspond to *Cribrospira orbiculata* (see our material of

Roquemaillère). In the latest Asbian of Montagne Noire, we found together in the "Lenses of the road", both homeomorphs; the first one is *Cribrospira mira,* its wall is entirely microgranular and homogenous (that is also the wall of *Janischewskina* sensu stricto, found in the late Brigantian of the Montagne Noire); the second one *Cribrospira* aff. *mikhailovi* presents this type of wall in the inner whorls, and a porous wall in the outer whorl. Both are found together with *Bradyina* ex gr. *rotula* d'Eichwald, 1830. The outcrops are latest Asbian, biozone SF1, in age.

Occurrence. Tulsky to base of Venevsky in Submoscovite Basin. Aleksinsky of central Urals. ?Asbian of England. Late Viséan of Poland, Ukraine (Galitsie-Volyn; $C_1^{v}e_2$-$C_1^{v}f_2$ of Donets Basin), central and Southern Urals and China. Two specimens in the latest Asbian of Montagne Noire: Lenses of the road, near Roquessels (DV293C) and sommet 224-Valuzières (DV600C).

Cribrospira? *perretae* n. sp.
Pl. 57, fig. 15.

1993 *Cribrospira* ? sp. - Perret, p. 443, pl. F2, figs. 1-3, 5-7.

Etymology: To Marie-France Perret which discovered the taxon.

Locus typicus: Serre de Castets, near Ardengost (Pyrenees, France).

Stratum typicum: Late Serpukhovian

Holotype: CAS.U, photo 2275, Perret, 1993, Pl. F2, fig. 3 (re-illlustrated here Pl. 57, fig. 15).

Type material: 20 specimens.

Diagnosis: A small species, which was previously interpreted as a juvenile *Janischewskina* or *Cribrospira*.

Description. Diameter = 0.450-0.630 mm; width = 0.360-0.500 mm; w/D = 0.79-0.80. Number of whorls: 1.5-2. See detailed description in Perret (1993).

Repository of the types. University of Köln.

Comparison. This species differs from the other questionable species of *Cribrospira* and from *C.*? *rovnensis* (Ganelina, 1956) in smaller dimensions. *C.*? *lebedevae* (nomen novum pro *Janischewskina compressa* Grozdilova and Lebedeva in Sultanaev et al., 1978 preoccupied) has the same diameter, but more volutions and a larger w/D ratio.

Occurrence. Late Serpukhovian of Pyrenees (Ardengost area): MFP.Areng (AH9) (Perret, 1973), MFP.CasC, CasU, Cas15bis, Cas25, Cas26, Cas27; ?MFP.AH18H (this study).

Genus *Janischewskina* Mikhailov, 1935

Type species. *Janischewskina typica* Mikhailov, 1935.

Synonym. *Samarina* Rauzer-Chernousova and Reitlinger, 1940.

Diagnosis. Test similar to *Bradyina* but with a wall homogenous, dark, single and not alveolar.

Remarks. The phylogeny seems to be *Cribrospira panderi-C. orbiculata- Janischewskina isotovae-J. typica*. It took place probably very quickly at the Asbian/Brigantian boundary.

Occurrence. Early Brigantian-earliest Bogdanovsky, Palaeotethyan (Moscow Syneclise, Donets Basin: $C_1^{v}f_2$-$C_1^{s}a$, Western and eastern slope of Urals, Southern Timan, Kazakhstan, Tien-Shan, Morocco, Algeria, England, Ireland, Southern France, Belgium, Poland, Turkey,

Northern Afghanistan, Malaysia, Southern China, Japan, Alaska). According to Conil et al. (1991) and Devuyst et al. (2005, text-fig. 13), the local LAD of *Janischewskina* is characteristic of the upper part of the Cf6δ = MFZ14 (Cózar and Somerville, 2004, p. 63, agreed with this opinion), but it is clear that the genus appears in the base of Brigantian in England (Strank, 1981, Fewtrell et al., 1989; although discussed by Cózar and Somerville, 2004 with introduction of a: *Janischewskina*? new gen., text-fig. 15 p. 61, and Cózar, 2004, text-fig. 5 and p. 383 with *Janischewskina*? sp.) and in our assemblages of Montagne Noire.

According to Mamet (1974a) the FAD of *Janischewskina* is located in his zone 14 (or zone 15 in Pinard and Mamet, 1998, p. 127), this idea (also admitted by Ross and Ross, 1985, fig. 1) was the source of the biostratigraphical misinterpretation of Vachard (1974a-b, 1977a-b), as well as the FAD of *Biseriella* indicated in the zone 18 (Mamet, 1974a, p. 403), while it is in fact latest Brigantian (or older). Similarly, the age early Bashkirian assigned to the unquestionable *Janischewskina* of Alaska (Peratrovich Island), and probably testify of reworkings (as well as the same age for the *Endothyranopsis sphaerica*). Both appear more likely late Serpukhovian in age, as in the Ardengost limestones. I conclude that the FAD of *Janischewskina* allows to correlate the lower boundary of the stages and biozones: Mikhailovsky, $C_1^{v}f_2$, Brigantian (see also Vdovenko, 2001, fig. 4), the Mouarhaz Formation in Central Morocco, and more questionably due to the rarity of *Janischewskina* in Belgium (MFZ15): late V3c and late Cf6γ. The LAD seems to be situated in the late Serpukhovian (Zapaltiubinsky), as in Southern Urals (Pazukhin et al., 2002, p. 221) and Japan (Mazuno and Ueno, 1997, tabl. 2 p. 194).

Janischewskina isotovae Lebedeva in Grozdilova et al., 1975
Pl. 58, figs. 1-7.

1975 *Janischewskina isotovae* n. sp. Lebedeva in Grozdilova et al., p. 40, pl. 6, fig. 2.
1978 *Janischewskina isotovae* Lebedeva in Grozdilova et al. - Sultanaev et al., p. 102, pl. 6, fig. 7.
non 1985 *Janischewskina isotovae* Lebedeva in Grozdilova et al. - Adachi, p. 119, pl. 20, figs. 5-6 (= *J. delicata*).
?1985 *Janischewskina* sp. B - Adachi, p. 120, pl. 20, figs. 11-12.
1989 *Bibradya grandis* Strank - Skompski et al., pl. 6, fig. 22.
?1991 *Janischewskina* sp. - Sánchez et al., pl. 3, fig. 2.
non 1993 *Janischewskina isotovae* Lebedeva in Grozdilova et al. - Ueno and Nakazawa, p. 31-32, figs. 12. 15-18 (with 3 references in synonymy).
non 1997 *Janischewskina* cf. *isotovae* Lebedeva in Grozdilova et al. - Mizuno and Ueno, tabl. 2, pl. 4, figs. 4-5 *(= Janischewskina delicata*).
v. 1999 *Janischewskina* sp. - Berkhli, pl. 3, fig. 7.
?2000 *Janischewskina* sp. - Sebbar, pl. 7, fig. 14.
?2003 *Janichevskina* sp. (thin walled) - Brenckle and Milkina, pl. 4, fig. 10.

Description. Diameter (D) = 1.010-1.460 mm; number of whorls: 2-3; thickness of wall at the last whorl = 0.019 mm.

Occurrence. Late Viséan (Gubashkinsky-Ladeininsky horizons) of central and Southern Urals. Late Viséan of Poland and ?Spain. Latest Brigantian of Roc de Murviel (MA50: 8 specimens, ?MA61, MA79, MA83, MA330.3: 3 specimens, MA330.4: 3 specimens, MA330.5, MA330.11: 3 specimens, DV253A). Late Serpukhovian of Ardengost area: MFP.AH20, MFP.CAS14, MFP. CAS15bis.A.

Janischewskina cf. *rovnensis* (Ganelina, 1956)
Pl. 58, figs. 13-18.

1956 *Samarina rovnensis* n. sp. Ganelina, p. 104-105, pl. 10, fig. 5.
v. p. 1974b *Janischewskina* cf. *rovnensis* (Ganelina) - Vachard, p. 297, pl. 18, fig. 6 only (non fig. 7 = *Bibradya*? sp.).

?1977 *Janischewskina* ex gr. *rovnensis* Ganelina (sic, without parentheses) - Vdovenko, pl. 5. 30, figs. 2-3.
v. 1977b *Janischewskina* cf. *rovnensis* (Ganelina) - Vachard, p. 147 (no illustration).
?1981 *Janischewskina* aff. *delicata* (Malakhova (sic) - Strank, pl. 18, fig. 1.
?1993 *Janischewskina* cf. *rovnensis* (Ganelina) - Makhlina et al., pl. 16, fig. 3.
?2001 *Janischewskina* sp. ex gr. *rovnensis* Ganelina (sic, without parentheses) - Vdovenko, tabl. 1 p. 174, pl. 20, figs. 2-3.
?2002 *Samarina rovnensis* Ganelina - Shcherbakova and Shcherbakov, p. 310 (no illustration).
?2003 *Janichevskina* sp. - Brenckle and Milkina, pl. 4, fig. 10.
?2004 *Janichewskina*? sp. 2 (juvenile) - Cózar and Somerville, fig. 14. 22-23.

Description. Diameter (D) = 0.600-0.700 mm; width (w) = 0.575-0.580 mm; ratio w/D = 0.83- 0.92; proloculus diameter = 0.090-0.100 mm; number of whorls: 2; number of chambers at the last whorl: 6; thickness of wall at the last whorl = 0.030-0.040 mm.

Occurrence. ?Late Viséan of Kazakhstan. Earliest Serpukhovian (Tarussky) of Moscow Basin. ?$C_1^vf_2$-C_1^sa of Donets Basin. ?Earliest Brigantian of Northern England. Latest Serpukhovian of Urals. Brigantian-early Serpukhovian of Montagne Noire: Castelsec (MA10-?, MA10.II, MA11.6: 3 specimens, ?MA11.VIII.3, Les Mentaresses (DV329B, DV329D); Roc de Murviel (MA21-?, MA33.103); La Serre (MA.LS. Talweg.4).

Janischewskina delicata (Malakhova, 1956a)
Pl. 58, figs. 8-12.

1956a *Samarina delicata* n. sp. Malakhova, p. 46-47, pl. 6, figs. 5-6.
1973 *Janischewskina delicata* (Malakhova) - Popova and Reitlinger in Einor, p. 54, pl. 7, figs. 5-6.
? 1976 *Janischewskina compressa* n. sp. Sosnina in Sosnina and Nikitin, p. 23-24, pl. 6, figs. 5-6, 11.
1979 *Janischewskina* aff. *delicata* (Malakhova) - Brazhnikova in Wagner et al., pl. 4, fig. 9.
v. 1979 *Janischewskina* cf. *delicata* (Malakhova) - Bensaïd et al., pl. 15, fig. 12.
v. 1980 *Janischewskina* cf. *delicata* (Malakhova) - Vachard, pl. 35, fig. 3.
?1981 *Janischewskina* aff. *delicata* Malakhova (sic) - Strank, pl. 18, fig. 1 (maybe *J. rovnensis*).
?1983 *Janischewskina* aff. *delicata* Malakhova (sic) - Aizenverg et al., p. 12, pl. 8, figs. 3-4.
1985 *Janischewskina isotovae* Lebedeva in Grozdilova et al. - Adachi, pl. 20, figs. 5-6.
?1988b *Janischewskina minuscularia* Ganelina - Ivanova, pl. 1, fig. 6.
1990 *Janischewskina* cf. *delicata* (Malakhova) - Simonova, pl. 2, fig. 6.
v. 1991 *Janischewskina* sp. - Vachard et al., pl. 1 fig. 2.
1992 *Janischewskina delicata* (Malakhova) - Kulagina et al., pl. 1, fig. 7.
p. 1993 *Janischewskina typica* Mikhailov - Mamet et al., pl. 8, figs. 1-2, 4, 6-12 (non fig. 3 = *Cribrospira*), pl. 9, figs. 1-3.
1993 *Janischewskina isotovae* Lebedeva in Grozdilova et al. - Ueno and Nakazawa, p. 31-32, figs. 12. 15-18.
v. 1996 *Janischewskina* cf. *delicata* (Malakhova) - Vachard and Montenat, pl. 3, fig. 3.
1997 *Janischewskina* cf. *isotovae* Lebedeva in Grozdilova et al. - Mizuno and Ueno, tabl. 2, pl. 4, figs. 4-5.
?2000c *Janischewskina typica* Mikhailov - Cózar, p 336, pl. 5, fig. 15.
2002 *Janischewskina delicata* (Malakhova) - Kulagina and Gibshman, text-fig. 3 p. 186, pl. 1, fig. 22.
2003 *Janichevskina delicata* (Malakhova) - Brenckle and Milkina, pl. 5, fig. 5.
2003 *Janichevskina delicata* (Malakhova) - Kulagina et al., text-fig. 7 p. 180 (no illustration).
? 2003a *Janischewskina typica* Mikhailov - Cózar, fig. 5T.
v. p. 2003 *Janischewskina* sp. - Fontaine et al. pl. 7, figs. 2-3, pl. 9, fig. 11 (non pl. 7, fig. 1, nor pl. 8, fig. 10 = *J. operculata*).
? 2004 *Janischewskina* cf. *typica* Mikhailov - Cózar et al., fig. 3. 15.
2004 *Janischewskina*? sp. 2 (same specimen illustrated by Strank 191 as *J.* cf. *delicata*) - Cózar and Somerville, fig. 14. 23.

Description. Differs from *J. typica/operculata* in smaller dimensions, faint sutures and thin wall. Diameter (D) = 0.800-1.200 mm; width (w) = 0.600-0.820 mm; ratio w/D = 0.57-0.64; 0.84; proloculus diameter = 0.064 mm; number of whorls: 2-3.5; number of chambers at the last whorl: 11-13; thickness of wall at the last whorl = 0.015-0.026 mm.

Occurrence. Latest Viséan of Samara Bend. Protvinsky of Kazakhstan. Serpukhovian (C4 to D4 limestones) of Donets Basin. Mikhailovsky,?Gubashkinsky and Serpukhovian (Tarussky-Protvinsky) of Urals. Upper V3c of Belgium. Early Serpukhovian of Southwestern Spain. Brigantian-Serpukhovian of Malaysia. Serpukhovian of Japan. Late Serpukhovian of central Morocco and Northern Afghanistan. ?Peghorn Limestone of England (Strank, 1981). Earliest Brigantian of Northern England. Early Bashkirian of Alaska (but most probably Protvinsky or Zapaltiubinsky). Ichinotani Formation and late Serpukhovian of Hina Group of Japan. Latest Brigantian-early Serpukhovian of Montagne Noire: Roc de Murviel (MA83) and La Serre (DV165B). Serpukhovian of Arize area (Pyrenees).

Janischewskina typica Mikhailov, 1935

Pl. 58, figs. 19-20.

1935 *Janischewskina typica* n. sp. Mikhailov, p. 40-41, pl. 1, fig. 8.
1940 *Samarina operculata* n. sp. Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al. , p. 53-55, 78, pl. 8, figs. 7-8, pl. 9, figs. 12-14, text-figs. 17a-b, 18.
1956 *Samarina operculata* Rauzer-Chernousova and Reitlinger - Brazhnikova, pl. 7, fig. 4.
1959 *Janischewskina typica* Mikhailov - Voloshinova and Reitlinger in Orlov, p. 250, figs. 164A-B-166.
1960 *Janischewskina typica* Mikhailov - Grozdilova and Lebedeva, p. 79, pl. 8, fig. 4.
1964 *Janischewskina typica* Mikhailov - Loeblich and Tappan, p. 354, text-fig. 270. 1-3.
1968 *Janischewskina operculata* (Rauser-Chernoussova and Reitlinger) - Aizenverg et al., pl. 13, fig. 3.
1972 *Janischewskina operculara* (sic) (Rauzer-Chernousova and Reitlinger) - Malakhova, p. 38, pl. 2, figs. 6-8.
v. 1973 *Janischewskina* sp. - Perret, p. 313-314, pl. 6, fig. 1.
1973 *Janischewskina operculata* (Rauzer-Chernousova and Reitlinger) - Ivanova, pl. 13, figs. 4-6, pl. 22, figs. 14-15, pl. 30, fig. 1, pl. 32, fig. 13.
non v. 1976 *Janischewskina operculata* (Rauser-Chernoussova and Reitlinger) - Argyriadis et al., p. 514 (no illustration, see Pille et al. submitted-b).
v. 1977 *Janischewskina operculata* (Rauzer-Chernousova and Reitlinger) - Perret and Vachard, p. 90 (no illustration).
1977 *Janischewskina typica* Mikhailov - Vdovenko, pl. 5. 30, fig. 1.
?1977 *Janischewskina* ex gr. *orbiculata* Ganelina - Vdovenko, pl. 26, fig. 3, pl. 5.29, figs. 2-4 (perhaps juveniles of *J. operculata*).
1980 *Janischewskina operculata* (Rauser-Chernoussova and Reitlinger) - Conil et al., pl. 9, fig. 11, pl. 26, figs. 13-14 (the determination is correct, hence, this material cannot be used
to create the genus *Praejanischewskina* Cózar and Somerville, in press).
1980 *Janischewskina operculata* (Rauser-Chernoussova and Reitlinger) - Skompski and Sobon-Podgorska, pl. 1, fig. 9, pl. 4, figs. 8.
non 1983 *Yanischewskina* cf. *typica* Mikhailov - Metcalfe, pl. 3, figs. 21-22 (= *Omphalotis samarica*).
1984 *Janischewskina typica* Mikhailov - Zhao et al., p. 109, pl. 19, figs. 7-8.
1984 *Janischewskina typica* Mikhailov - Igo et al., p. 109, text-fig. 3B p. 457.
?1985 *Janischewskina* aff. *typica* Mikhailov - Adachi, p. 119, pl. 20, figs. 3-4.
1985 *Janischewskina* sp. B - Adachi, p. 119-120, pl. 20, figs. 7-10.
1987 *Janischewskina typica* Mikhailov - Luo, pl. 3, fig. 17.
1987 *Janischewskina typica* Mikhailov - Loeblich and Tappan, pl. 250, figs. 7-10.
1988 *Janischewskina typica* Mikhailov - Laloux, pl. 2, fig. 33.
?1988 *Janischewskina operculata* (Rauser-Chernoussova and Reitlinger) - Kulagina, p. 25, 26, pl. 3, fig. 10 (apparently transitional with *Cribrospira*).
1989 *Janischewskina operculata* (Rauser-Chernoussova and Reitlinger) - Fewtrell et al., p. 56, pl. 3. 9 , fig. 7.
1991 *Janischewskina operculata* (Rauser-Chernoussova and Reitlinger) - Marfenkova, pl. 6, fig. 10.
1993 *Janischewskina typica* Mikhailov - Makhlina et al., pl. 16, fig. 1, pl. 17, fig. 1? (ex gr.), 3.
v. 1993 *Janischewskina typica* Mikhailov - Perret, p. 442, pl. F2, figs. 4, 18.
1996 *Janischewskina typica* Mikhailov - Rauzer-Chernousova et al., p. 61, text-fig. 10 a-d p. 62, pl. 16, fig. 7.
1996 *Janischewskina typica* Mikhailov - Reitlinger in Einor, pl. 2, fig. 7.
1996 *Janischewskina operculata* (Rauser & Reitlinger) - Marfenkova in Einor, pl. 41, fig. 38.
1997 *Janischewskina typica* Mikhailov - Brenckle et al., pl. 2, figs. 3-4.
1997 *Janischewskina* cf. *J. typica* Mikhailov - Liszak and Ross, pl. 1 figs. 19-21.
1998 *Janischewskina typica* Mikhailov - Pinard and Mamet, p. 127-128, pl. 38, figs. 10-11 (with synonymy).
2000c *Janischewskina typica* Mikhailkov - Cózar, pl. 5, fig. 15.

?2001 *Janischewskina* ex gr. *orbiculata* Ganelina - Vdovenko, pl. 19, figs. 3-4 (same photos as in Vdovenko, 1977).
?2001 *Janischewskina* sp. ex gr. *typica* Mikhailov - Vdovenko, tabl. 1 p. 174 (no illustration).
2001 *Janischewskina typica* Mikhailov - Vdovenko, pl. 20, fig. 1.
2002 *Janischewskina typica* Mikhailov - Kulagina and Gibshman, text-fig. 3 p. 186, pl. 1, fig. 29.
2002 *Janischewskina operculata* (Rauser-Chernoussova and Reitlinger) - Marfenkova, p. 196 (no illustration).
2003 *Janischewskina typica* Mikhailov - Kulagina et al., text-fig. 3 p. 176, text-fig. 7 p. 180 (no illustration).
v. p. 2003 *Janischewskina* sp. - Fontaine et al., pl. 7, fig. 1, pl. 8, fig. 10 (non pl. 7, figs. 2-3; pl. 9, fig. 11 = *J. delicata*).
2003a *Janischewskina typica* Mikhailov - Cózar, fig. 5T.
2004 *Janischewskina typica* Mikhailov - Cózar and Rodriguez, fig. 9. 15.
? 2004 *Janischewskina* cf. *typica* Mikhailov - Cózar and Somerville, text-fig. 4 p. 46 (pars), fig. 11. 21.
? 2004 *Janischewskina typica* Mikhailov - Cózar and Somerville, text-fig. 15 p. 61 (pars) (no illustration).
2005a *Janischewskina typica* Mikhailov - Cózar and Somerville, text-fig. 9 p. 12 (pars), p. 21, fig. 13. 24.
2005 *Janischewskina typica* Mikhailov - Brenckle, p. 61, pl. 10, figs. 8, 12, 14.
2005 *Janischewskina typica* Mikhailov - Somerville and Cózar, pl. 3, fig. 3.

Description. Diameter (D) = 1.390-2.200 mm; proloculus diameter = 0.115 mm; number of whorls: 2-3-4?; number of chambers at the last whorl: 5-7 (total: 14); height of the last whorl = 0.650 mm; thickness of wall at the last whorl = 0.040-0.070 mm.

Remark. The range given by Pinard and Mamet (1998), from zone 15 (i. e., Cf6β = MFZ13) to zone 20 (i. e., Cf9), is particularly erroneous.

Occurrence. Mikhailovsky-Stechevsky of Submoscovite Basin. Venevsky of central Urals. Mikhailovsky-early Serpukhovian-Zapaltiubinsky of Southern Urals. $C_1^vf_2$-?C_1^sa of Donets Basin. Late Viséan of Poland. Late Viséan -Serpukhovian of Kazakhstan and Tarim (China). Serpukhovian of Guangxi (China). Late Serpukhovian of Japan (Ichinotani Formation and Hina Group). Brigantian of England. Early Serpukhovian of Southwestern Spain. V3c of Belgium. Late Brigantian of Ireland. Brigantian of Malaysia. Late Viséan of Nevada and Washington. Late Serpukhovian of Ardengost area: Areng (RC8549) (Perret, 1973); MFP.CASF, MFP.AH.C81 (Perret, 1993); MFP.AH.B/81.9 (this study).

Family Bradyinidae Reitlinger, 1950 nomen translat. Reitlinger, 1958 (ex subfamily)
Subfamily Bradyininae Reitlinger, 1950
Genus *Bradyina* von Möller, 1878

Type species. *Bradyina nautiliformis* von Möller, 1878 (designated by Cushman, 1927b).

Diagnosis. Bradyinidae nautiloid, planispirally coiled and involute. Whorls and chambers are not numerous. Septa are short with additional pre- and post-septal lamellae. Alveolar wall overlain by a continuous tectum. Simple aperture becoming cribrate at the last chamber. Additional sutural pores present**.**

Remarks. The generic distinctions between *Bradyina*, *Parabradyina* Mamet and Pinard, 1992, *Pseudobradyina* Reitlinger, 1950, *Glyphostomella* Cushman and Waters, 1928, *Bradyinelloides* Mamet and Pinard, 1992, and *Pseudojanischewskina* Mamet and Pinard, 1992, seems to be poorly established and correspond more probably to very rare atypical specimens among the populations of true *Bradyina*. Contrary to Loeblich and Tappan (1987) the wall is not keriothecal, but comparable with the subepidermic wall of the Mesozoic Lituolidae. It differs also in the «pseudo-alveolar» wall mentioned herein for *Endothyranopsis sphaerica*.

Occurrence. Late Asbian (middle part of MFZ14; Devuyst et al., 2005, text-fig. 13)-late Early Permian (Middle/Late Permian *Bradyina* must be assigned to *Postendothyra* Lin, 1984);

Palaeotethyan in the late Mississippian; cosmopolite since the early Pennsylvanian (e. g., Mamet, 1970, p. 32).

Bradyina rotula (von Eichwald, 1860)
Pl. 59, fig. 1-7.

1860 *Nonionina rotula* n. sp. d'Eichwald, p. 349-350, pl. 22, fig. 18a-c.
1879 *Bradyina rotula* Eichwald - von Möller, p. 10, text-fig. 1.
1956a *Bradyina rotula* (Eichwald) - Malakhova, p. 45, pl. 5, figs. 8-9.
1959 *Bradyina rotula* (Eichwald) - Voloshinova and Reitlinger, text-figs. 173-175, pl. 4, figs. 15-16.
1960 *Bradyina rotula* (Eichwald) - Grozdilova and Lebedeva, p. 77-78, pl. 7, fig. 4.
1963 *Bradyina rotula* (Eichwald) - Conil and Pirlet, pl. 3, fig. 40.
1964 *Bradyina rotula* (Eichwald) - Conil and Lys, p. 230, pl. 40, fig. 819.
1967 *Bradyina rotula* (Eichwald) - Conil and Paproth, p. 76 (no illustration).
1972 *Bradyina rotula* Eichwald - Malakhova, p. 40, pl. 5, figs. 5-6.
1972 *Bradyina rotula* (Eichwald) - Bertrand, pl. 2, fig. 26.
v. 1973b *Bradyina* cf. *rotula* (Eichwald) - Perret, p. 312-313, pl. 5, fig. 3.
1973 *Bradyina rotula* Moell. (sic) - Maslov, pl. 29, fig. 7.
v. 1974b *Bradyina* sp. 1 - Vachard, p. 292-293, pl. 18, figs. 1-3.
v. 1974b *Bradyina rotula* (d'Eichwald) - Vachard, p. 293-294, pl. 18, figs. 4-5 (with synonymy).
1975 *Bradyina rotula* (Eichwald) - Mikhno and Balakin, p. 42, pl. 9, figs. 8-10.
1975 *Bradyina rotula* (Eichwald), 1960 (sic) - Grozdilova et al., p. 40, pl. 6, fig. 1.
1976 *Bradyina rotula* (Eichwald) - Conil, pl. 4, fig. 39.
v. 1977 *Bradyina rotula* (Eichwald) - Perret and Vachard, p. 90 (no illustration).
1977 *Bradyina rotula* (Eichwald) - Paproth et al., p. 61 (no illustration).
v. 1977b *Bradyina rotula* (d'Eichwald) - Vachard, p. 147, pl. 4, fig. 15.
v. 1977b *Bradyina* cf. *potanini* Venukoff - Vachard, p. 147-148, pl. 4, figs. 13-14, 16 (with 3 references in synonymy).
1978 *Bradyina rotula* (Eichw.) - Sultanaev et al., p. 100, pl. 7, fig. 2.
1980 *Bradyina rotula* (Eichwald) - Skompski and Sobon-Podgorska, pl. 1, fig. 6.
1980 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Skompski and Sobon-Podgorska, pl. 3, fig. 1.
1981 *Bradyina rotula* (Eichw.) - Strank, pl. 19, fig. 11, pl. 20, fig. 23.
v. 1982 *Bradyina rotula* (Eichwald) - Fontaine and Vachard, p. 193.
1985 *Bradyina rotula* Eichwald emend. Möller (sic) - Adachi, p. 115, pl. 17, fig. 12 (with synonymy).
1985 *Bradyina rotula* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1989 *Bradyina rotula* (Eichwald) - Fewtrell et al., p. 56, pl. 3. 9, fig. 11.
1989 *Bradyina rotula* (Eichwald) - Skompski et al., pl. 7, fig. 28.
1992 *Bradyina rotula* (Eichwald) - Somerville et al., tabl. 3 p. 211, fig. 6S.
1996 *Bradyina rotula* (Eichwald) - Gallagher, text-fig. 2 p. 242 (no illustration).
1996 *Bradyina rotula* (von Eichwald) - Reitlinger in Einor, pl. 2, fig. 16.
1997 *Bradyina rotula* (Eichwald) - Gallagher and Somerville, text-fig. 4 p. 318, text-fig. 6 p. 321, text-fig. 7a p. 323, fig. 9l.
1998 *Bradyina rotula* (Eichwald) - Gallagher, pl. 1, fig. 2.
2000 *Bradyina rotula* (d'Eichwald) - Sebbar, pl. 9, fig. 1.
2001 *Bradyina rotula* (d'Eichwald) - Vdovenko, tabl. 1 p. 174, pl. 18, fig. 2, pl. 19, fig. 1.
2002 *Bradyina rotula* (d'Eichwald) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
2003 *Bradyina rotula* (d'Eichwald) - Kulagina et al., text-fig. 7 p. 180 (no illustration).
v. 2002a *Bradyina rotula* (Eichwald) - Aretz, fig. 7. 14.
v. 2002a *Bradyina* cf. *rotula* (Eichwald) - Aretz, fig. 7. 15.
2003 *Bradyina rotula* (Eichwald) - Brenckle and Milkina, pl. 4, fig. 8.
2003 *Bradyina rotula* (Eichw.) - Kulagina et al., text-fig. 3 p. 176 (no illustration).
v. 2003 *Bradyina rotula* (Eichwald) - Fontaine et al., pl. 7, fig. 3.
2004 *Bradyina rotula* (Eichwald) - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 6 p. 47, text-fig. 7 p. 48, text-fig. 9 p. 49, text-fig. 15 p. 61, fig. 11. 18-20, fig. 14. 21.
2004 *Bradyina rotula* (Eichwald) - Piecha et al. pl. 1, fig. 1.
2005a *Bradyina rotula* (d'Eichwald) - Cózar and Somerville, text-fig. 5 p. 7, text-fig. 6 p. 8, text-fig. 7 p. 10, text-fig. 8 p. 11, text-fig. 10 p. 13, fig. 13. 20.
2005 *Bradyina rotula* (d'Eichwald) - Brenckle, p. 14-15, pl. 1, figs. 3, 5, 8.
2005 *Bradyina rotula* (d'Eichwald) - Orlov-Labkovsky, p. 23, 25 (no illustration).

2005 *Bradyina rotula* (d'Eichwald) - Somerville and Cózar, pl. 3, fig. 4.

Description. Diameter (D) = 1.250-2900 mm; width (w) = 1.875-2.000 mm; ratio w/D = 0.60-0.63; proloculus diameter = 0.190-0.260 mm; number of whorls: 2.5-3; number of chambers at the last whorl: 5-7.5; height of the last whorl = 0.600 mm; thickness of wall at the last whorl = 0.075-0.140 mm.

Occurrence. Late Asbian-Brigantian of England, Ireland, Belgium, France, Germany, Poland, Malaysia. Late Viséan of Russian Platform (Aleksinsky-Mikhailovsky), Samara Bend, Donets basin ($C_1^{v}f_2$-$C_1^{v}g$), Timan, Kazakhstan, Southern and central Urals (Ladeininsky), Northern Urals and Uzbekistan. Early Serpukhovian of Southern Urals. Late Serpukhovian of Algeria. Late Brigantian of Tien-Shan. Late Viséan of Laos. Ichinotani Formation of Japan. Latest Asbian-latest Brigantian of the Montagne Noire: Lenses of the road, near Roquessels (DV 332C); Castelsec (MA10.6: juvenile, MA 10.7.2, MA10.14, MA10.I.2, MA10.II.122, MA11.110.5, MA143, MA.Heidi.Lame); Roquemaillère (DV134E); Roc du Cayla (MA12.23, DV465B); Les Pascales (MA.PA1: juvenile); Les Mentaresses (DV328'A, DV328'C: juvenile); Roc de Murviel (MA33.103, MA50: 9 specimens including 3 "*Parabradyina*", MA53, ?MA82: juvenile or *B. modica*, MA83, MA330.1: 4 specimens, MA330.9: 2 specimens, MA330.11, DV251B). Late Serpukhovian of Ardengost area: Areng (RC8549), Granges de Peyrissé, Frechet (Perret, 1973b), MFP.AH18 (juvenile or *B. modica*) (this study).

Bradyina concinna Reitlinger, 1950

Pl. 59, fig. 8.

1950 *Bradyina concinna* n. sp. Reitlinger, p. 39, pl. 8, fig. 7.
v. 1973b *Bradyina* cf. *samarica* Reitlinger - Perret, p. 312, pl. 5, fig. 2.
1998 *Bradyina concinna* Reitlinger - Pinard and Mamet, p. 123-124, pl. 38, fig. 12, pl. 40, fig. 4, pl. 41, figs. 1, 6, pl. 42, figs. 3-4 (with synonymy).
Add:
1983 *Bradyina* ex gr. *concinna* Reitlinger - Aizenverg et al., p. 12-13 (no illustration).
1984 *Bradyina concinna* Reitlinger - Zhao et al., p. 107, pl. 18, figs. 13-15.
1987 *Bradyina concina* (sic) Reitlinger - Liao et al., pl. 3, fig. 14.
1990 *Bradyina concinna* Reitlinger - Lin et al., p. 195, pl. 19, figs. 30-31.
1992 *Bradyina concinna* Reitlinger - Kulagina et al., pl. 1, fig. 1.
1993 *Bradyina concinna* Reitlinger - Mamet et al., pl. 9, figs. 7-9, 11.
v. 1993 *Bradyina* sp. - Perret, pl. F.II, fig. 15.
1995 *Bradyina concina* (sic) Reitlinger - Pajic and Filipovic, pl. 32, figs. 9-10.
2000 *Bradyina concinna* Reitlinger - Sebbar, pl. 9, figs. 4-5, 7.
2001 *Bradyina concinna* Reitlinger - Kulagina et al., text-fig. 11 p. 38 (no illustration).
v. 2002 *Bradyina* cf. *concinna* Reitlinger - Krainer and Vachard, p. 16, pl. 4, fig. 2.
2003 *Bradyina concinna*? Reitlinger - Brenckle and Milkina, pl. 5, fig. 6
? 2004 *Janischewskina*? sp. 3 - Cózar and Somerville, fig. 14. 24.

Description. Diameter (D) = 1.020-2.100 mm; width (w) = 1.380 mm; number of whorls: 2-3; number of chambers at the last whorl: 4-5; height of the last whorl = 0.630-0.660 mm; thickness of wall at the last whorl = 0.025-0.040 -0.074 mm.

Occurrence. Serpukhovian-Kasimovian, ?Gzhelian. Paleotethys and North America (see Pinard and Mamet, 1998; and Krainer and Vachard, 2002). ?Earliest Brigantian of Northern England. Protvinsky-Voznessensky of Donets Basin. ?Protvinsky of Kazakhstan. Middle Carboniferous of Tarim (China). Late Serpukhovian-early Bashkirian of Alaska. Latest Brigantian of Roc de Murviel (MA24: 1 specimen, MA83: 1 specimen, MA330.5: 4 specimens). Late Serpukhovian of Ardengost area: Granges de Peyrissé MFP.Per1 (Perret, 1973b), Cas24a (Perret, 1993 re-interpreted here).

Bradyina cribrostomata Rauzer-Chernousova and Reitlinger in Rauzer Chernoussova and Fursenko, 1937

Pl. 59, fig. 9-11.

1937 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger n. sp. Rauzer-Chernousova and Fursenko, p. 295-296, figs. 231a-c, figs. 234 a-b.
1940 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al., p. 51, 77, text-figs. 14a-c, text-figs. 16a-b.
1960 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Grozdilova and Lebedeva, p. 76-77, pl. 8, fig. 3.
1964 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Potievskaya, p. 38-39, pl. 1, figs. 8-11.
1970 *Bradyina* ex gr. *cribrostomata* Rauser et Beljaev (sic) - Rumyantseva, pl. 3, fig. 9.
1973 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Popova and Reitlinger in Einor, p. 54, pl. 7, figs. 7-8, pl. 8, figs. 1-4, 6-8 (with synonymy).
v. 1977 *Bradyina cribrostomata* (Rauzer-Chernousova and Reitlinger) - Perret and Vachard, p. 90 (no illustration).
1978 *Bradyina cribrostomata* (Rauzer-Chernousova and Reitlinger) - Sultanaev et al., p. 100, pl. 7, fig. 1.
1978 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Lys et al., pl. 2, fig. 15.
1978 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Sosipatrova, pl. 3, figs. 1-2, pl. 5, fig. 22.
1978 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Lin, p. 35, pl. 7, figs. 7-8.
v. 1979 *Bradyina cribrostomata* (Rauzer-Chernousova and Reitlinger) - Bensaïd et al., pl. 15, fig. 14.
non 1980 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Skompski and Sobon-Podgorska, pl. 3, fig. 1 (= *B. rotula*).
?1981 *Bradyina* of the group *B. cribrostomata* Rauzer-Chernousova and Reitlinger - Mamet et al., p. 30 (no illustration).
1983 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Aizenverg et al., p. 12-13, pl. 9, fig. 1.
1984 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Zhao et al., p. 107, pl. 18, figs. 1-5.
1984 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Groves, text-fig. 7 p. 289, pl. 4, figs. 1-3.
? 1985 *Bradyina* ex gr. *cribrostomata* Rauzer-Chernousova and Reitlinger - Lys, pl. 1, fig. 10 (wall too large and too coarsely alveolar).
1985 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Adachi, p. 114, pl. 17, figs. 9-10 (with synonymy).
1985 *Bradyina* ex gr. *cribrostomata* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1987 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Sinitsyna and Sinitsyn, pl. 3, fig. 14, pl. 6, fig. 5, pl. 9, fig. 4.
? 1988 *Bradyina magna* Roth and Skinner - Lys, pl. 1, fig. 8.
1988 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Groves, p. 384, figs. 14. 23-28 (with synonymy).
1988 *Bradyina cribrostomata* Rauser et Reitlinger - Kulagina, p. 26, pl. 3, fig. 26.
1988 *Bradyina cribrostomata* Rauser et Reitlinger - Kulagina and Pazukhin, p. 41, 42 (no illustration).
1988b *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Ivanova, pl. 1, fig. 7.
1989 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Fewtrell et al., p. 64, pl.3. 12, fig. 2.
1989 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Skompski et al., pl.6, fig. 1.
v. 1990 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Vachard, p. 95, pl. 2, fig. 12.
v. 1991 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Vachard et al., pl. 1 fig. 3.
?1993 *Bradyina potanini* Venukoff - Mamet et al., pl. 8, fig. 5, pl. 9, figs. 4-6, 10 (maybe juveniles of *B. cribrostomata*).
v. 1993 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Perret, pl. F.II, fig. 17, pl. F.XII, fig. 12.
v. 1996 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Proust et al., p. 347 (no illustration).
v. 1996 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Vachard and Montenat, pl. 3, fig. 3.
1996b *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Mamet, pl. 1, fig. 20.
1997 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Kulagina, p. 61 (no illustration).
?1997 *Bradyina* ex gr. *cribrostomata* Rauzer-Chernousova and Reitlinger - Mizuno and Ueno, tabl. 2, pl. 4, fig. 11.
2000 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Sebbar, pl. 9, figs. 1-2, pl. 10, figs. 2-3, 8.
?2002 *Bradyina* sp. A (ex gr. *cribrostomata* Rauzer-Chernousova and Reitlinger) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
?2002 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Marfenkova, p. 194 (no illustration).
?2002 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Ponomareva et al., p. 238, 240 (no illustration).

2002 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Shcherbakova and Shcherbakov, p. 310, 311, 312, 313 (no illustration).
2003 *Bradyina cribrostomata* Raus. et Reitl. - Kulagina et al., text-fig. 3 p. 176, ?text-fig. 7 p. 180 (ex gr.) (no illustration).
v. 2003 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Fontaine et al., pl. 9, fig. 13.
2003 *Bradyina cribrostomata* (Rauzer-Chernousova and Reitlinger) (sic for the brackets) - Brenckle and Milkina, pl. 6, fig. 41.
2005 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Brenckle, p. 14, pl. 1, figs. 4, 7.
2005 *Bradyina cribrostomata* Rauzer-Chernousova and Reitlinger - Orlov-Labkovsky, p. 23, 25 (no illustration).

Description. Large species with regular increasing of the spire, pre- and post-lamellae perpendicular to the wall and regular alveoles in the wall. See Brenckle (2005, p. 14). Diameter (D) = 1.500-2.300 mm; width (w) = 1.200-1.980 mm; ratio w/D = 0.70-0.90; proloculus diameter = 0.090-0.150 mm; number of whorls: 2-3; number of chambers at the last whorl = 5-7; thickness of wall at the last whorl = 0.060-0.120 mm.

Occurrence. Early Serpukhovian-early Bashkirian Donets Basin, Timan, Russian Platform, Kazakhstan. Ust-sarbaisky-Moscovian of Urals. Bashkirian of Samara Bend. C_1^sa (Protvinsky: C4 limestone)-C_2^m (M8 limestone) of Donets Basin. Early and middle Serpukhovian of Tien-Shan and Malaysia. Early Serpukhovian of Algeria (Reggan Basin). Late Serpukhovian of central Morocco, Uzbekistan, Northern Afghanistan and England. Earliest Bashkirian of Northern Iran (Eastern Alborz). Serpukhovian-Moscovian of the USA. Moscovian of Bolivia. Late Serpukhovian-early Moscovian of Algeria. ?Early Moscovian of Southern Tunisia. ?Late Serpukhovian of Alaska. Late Bashkirian of Poland, Spitsbergen, Kazakhstan and Thailand. Ichinotani Formation of Japan. Middle Carboniferous of Tarim (China) and South China. Late Serpukhovian-early Bashkirian of Hina Group of Japan. Atokan of Idaho. Kashirian of Spitsbergen. Late Serpukhovian of Ardengost area: MFP.CAS29 (Perret, 1993); MFP.AH20B, MFP.AH.B/81.10, MFP.CAS23. Serpukhovian-Bashkirian of Pyrenees (Ardengost, Arize).

7.11. Loeblichioids

Superfamily Loeblichoidea Cummings, 1955a nomen translat. herein

Composition. The superfamily Loeblichoidea links Loeblichiidae, Dainellidae and Spinoendothyridae (Cózar and Vachard, 2001). The Loeblichiidae are constituted of Loeblichiinae and Endostaffellinae.

Family Dainellidae Cózar and Vachard, 2001

Composition. The family is composed of forms which can present many convergences, but useful to separate due to their important stratigraphical value. *Dainella* Brazhnikova, 1962, *Bessiella* Conil and Hance in Groessens et al., 1982, ?*Florenella* Conil et al., 1980, ?*Paradainella*, Brazhnikova in Brazhnikova and Vdovenko, 1971, *Vissarionovella* Cózar and Vachard, 2001, *Bozorgniella* Cózar and Vachard, 2001, *Pojarkovella* Simonova and Zub, 1975.

Occurrence. The family is developed from latest Tournaisian/earliest Viséan ("Cf4 ?" of Hance, 1996, text-fig. 2 p. 31) to the late Viséan, only in Palaeotethys. Separated by a long interval since Df3ε to Cf4 Dainellidae and Quasiendothyridae are not related, but derivated probably from the Spinoendothyridae (Cózar and Vachard, 2001).

Genus *Vissarionovella* Cózar and Vachard, 2001

Type species. *Eostaffella tujmasensis* Vissarionova, 1948.

Diagnosis. Test inflated lenticular to nautiloid, with rounded periphery, and large and shallow unmbilici. Coiling endothyroid in the internal whorls and then planispiral, less deviated than *Dainella*, and more deviated than *Eostaffella*. Pseudochomata present. Wall microgranular, eventially differentiated in a tectum and an inner tectorium. Basal terminal aperture.

Occurrence. Middle-late Viséan (Holkerian-Asbian); very rare in Brigantian (this study, Roque Redonde, RR70), Western Palaeotethys and Urals (see Cózar and Vachard, 2001) (until Turkey: Okuyucu and Vachard, 2006). Very rare in Morocco (Saïd, 2005) and Germany (Peicha et al., 2004, pl. 1, fig. 3, under the name *Eostaffella* ex gr. *radiata* (Brady)).

Vissarionovella donzelli Cózar and Vachard, 2001

Pl. 60, figs. 1-3.

2001*Vissarionovella donzelli* n. sp. Cózar and Vachard, p. 518, fig. 7. 1-12.
2004 *Vissarionovella* cf. *donzelli* Cózar and Vachard - Cózar and Somerville, fig. 11. 2.
? v. 2005 *Vissarionovella* sp. - Saïd, p. 181, fig. X. 1. 6 (or new species).

Description. Diameter (D) = 0.885-1.035 mm; proloculus diameter = 0.050 mm; number of whorls: 4-6; number of chambers at the last whorl = 14; height of the last whorl = 0. 220 mm; thickness of wall at the last whorl = 0.020 mm.

Occurrence. Late Livian of Southern Spain. Rare in the Brigantian of Central Morocco. Latest Asbian of Montagne Noire: Lenses of the road, near Roquessels (DV332A, DV332E).

Vissarionovella aff. *llangollensis* (Conil and Ramsbottom in Conil et al., 1981)

Pl. 60, figs. 4-10.

? 1972 *Dainella* sp. - Bertrand, pl. 2, fig. 20.
aff. 1981 *Bessiella* (?) *llangollensis* n. sp. Conil and Ramsbottom in Conil et al., p. 259, pl. 3, figs. 61-63.

Description. Diameter (D) = 0.620-0.700 mm; proloculus diameter = 0.043 mm; number of whorls: 4; number of chambers at the last whorl: 14; height of the last whorl = 0.100 mm; thickness of wall at the last whorl = 0.010-0.015mm.

Remarks. This taxon differs from *V. llangollensis* in chambers more numerous and more quadratic, and supplementary deposits more developed. It is probably a new species, but I lack of well oriented, transverse and axial sections.

Occurrence. Early to earliest late Asbian of Wales. ?Aleksinsky of Moscow Basin. Latest Asbian-Asbian/Brigantian boundary of the Montagne Noire: Lenses of the road, near Roquessels (?DV332E); Castelsec (MA10.6: 6 specimens); Roquemaillère (?DV134A), Roque Redonde (RR70).

Genus *Pojarkovella* Simonova and Zub, 1975

Type species. *Pojarkovella honesta* Simonova and Zub, 1975.

Diagnosis. Test involute, lenticular and compressed. Early stage endothyrid with strong deviations, last whorl planispiral and semi-evolute to evolute. Chomata present. Wall brownish, granular, with possible differenciation of a luminotheca.

Synonyms. They are numerous (see Cózar, 2002). The most interesting is *Nibelia* Conil, 1980.

Remarks. The genera *Pojarkovella* seems to be remarkably polymorph; therefore the limits of the genus and its different species are rather imprecise. Nevertheless, *Pojarkovella* sensu Ueno and Nakazawa (1993) is clearly an *Endothyra* ex gr. *similis*.

Occurrence. Late middle-late Viséan (biozones Cf5-Cf6δ = MFZ12-14), Palaeotethyan (until China and Sumatra) and Uralian (until Timan-Pechora). The FAD is by definition located at the base of the biozone Cf5 = MFZ12 (but possible ancestral forms might exist in the Cf4δ = MFZ11; Conil, 1980, p. 49); the LAD is poorly known, and depends of the opinions about the genus (synonym or not) *Euxinita*. In Montagne Noire and southeast Ireland the LAD seems to be latest Asbian in age, but the type species *P. nibelis* is Mikhailovsky, i. e., Brigantian, in age. ?Early Serpukhovian-base of late Serpukhovian of Tien Shan (Orlov-Labkovsky, 2005; not illustrated). ?Bashkirian of Canadian Arctic (with *Pojarkovella* sp. of Pinard and Mamet, 1998, pl. 34, fig. 19; only illustrated by a no diagnostic transverse section, and perhaps misidentified to a *Reitlingerina* Rauzer-Chernousova, 1985).

Pojarkovella occidentalis n. sp.
Pl. 60, figs. 11-17.

v. 1974b *Urbanella reliqua* (Rauzer-Chernousova) - Vachard, p. 305, pl. 20, figs. 1-3.
v. 1977b *Urbanella reliqua* (Rauzer-Chernousova) - Vachard, p. 152, pl. 5, figs. 16-17 (with 3 references in synonymy).
? 2005a *Poyarkovella* sp. - Cózar and Somerville, fig. 13. 15.
? 2005 *Pojarkovella* sp. 2 - Somerville and Cózar, pl. 3, figs. 13.

Etymology. Latine *occidentalis*, Western, because of the geographic location compared to the numerous species of Urals and Kazakhstan.

Locus typicus. Valuzières (Hérault).

Stratum typicum. Assemblage SF1, equivalent to the latest Asbian.

Diagnosis. A *Pojarkovella* with many characters of *Urbanella*: strong deviation of axis, regularly evolute last whorls, relatively few developed chomata.

Description. Diameter (D) = 0.370-0.490 mm (one specimen up to 0.610); width (w) = 0.180-0.210 mm; ratio w/D = 0.40-0.46; proloculus diameter = 0.030 mm; number of whorls: 3-4; number of chambers at the last whorl: 12-13; thickness of wall at the last whorl = 0.018-0.025 mm.

Holotype. Sample DV600B, Pl. 60, fig. 12.

Type material. 15 (perhaps 19) specimens.

Repository of the types. Collection of Palaeontology of Lille.

Comparison. *Pojarkovella occidentalis* n. sp. differs from *P. reliqua* (Rauzer-Chernousova, 1948h) in a less compressed test, and from *P. nibelis* (Durkina, 1959) in a small size, smaller chomata, and less evolute last volution. *P. honesta* relatively similar is synonymized with *P. nibelis* in Cózar (2002).

Occurrence. ?Late Asbian of SE Ireland. Latest Asbian-Latest Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293C, DV293.2A: 2 specimens, DV293.2B, DV 332A, DV332B, DV.FB16); sommet 224-Valuzières (DV600B: 2 specimens, DV600C: 3 specimens); Castelsec (?MA10.9, ?MA10.12: 3 specimens, MA11.2); Roc de Murviel (MA7, MA82).

Family Loeblichiidae Cummings, 1955a
nomen translat. Rozovskaya in Poyarkov, 1963 (ex subfamily)
Subfamily Endostaffellinae Loeblich and Tappan, 1984
Genus *Endostaffella* Rozovskaya, 1961

Type species. *Endothyra parva* von Möller, 1879.

Synonyms. *Zellerina* Mamet and Skipp, 1970 (preoccupied); *Zellerinella* Mamet, 1981 (non sensu Ueno and Nakazawa, 1993 = *Endothyra*); *Zellerina*? sensu Adachi, 1985; *Millerella* (pars), *Eostaffella* (pars), *Endothyra* (pars).

Diagnosis. Test small, discoid or lenticular. Quasiendothyroid coiling with strong initial distorsion, and last 1.5 to 2.5 whorls planispirally coiled, sometimes semi-evolute. Faint or absent pseudochomata or chomata. Wall microgranular. Simple terminal aperture.

Remarks. I agree with Brenckle (2005) to consider that the difference with *Zellerinella* is only specific (see also the problems between *Endostaffella* and *Priscella*).

Occurrence. ?Late Tournaisian-Viséan-early Serpukhovian (the acme is Brigantian; e.g. Cózar, 2004, p. 384); Palaeotethyan (until to Thailand). Late Viséan-early Bashkirian, Arkansas, Alaska (USA), Laos. Late Serpukhovian of Pyrenees. Omi Limestone of central Japan (Ueno and Nakazawa, 1993). Serpukhovian-early Bashkirian of Southern Urals. Late Viséan-base of late Sepukhovian of Tien Shan (with *E. delicata*, according to Orlov-Labkovsky, 2005, p. 26).

Endostaffella parva (von Möller, 1879)
Pl. 61, figs. 1-4.

1879 *Endothyra parva* n. sp. von Möller, p. 18-20, pl. 1, fig. 4, pl. 5, figs. 1a-b.
1948f *Eostaffella parva* Moeller (sic) - Rauzer-Chernousova, p. 234 (no illustration).
1956a *Eostaffella parva* (Moeller) - Malakhova, p. 49-50, pl. 7, figs. 8-9.
?1970 *Endostaffella parva* (Moeller) - Rumyantseva, pl. 5, figs. 13-15 (probably *Eostaffella* ex gr. *prisca* Rauzer-Chernoussova).
?1970 *Endothyra parva* von Möller - Mamet, p. 38 (no illustration).
v. 1974b *Endostaffella parva* (von Möller) - Vachard, p. 281-282, pl. 16, figs. 7-8 (with synonymy).
?1977 *Endothyra* sp. - Paproth et al., pl. 6, fig. 23.
v. 1977b *Endostafella* (sic) *parva* (von Moeller) - Vachard, p. 149-150, pl. 5, figs. 1-2 (with 3 references in synonymy).
non 1978 *Endostaffella parva* (von Moeller) - Lys et al. , pl. 1, fig. 11, pl. 2, fig. 12 (= *Omphalotis* sp.)
v. 1982 *Endostaffella parva* Raus. (sic) - Fontaine and Vachard, p. 189 (no illustration).
?1981 *Endostaffella* aff. *rozovskayae* Conil & Longerstaey - Strank, pl. 12, figs. 18, 20.
1981 *Endostaffella* cf. *parva* (Moeller) - Strank, pl. 12, fig. 15.
1981 *Endostaffella rozovskayae* Conil & Longerstaey - Strank, pl. 18, fig. 21.
1981 *Endostaffella* cf. *rozovskayae* Conil & Longerstaey - Strank, pl. 19, fig. 17.
1981 *Endostaffella parva* (Moeller) - Strank, pl. 20, fig. 7.
1981 cf. *Endostaffella rozovskayae* Conil & Longerstaey - Strank, pl. 20, fig. 19.
1983 *Endostaffella* ex gr. *parva* (Moell.) - Aizenverg et al., p. 12 (no illustration).
1984 *Plectogyra parva* Moeller - Zhao et al., p. 105, pl. 17, figs. 12-14.
1985 *Zellerina*? sp. - Adachi, p. 109, pl. 16, figs. 8-9.
non 1987 *Endostaffella* ex gr. *parva* (Möller) - van Ginkel, p. 199, fig. 3. 2 (= ?*Mediocris*).
?1988 *Endostaffella parva* (Moell.) - Kulagina, p. 25, 26 (no illustration).
?1988 *Endostaffella parva* (Moell.) - Kulagina and Pazukhin, p. 41 (no illustration).
?1989 Loeblichiidae - Fewtrell et al., p. 52, pl. 3. 7, fig. 13 (at least of the group).
v. 1990 *Endostaffella parva* (von Moeller) - Vachard, pl. 1, figs. 1-3.
1991 *Endostaffella parva* (Möller) - Gibshman and Akhmetshina, pl. 2, fig. 19.
1996 *Endostaffella parva* (von Moeller) - Rumyantseva in Einor, pl. 33, fig. 7.
v. 1999 *Endostaffella parva* (von Möller) - Berkhli, p. 110 (no illustration).
v. 1999 *Endostaffella parva* (Moeller) - Fontaine et al., p. 464 (no illustration).
2001 *Endostaffella parva* (von Möller) - Vdovenko, p. 334, tabl. 1 p. 375, pl. 23, figs. 15-17.

2002 *Endostaffella parva* (von Möller) - Shcherbakova and Shcherbakov, p. 307 (no illustration).
p. 2002 *Endostaffella* ex gr. *E. parva* (von Möller) - Van amerom et al., pl. 3, fig. 23 (non fig. 24 = *Endothyra prisca*).
2003 *Endostaffella parva* (von Möller) - Brenckle and Milkina, pl. 4, fig. 9.
v. 2005 *Endostaffella* ex gr. *parva* (von Möller) - Saïd, p. 180, p. 182, p. 184, p. 190 (no illustration).
p. 2005 *Endostaffella parva* (von Möller) - Brenckle, p. 23-25, pl. 3, figs. 27-31 (non figs. 32-37 = other species of *Endostaffella*).
2005 *Endostaffella parva* (von Möller) - Somerville and Cózar, pl. 3, figs. 7, 11.

Description. Diameter (D) = 0.200-0.400 mm; width (w) = 0.090-0.160 mm; ratio w/D = 0.40-0.47; proloculus diameter = 0.015-0.020 mm; number of whorls: 3.5-4; number of chambers at the last whorl: 9-11; height of the last whorl = 0.090-0.135 mm; thickness of wall at the last whorl = 0.005-0.010 mm.

Occurrence. Tulsky-Tarussky of Moscow Basin. Late Viséan of Kazakhstan. Early Serpukhovian-Zapaltiubinsky-Bogdanovsky of Urals. $C_1^vf_2$-Zapaltiubinsky of Donets Basin. V3c of Germany. Late Asbian of Ireland. Late Asbian-late Brigantian of Morocco. ?Early Bashkirian of Uzbekistan. Early Bashkirian of Tien-shan. Late Viséan of Viet-Nam and Tarim (China). Late Viséan/Serpukhovian of Thailand. Ichinotani Formation of Japan. Latest Asbian- Brigantian of the Montagne Noire: Lenses of the road, near Roquessels (DV.FB18); Castelsec (MA10.7.2); Japhet (DV350A); Roque Redonde (RR51?); Jeantels (DV690); Mounio (DV431D); Roc de Murviel (?MA24, ?MA59, MA73.2).

Endostaffella shamordini (Rauzer-Chernousova, 1948f)
Pl. 61, figs. 4-22.

1948f *Endothyra parva shamordini* var. nov. (sic) Rauzer-Chernousova, p. 234-235, pl. 16, figs. 17-18.
1951 *Millerella tantilla* n. sp. Ganelina, p. 32-33 (French translation), pl. 3, figs. 22-24.
v. 1974b *Endostaffella shamordini* (Rauzer-Chernousova) - Vachard, p. 282-283, pl. 16, figs. 9-12 (with synonymy).
1975 *Endostaffella shamordini* (Rauzer-Chernousova) - Mikhno and Balakin, p. 43, pl. 10, figs. 12-17.
v. 1977b *Endostaffella shamordini* (Rauzer-Chernousova) - Vachard, p. 150, pl. 5, figs. 3-6 (wih 3 references in synonymy).
1981 *Endostaffella shamordini* (Rauzer-Chernousova) - Strank, pl. 17, fig. 14.
1982 *Endostaffella shamordini* (Rauzer-Chernousova) - Rich, pl. 1, fig. 20.
?1983 *Endostaffella shamordini* (Rauzer-Chernousova) - Conil and Paproth, tabl. 1 p. 35, fig. 3. 4.
?1983 cf. *Bessiella* - Conil and Paproth, fig. 3. 4.
1988 *Endostaffella fucoides* (Rozovskaya) - Kulagina, pl. 2, fig. 3.
? 1989 *Endostaffella* sp. - Fewtrell et al., p. 55, pl. 3. 8, fig. 15.
? p. 1989 *Endostaffella fucoides* (Rozovskaya) - Fewtrell et al., p. 56, pl. 3. 9, figs. 8 (non figs. 9-10 other species of *Endostaffella*).
v. 1996 *Endostaffella shamordini* (Rauzer-Chernousova) - Vachard, pl. 1, fig. 5.
1999b *Endostaffella shamordini* (Rauzer-Chernousova) - Cózar and Rodríguez, pl. 2, fig. 8.
2000c *Endostaffella shamordini* (Rauzer-Chernousova) - Cózar, p. 334, pl. 5, fig. 10.
2001 *Endostaffella shamordini* (Rauzer-Chernousova) - Vdovenko, p. 334, tabl. 1 p. 375, pl. 23, figs. 23-29.
2002 *Endostaffella chamordini* (sic) Ros. (sic) - Pazukhin et al., p. 221 (no illustration).
? v. 2005 *Endostaffella fucoides* (Rozovskaya) - Saïd, p. 184, p. 188? (cf.) (no illustration).
p. 2005 *Endostaffella discoidea* (Girty) - Brenckle, p. 20, 21-22, pl. 3, figs. 14, 19-23.
?2005 *Millerella*? *tantilla* Ganelina - Orlov-Labkovsky, p. 25 (no illustration).
2005 *Endostaffella shamordini* (Rauzer-Chernousova) - Somerville and Cózar, pl. 3, fig. 6, 10.
? 2005 *Endostaffella delicata* Rozovskaya - Sanz-Lopez et al., pl. 6, fig. 6.

Description. Diameter (D) = 0.220-0.465 mm; width (w) = 0.070-0.220 mm; ratio w/D = 0.33-0.53; proloculus diameter = 0.015-0.017 mm; number of whorls: 3-4.5; thickness of wall at the last whorl = 0.004-0.008 mm.

Occurrence. Late Viséan-Serpukhovian of Russian Platform. $C_1^ve_1$-C_1^vg of Donets Basin. Venevsky of Southern Urals (Pazukhin et al., 2002). Aleksinsky-Tarussky Submoscovite

Basin (Ganelina, 1951). Late Holkerian-early Serpukhovian of Southwestern Spain. Late Viséan of Georgia (USA). Late Viséan of Uzbekistan. Late Asbian of Ireland. ?Asbian-Brigantian of England. Late Viséan of Germany. ?Late Brigantian of Morocco. Early Serpukhovian of Iran (Eastern Alborz). Late Viséan of Tien-Shan. Latest Asbian-early Serpukhovian of Montagne Noire: Lenses of the road, near Roquessels (DV293H); Castelsec (MA10-?); Roquemaillère (DV134C, DV137A, B, C, D, E, F, DV140C, ?ML764); Roc du Cayla (?DV466B); Vailhan-Château (DV246F, ?DV248B); Vailhan-Roque de Loup (?DV327A); Les Mentaresses (?DV328'E); Roc de Murviel (MA33-3, MA87); La Serre (?MA.LSII.2029, ?MA.LS.Feldweg10).

Endostaffella discoidea (Girty, 1915)
Pl. 61, figs. 23-25.

1915 *Endothyra discoidea* n. sp. Girty, p. 27, pl. 10, figs. 11-16.
?1970 *Eostaffella* of the group *E.*? *discoidea* Girty (sic) - Mamet, n° 32 of text-fig. 3 p. 4-5, p. 11, n° 24 of text-fig. 14 p. 28-29, p. 37-38, pl. 5, fig. 6, pl. 6, figs. 7, 9-12, pl. 11, fig. 3, pl. 18 fig. 2 (undeterminable transverse sections).
?1970 *"Eostaffella"*? *discoidea* (Girty) - Petryk et al., n° 93 of text-fig. 4 p. 93 (no illustration).
?1970 *"Eostaffella"*? *discoidea* (Girty) - Skipp and Mamet, p. B121(no illustration).
1972 *Zellerina discoidea* (Girty) - Mamet, enclosure between p. 4 and 5 (pars) (no illustration).
v. 1973b ?*Eostaffella (Seminovella) elegantula* Rauzer Chernoussova - Perret, p. 319, pl. 6, fig. 3.
1973 *Zellerina discoidea* (Girty) - Browne and Pohl, pl. 31, figs. 3-4 (after Girty).
v. ? 1977 *Eostaffella* cf. *pseudostruvei* (Rauzer Chernoussova and Belyaev) - Perret and Vachard, p. 90 (no illustration).
1980 *Zellerina discoidea* (Girty) - Rich, p. 32, pl. 14, figs. 10-12, 15-22 (with synonymy).
1981 *"Eostaffel*a" *discoidea* (Girty) - Mamet et al., p. 27, 28 (no illustration).
1982a *"Endothyra" discoidea* Girty - Brenckle et al., text-figs. 2-3 (no illustration).
1982 *Endostaffella discoidea* (Girty) - Baxter and Brenckle, text-fig. 3 p. 140, p. 143.
1982 *Zellerina discoidea* (Girty) - Rich, pl. 5, figs. 9-12, 21, 23.
1985 *Endostaffella discoidea* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1992 *Zellerinella discoidea* (Girty) - Matsusue, text-fig. 2 p. 383, fig. 4. 3.
1993 *Zellerinella discoidea* (Girty) - Mamet et al., pl. 11, figs. 1-3.
1997 *Zellerinella discoidea* (Girty) - Mazuno and Ueno, tabl. 2, pl. 4, figs. 12-15.
v. 1993 *Eostaffella (Seminovella) elegantula* Rauzer Chernoussova - Perret, pl. F3, fig. 26.
2003 *Endostaffella discoidea* (Girty) - Brenckle and Milkina, pl. 5, fig. 27.
?2004 *Millerella*? sp. - Cózar and Somerville, fig. 11. 31.
p. 2005 *Endostaffella discoidea* (Girty) - Brenckle, p. 20-23, pl. 2, figs. 18-19, 25-26, pl. 3, figs. 1-13 (non figs 14-26 = other species of *Endostaffella*).
? 2006 *Endostaffella* aff. *E. discoidea* (Girty) - Groves and Beason, pl. 1, figs. 16-22 (another species of *Endostaffella* and/or *Endothyra* ex gr. *prisca*).

Description. Diameter (D) = 0.290-0.430 mm; width (w) = 0.070-0.140 mm; ratio w/D = 0.18-0.38; proloculus diameter = 0.020-0.025 mm; number of whorls: 4-6; number of chambers at the last whorl = 9-12; thickness of wall at the last whorl = 0.007-0.015 mm.

Remarks. *Zellerinella discoidea* seems to have *Endostaffella shamordini* as direct ancestor due to the successive FAD and the transitional morphological characters, but they are not exactly synonyms as indicated by Brenckle (2005). Contrary to Mamet (1970, p. 37), *Millerella tortula* Zeller, 1953 and *M. designata* Zeller, 1953 are not really identical to *Endostaffella discoidea*.

Occurrence. Brigantian-early Serpukhovian of Monteagle Limestone and late Serpukhovian of Bangor Limestone (USA). Late Asbian-late Serpukhovian of Georgia (USA). Late Asbian of Alberta (Canada) and Idaho (USA). Late Asbian-early Serpukhovian of Windsor Group (SE Canada). Serpukhovian of Kazakhstan. Akiyoshi Group and Hina Group (late Serpukhovian) of Japan. Late Serpukhovian of Ardengost area: Bois de Gertous, Fontaine de Badet Fo2 (Perret, 1973b, 1993), MFP.AH18, AH18E, AH20C, AH20F, AH20'F, MFP.CAS10 (this study).

Genus *Euxinita* Conil and Dil in Conil et al., 1980

Type species. *Dainella*? *efremovi* Vdovenko and Rostovceva in Brazhnikova et al., 1967.

Synonyms. *Euxinella* Conil and Dil in Dil, 1977 (preoccupied), *Dainella*?, *Pojarkovella* (pars) ,**"***Pojarkovella***"**.

Diagnosis. Genus similar to *Endostaffella* but exhibiting a more inflated test, an absence or rarity of semi-evolute whorls, and, principally, well developed pseudochomata. The recrystallizations of the wall, often emphasized by the authors, are in fact weakly conspicuous in the investigated collections, and apparently limited to the contacts between wall and septa (observations in the Moroccan material (Akerchi) of D. Vachard, M. Berkhli and M. Legrand; see also Brenckle 2005).

Remarks. A discussion exists between the authors which admit the validity of *Euxinita* (e. g., Brazhnikova et al., 1967; Conil et al., 1980; Okuyucu and Vachard, 2006) and the authors which consider *Euxinita* as a synonym of *Poyarkovella* (Reitlinger, 1981; Cózar and Vachard, 2001; and Cózar, 2002). I consider *Pojarkovella guadiatensis* Cózar, 2002 as an *Euxinita* species.

Occurrence. ?Late Asbian. Brigantian-early Serpukhovian of Western Palaeotethys.

Euxinita efremovi Vdovenko and Rostovceva in Brazhnikova et al., 1967

Pl. 61, figs. 26-32.

1967 *Dainella* (?) *efremovi* n. sp. forma typica Vdovenko and Rostovceva in Brazhnikova et al. p. 148-149, pl. 47, figs. 1-5.
1967 *Dainella* (?) *efremovi* n. sp. forma inflata Vdovenko and Rostovceva in Brazhnikova et al. p. 149, pl. 46, fig. 10, pl. 47, figs. 6-7.
1967 *Dainella* (?) *efremovi* n. sp. forma subsymmetrica Vdovenko and Rostovceva in Brazhnikova et al. p. 149-150, pl. 46, figs. 6-8, pl. 47, figs. 8-13.
1967 *Dainella* (?) *efremovi* n. sp. forma compressa Vdovenko and Rostovceva in Brazhnikova et al. p. 150-151, pl. 47, figs. 14-16.
v. 1974b *Dainella* (?) *efremovi* Vdovenko and Rostovceva - Vachard, p. 279-281, pl. 16, figs. 14-16.
1976 *Euxinella* sp. - Bless et al., pl. 11, fig. 7, pl. 12, fig. 15.
1976 *Euxinella* aff. *efremovi* (Vdovenko & Rostovceva) - Bless et al., pl. 12, fig. 2.
1976 cf. *Euxinella* sp. - Bless et al., pl. 12, fig. 3.
? 1976 ?*Euxinella* sp. - Bless et al., pl. 12, fig. 11.
1977 *Euxinella* aff. *efremovi* (Vdovenko & Rostovceva) - Dil, pl. 8, figs. 119-121.
1977 *Euxinella* sp. 1 - Dil, pl. 8, figs. 122-123.
1977 *Euxinella* sp. 2 - Dil, pl. 8, fig. 129.
1977 *Euxinella* sp. 3 - Dil, pl. 8, fig. 131.
1977 *Euxinella* sp. - Dil, pl. 8, figs. 128, 130.
v. 1977b "*Dainella*?" *efremovi* Vdovenko and Rostovceva - Vachard, p. 149, pl. 5, figs. 7-9 (with 12 references in synonymy).
non 1985 *Euxinella efremovi* (Vdovenko & Rostovtseva) - Lys, pl. 1, fig. 8 (= *Endothyra* sp.).
2001 *Euxinita efremovi* (Vdovenko and Rostovceva) - Vdovenko, tabl. 1 p. 175, pl. 1, figs. 14, 16-17, pl. 23, figs. 7-14.
2004 *Pojarkovella* cf. *efremovil* (sic) - Cózar et al., fig. 3. 3.
2004 "*Pojarkovella*" *efremovi* (Vdovenko and Rostovceva) - Cózar and Somerville, text-fig. 3 p. 45, text-fig. 4 p. 46, text-fig. 6 p. 47, text-fig. 9 p. 49, text-fig. 15 p. 61, fig. 11. 24-26, 28-30, fig. 14. 26.
2004 *Pojarkovella efremovi* - Cózar, text-fig. 5 p. 376, text-fig. 6 p. 378, p. 383, pl. 2, fig. 9.
2005a "*Pojarkovella*" *efremovi* (Vdovenko and Rostovceva) - Cózar and Somerville, text-fig. 6 p. 8, text-fig. 7 p. 10, text-fig. 8 p. 11, text-fig. 9 p. 12, text-fig. 10 p. 13, text-fig. 11 p. 15, text-fig. 16 p. 25, fig. 13. 17.
v. 2005 *Euxinita* sp. - Saïd, fig. X. 1. 19.
2005 *Euxinita efremovi* (Vdovenko & Rostovtseva in Brazhnikova et al.) - Brenckle, p. 45, pl. 7, figs. 16-17.
2005 "*Pojarkovella*" *efremovi* (Vdovenko and Rostovceva) - Somerville and Cózar, pl. 3, figs. 12, 14.
2005c *Pojarkovella efremovi* (Vdovenko and Rostovceva) - Cózar et al., fig. 11. 19-20.

Description. Diameter (D) = 0.270-0.480 mm; width (w) = 0.160-0.280 mm; ratio w/D = 0.50-0.58; number of whorls: 3-4; thickness of wall at the last whorl = 0.013-0.015 mm.

Remarks. These specimens show a microgranular, not recrystallized wall. These forms correspond to a deviated and inflated *Endostaffella* (see aso *Pojarkovella* cf. *efremovil* (sic) of Cózar et al., 2004) or to some false "*Eostaffellina*" or "*Plectostaffella*" of the literature (e. g., respectively, Makhlina et al., 1983; Vdovenko, 2001; and Conil et al., 1980), they seem to be fundamentally different of *Pojarkovella*.

Occurrence. As for the genus. The FAD in Northern England is earliest Brigantian (Cózar and Somerville, 2004, text-fig. 15). $C_1^{v}f_2$-$C_1^{s}a$ (C1 limestone) of Donets Basin. Early Brigantian of Ireland. Houthem and Mesch boreholes (the Netherlands). V3c of Turkey (Zonguldak Basin). Brigantian of Montagne Noire: Japhet (DV856.2); Vailhan-Roque de Loup (DV248D-E); Les Boutinelles (MA.BOU25.9B).

Euxinita ? sp.1
Pl. 61, fig. 33.

v. 1993 *Urbanella* ? *parachomatica posterior* Vdovenko - Perret, pl. F3, fig. 29.

Description. The unique specimen looks like *Euxinita* or *Pojarkovella* more than *Urbanella*. Diameter = 0.625 mm; width = 0.250 mm; ratio W/D = 0.40; proloculus diameter = 0.050 mm; whorl number: 3; thickness of last whorl = 0.005 mm.
Occurrence. Late Serpukhovian of Ardengost area: Cas 37 (Perret, 1993).

7.12. Palaeotextularioids

Superfamily Palaeotextularioidea Galloway, 1933 nomen translat. Habeeb, 1979 (ex family)
Family Palaeotextulariidae Galloway, 1933 nomen translat. Wedekind, 1937 (ex subfamily).
Subfamily Palaeotextulariinae Galloway, 1933

Genus *Palaeotextularia* Schubert, 1921
Type species. *Palaeotextularia schellwieni* Galloway and Ryniker, 1930.

Diagnosis. Test entirely biseriate. Wall bilayered, with an outer, brownish, eventually with a carbonate agglutinate (e. g., Reitlinger, 1950, pl. 1, fig. 5), and an inner yellowish, pseudofibrous, perforate inner layer. Simple and basal terminal aperture.

Occurrence. Late Viséan (MFZ13) to Late Permian (but after the Viséan, it is difficult to distinguish this adult genus from a juvenile *Climacammina*), cosmopolite.

Palaeotextularia ex gr. *longiseptata* Lipina, 1948
Pl. 62, figs. 1-6.

1948 *Palaeotextularia longiseptata* n. sp. Lipina, p. 199, pl. 9, figs. 1-3, 7.
1970 *Palaeotextularia* of the group *P. longiseptata* Lipina - Mamet, n° 46 of text-fig. 3 p. 4-5, p. 13, n° 40 of text-fig. 14 p. 28-29, p. 42 (no illustration).
v. 1974b *Palaeotextularia longiseptata longiseptata* Lipina - Vachard, p. 315-316, pl. 21, fig. 10 (with synonymy).
v. 1974b *Palaeotextularia longiseptata crassa* Conil and Lys - Vachard, p. 316-317, pl. 6, fig. 4, pl. 21, fig. 9 (with synonymy).
v. 1977b *Palaeotextularia longiseptata longiseptata* Lipina - Vachard, p. 153, pl. 6, fig. 3.
v. 1977b *Palaeotextularia longiseptata crassa* Conil and Lys - Vachard, p. 153, pl. 6, fig. 5.
1978 *Palaeotextularia longiseptata* Lipina - Lin, p. 19, pl. 2, fig. 26.
1981 *Palaeotextularia* of the group *P. longiseptata* Lipina - Mamet et al., p. 27, 28, 29, 30 (no illustration).

1981 *Palaeotextularia* ex gr. *longiseptata* Lipina - Strank, pl. 12, fig. 8, pl. 13, fig. 1.
1983 *Palaeotextularia longiseptata* Lipina - Aizenverg et al., p. 12 (no illustration).
1984 *Palaeotextularia longiseptata* Lipina - Zhao et al., p. 98, pl. 25, figs. 14-15.
1988 *Palaeotextularia longiseptata* Lipina - Kulagina, p. 25 (no illustration).
1989 *Palaeotextularia* aff. *longiseptata* (Lipina) (sic for the parentheses) - Fewtrell et al., p. 48, pl. 3. 6, fig. 6.
1992 *Palaeotextularia longiseptata* Lipina - Matsusue, text-fig. 2 p. 383 (no illustration).
1992 *Palaeotextularia longiseptata crassa* Conil and Lys - Matsusue, text-fig. 2 p. 383 (no illustration).
1993 *Palaeotextularia longiseptata* Lipina - Mamet et al., pl. 13, fig.8-9.
1993 *Palaeotextularia* ex gr. *longiseptata* Lipina - Ueno and Nakazawa, p. 16, fig. 5. 9.
1996 *Palaeotextularia* ex gr. *longiseptata* Lipina - Gallagher, text-fig. 2 p. 242 (no illustration).
1997 *Palaeotextularia* ex gr. *longiseptata* Lipina - Gallagher and Somerville, text-fig. 4 p. 318, text-fig. 5 p. 320, text-fig. 6 p. 321, text-fig. 8 p. 325 (no illustration).
1998 *Palaeotextularia longiseptata* Lipina - Pinard and Mamet, p. 114-115, pl. 16, figs. 3, 10, text-fig. 11. 6 (with synonymy).
2000 *Palaeotextularia longiseptata* Lipina - Sebbar, pl. 12, fig. 9.
2000a *Palaeotextularia longiseptata* Lipina - Cózar, p. 58-59, pl. 2, fig. 8.
2001 *Palaeotextularia longiseptata longiseptata* Lipina - Vdovenko, tabl. 1 p. 171, pl. 5, figs. 9, 11.
2002 *Palaeotextularia longiseptata* Lipina - Shcherbakova and Shcherbakov, p. 307, 308, 311 (no illustration).
2003 *Palaeotextularia longiseptata* Lipina - Brenckle and Miklina, pl. 3, fig. 23.
2005 *Palaeotextularia longiseptata* Lipina - Somerville and Cózar, pl. 1, fig. 31.

Description. Heigth (H) = 0.880-1.700 mm; width (w) = 0.530-1.000 mm; number of chambers: 10-14; apical angle: 35-50°.

Occurrence. Tulsky-Venevsky of Submoscovite Basin. Serpukhovian-early Bashkirian of Urals. Early Asbian of Southwestern Spain. Late Viséan of Kazakhstan, Uzbekistan, Ireland and Morocco. Late Viséan of Tarim (NW China) and South China. Akiyoshi Group of Japan. Asbian-early Serpukhovian of Maritime Provinces (SE Canada). Late Asbian-Early Pennsylvanian of Idaho (USA). Late Serpukhovian of Algeria. Late Viséan-early Bashkirian of Donets Basin. Early Bashkirian of Alaska. Latest Asbian-Brigantian of the Montagne Noire: Lenses of the road, near Roquessels (DV293D, ?DV293I); Roquemaillère (DV134C, DV134D, DV140D); Vailhan-Château (DV246E, DV246F, DV246G); Mounio (DV431E); Péret (ML784); Roc de Murviel (MA33.0, MA330.5).

Genus *Cribrostomum* von Möller, 1879 emend. Cummings, 1956

Type species. *Cribrostomum textulariforme* von Möller, 1879 (designated by Cushman, 1928a).

Diagnosis. Palaeotextulariinae (i. e., with bilayered wall) with biseriate initial chambers with areal and single apertures; the last chamber is uniseriate and cribrate.

Remarks. Pennsylvanian and Permian «*Cribrostomum*» are in fact incomplete *Climacammina*.

Occurrence. Late Asbian-Brigantian of Belgium, Germany (in the Crenistria zone: Conil and Paproth, 1983), Spain, France, England, Ireland, Russian Platform, Urals, Timan, Kazakhstan, Viet-Nam, Japan, Alberta (Canada). Early-latest Serpukhovian of Urals (Shcherbakova and Shcherbakov, 2002: *Cribrostomum eximium* Moell., p. 307, 310). A typical Cf6γ (i.e. late Asbian = MFZ14) marker of Ireland (Gallagher and Somerville, 1997, p. 318) and Northern England (Cózar and Somerville, 2004, p. 51). Up to earliest Serpukhovian of Donets Basin and Belgium.

Cribrostomum lecomptei Conil and Lys, 1964
Pl. 62, figs. 7-11.

1963 *Cribrostomum mölleri* Conil and Lys - Conil and Pirlet, pl. 1, fig. 6 (nomen nudum).
1964 *Cribrostomum lecomptei* n. sp. Conil and Lys, p. 81-82, pl. 11, fig. 204.
1967 *Cribrostomum lecomptei* Conil and Lys - Eickhoff, p. 32, pl. 7, figs. 1-2.
?1967 cf. *Cribrostomum lecomptei* Conil and Lys - Conil and Paproth, p. 65, 76 (no illustration).
1968b *Cribrostomum lecomptei* Conil and Lys - Eickhoff, p. 175-176, pl. 19, fig. 7, pl. 20, fig. 7.
non v. 1974b *Cribrostomum lecomptei* Conil and Lys - Vachard, p. 318-319, pl. 21, fig. 11 (see below *Climacammina simplex*).
non v. 1977b *Cribrostomum lecomptei* Conil and Lys - Vachard, p. 153 (no illustration) (see below *Climacammina* cf. *padunensis*).
v. 1977b *Climacammina antiqua* Brady - Vachard, p. 153 (no illustration).
1985 *Cribrostomum lecomptei* Conil and Lys - Adachi, p. 89-90, pl. 10, fig. 14.
1989 *Cribrostomum lecomptei* (Conil and Lys) (sic for the parentheses) - Fewtrell et al., p. 54, pl. 3. 8, fig. 7.
1992 *Cribrostomum lecomptei* (Conil and Lys) (sic for the parentheses) - Somerville et al., fig. 6b.
1996 *Cribrostomum lecomptei* - Gallagher, text-fig. 2 p. 242 (no illustration).
1997 *Cribrostomum lecomptei* Conil and Lys - Gallagher and Somerville, text-fig. 4 p. 318, text-fig. 5 p. 320, text-fig. 6 p. 321, text-fig. 8 p. 325, fig. 9b.
1998 *Cribrostomum lecomptei* Conil and Lys - Gallagher, pl. 1, fig. 8.
2000a *Cribrostomum lecomptei* Conil and Lys - Cózar, p. 59-60, pl. 3, fig. 3 (with synonymy).
2001 *Cribrostomum* sp. ex gr. *lecomptei* Conil and Lys - Vdovenko, tabl. 1 p. 171, pl. 7, fig. 6.
2003a *Cribrostomum lecomptei* Conil and Lys - Cózar, fig. 4 A.
2004 *Cribrostomum lecomptei* Conil and Lys - Cózar and Somerville, fig. 10. 25, fig. 14. 12 ?, 14.
2004 *Cribrostomum lecomptei* Conil and Lys - Cózar, pl. 2, fig. 11.
2005a *Cribrostomum lecomptei* Conil and Lys - Cózar and Somerville, fig. 13. 13.
2005 *Cribrostomum lecomptei* Conil and Lys - Somerville and Cózar, pl. 1, fig. 29.
2006 *Cribrostomum lecomptei* Conil and Lys - Gallagher et al., fig. 14. 9.

Description. Initial part looks like *Palaeotextularia* ex gr. *longiseptata*, septa spread apart gradually later and becomes swollen and club-shaped. Sutures become deeper in this part. Last one or two chambers are larger (they overlap the axis) and cribrate with few perforations. The bilayered wall is well visible in all the chambers. Heigth (H) = 1.500-1.970 mm; width (w) = 0.900-0.960 mm; proloculus diameter = 0.080-0.130 mm; number of chambers: 13-15; height of the last whorl = mm; thickness of wall at the last whorl = 0.025-0.035 mm; apical angle = 30°.

Remarks. Some confusions seem to exist among the *Cribrostomum* and *Climacammina* identified by Vachard (1974b, 1977b).

Occurrence. As for the genus. Brigantian of Montagne Noire: Castelsec (MA10-?, MA10.3, MA10.7.1, MA10.14); Roquemaillère (ML.UM.ROQ); Japhet (DV856.2); Roque Redonde (RR56); Les Pascales (MA.PA11); Péret (ML784).

Genus *Climacammina* Brady in Etheridge, 1873 emend. Cummings, 1956
Type species. *Textularia antiqua* Brady in Young and Armstrong, 1871.

Diagnosis. Palaeotextulariinae (i. e., with bilayered wall) with biseriate initial chambers with areal and single apertures, followed by several uniseriate and cribrate chambers.

Remarks. Since the Bashkirian all the Palaeotextulariinae are probably only represented by *Climacammina*. *Palaeotextularia* and *Cribrostomum* auctorum are probaby immature stages of these *Climacammina*. A siliceous agglutinate appears since the Bashkirian (Perret, 1993, pl. F.XI, fig. 4), consequently the Textulariida are not necessarily more primitive than the Fusulinida as universally admitted (e. g., Loeblich and Tappan, 1987).

Occurrence. The Asbian forms (e. g., mentioned by Mamet, 1970 or Petryk et al., 1970, n°87 of text-fig. 4 p. 93) must evidently be identified to *Koskinobigenerina*. Late Brigantian =

upper MFZ15 with a FAD coeval with that of *Janischewskina* (Cózar and Somerville, 2004; Cózar, 2004; Devuyst et al., 2005, text-fig. 13) to late Changhsingian (= Latest Permian) (Gaillot pers. comm.), cosmopolite since the Pennsylvanian (Mamet, 1970, p. 33).

Climacammina cf. *padunensis* Ganelina, 1956

Pl. 62, fig. 12.

cf. 1956 *Climacammina padunensis* n. sp. Ganelina, p. 19-20 (French translation), pl. 4, figs. 7-8.
1956a *Climacammina simplex* Rauser - Malakhova, p. 48, pl. 7, fig. 1.
v. 1974b *Cribrostomum lecomptei* Conil and Lys - Vachard, p. 318-319, pl. 21, fig. 11.
1960 *Climacammina simplex* Rauzer-Chernousova - Grozdilova and Lebedeva, p. 84-85, pl. 9, fig. 2.
1975 *Climacammina simplex* Rauzer-Chernousova - Grozdilova et al., p. 60, pl. 14, fig. 5.
v. 1977b *Cribrostomum lecomptei* Conil and Lys - Vachard, p. 153 (no illustration).
? 1993 *Climacammina* sp. A - Ueno and Nakazawa, p. 18, fig 5. 1.
2001 *Climacammina simplex* Rauzer-Chernousova - Vdovenko, tabl. 1 p. 171, pl. 7, fig. 5, pl. 8, fig. 1, pl. 9, fig. 2? (ex gr.).
2005a *Climacammina* sp. - Cózar and Somerville, fig. 13. 14.
2005 *Climacammina* sp. - Somerville and Cózar, pl. 1, fig. 32.

Description. Our rare specimens differ essentially from *C. padunensis* in only two uniseriate chambers (versus 3-4). Heigth (H) = 1.650-2190 mm; width (w) = 0.710-0.7300 mm; number of chambers: more than 11 (7-8 biseriate, 3-4 uniseriate); thickness of wall at the last whorl = 0.040-0.050 mm.

Occurrence. Late Viséan of Kazakhstan and Urals (Gubashkinsky and Ladeïninsky). Late Asbian-early Brigantian of Northern England. Mikhailovsky and Veneisky of Moscow Syneclise. C_1^{v}g-C_1^{s}a (B4-C1 limestones) of Donets Basin. Latest Viséan of Algeria (Reggan Basin). Latest Brigantian of Ireland. Omi Limestone of central Japan. Late Brigantian of Montagne Noire: Les Pascales (DV601C).

Subfamily Koskinobigenerininae Loeblich and Tappan, 1984

Genus *Consobrinella* Mamet and Pinard, 1992.

Type species. *Palaeotextularia consobrina* Lipina, 1948.

Diagnosis. Similar to *Palaeotextularia*, but unilayered wall, brownish, granular.

Remarks. See above *Globispiroplectammina*.

Occurrence. Middle Viséan-late Serpukhovian (Mamet and Pinard, 1992), probably cosmopolite.

Consobrinella ex gr. *consobrina* (Lipina, 1948)

Pl. 63, figs. 1-8.

1948 *Palaeotextularia consobrina* n. sp. Lipina, p. 201-202, pl. 10, figs. 2-4.
1956a *Palaeotextularia consobrina* Lipina - Malakhova, p. 47-48, pl. 6, fig. 8.
1970 *Palaeotextularia* of the group *P. consobrina* Lipina - Mamet, n° 45 of text-fig. 3 p. 4-5, p. 13, n° 39 of text-fig. 14 p. 28-29, p. 42, pl. 3, figs. 5-7, pl. 15, fig. 3, pl. 18, fig. 3.
v. 1973b *Palaeotextularia* cf. *consobrina* Lipina sensu Bogush and Juferev - Perret, p. 297-298, pl. 2, fig. 3 (with synonymy).
v. 1974b *Palaeotextularia consobrina* Lipina - Vachard, p. 314-315, pl. 21, fig. 8 (with synonymy).
v. 1974b *Palaeotextularia lipinae* Conil and Lys - Vachard, p. 309, pl. 20, figs. 16, 18 (with synonymy).
1976 *Palaeotextularia* ex gr. *consobrina* Lipina - Bless et al., pl. 9, fig. 18.
v. 1977 *Palaeotextularia lipinae* Conil and Lys - Perret and Vachard, p. 90 (no illustration).
?1977 *Palaeotexularia* sp. - Paproth et al., pl. 6, fig. 11.
v. 1977b *Palaeotextularia consobrina* Lipina - Vachard, p. 153, pl. 6, fig. 3.
v. 1977b *Palaeotextularia lipinae* Conil and Lys - Vachard, p. 153 (no illustration).

1978 *Palaeotextularia consobrina* Lipina - Lin, p. 18, pl. 2, fig. 24.
1980 *Palaeotextularia consobrina* Lipina - Skompski and Sobon-Podgorska, pl. 1, fig. 1.
?1981 *Palaeotextularia* of the group *P. consobrina* Lipina - Mamet et al., p. 26, 27, 28, 29, 30 (no illustration).
1981 *Palaeotextularia* ex gr. *consobrina* Lipina - Strank, pl. 18, fig. 11.
1983 *Palaeotextularia* ex gr. *consobrina* Lipina - Aizenverg et al., p. 12 (no illustration).
1988 *Palaeotextularia consobrina* Lipina - Kulagina, p. 25 (no illustration).
1989 *Palaeotextularia* aff. *lipinae* Conil and Lys - Fewtrell et al., p. 58, pl. 3. 9, fig. 12.
1993 *Palaeotextularia* cf. *consobrina* Lipina - Perret, p. 403-404 (no illustration) (with synonymy).
1996 *Palaeotextularia* ex gr. *consobrina* Lipina - Gallagher, text-fig. 2 p. 242 (no illustration).
1997 *Palaeotextularia* ex gr. *consobrina* Lipina - Gallagher and Somerville, text-fig. 4 p. 318, text-fig. 5 p. 320 (no illustration).
1998 *Consobrinella* ex gr. *consobrina* (Lipina) - Gallagher, pl. 1, fig. 7.
1999a *Consobrinella consobrina* (Lipina) - Cózar and Rodríguez, text-fig. 5 (pars)
1999b *Consobrinella consobrina* (Lipina) - Cózar and Rodríguez, pl. 3, fig. 7.
2000a *Consobrinella consobrina* (Lipina) - Cózar, p. 52, 54, pl. 2, fig. 5.
2001 *Consobrinella lipinae* (Conil and Lys) - Vdovenko, tabl. 1 p. 170, pl. 5, figs. 1-3, 5.
2001 *Consobrinella consobrina* (Lipina) - Vdovenko, tabl. 1 p. 170, pl. 5, figs. 4, 6-8.
v. 2002a *Consobrinella* ex gr. *consobrina* (Lipina) - Berkhli et al., p. 192 (no illustration).
2002 *Palaeotextularia consobrina* Lip. - Shcherbakova and Shcherbakov, p. 311, 312, 313 (no illustration).

Description. Heigth (H) = 0.470-1.150 mm; width (w) = 0.380-0.710 mm; number of chambers: 8-14; thickness of wall at the last whorl = 0.020 mm; apical angle: 35-60°.

Occurrence. Tulsky-Serpukhovian of Russian Platform. Early Serpukhovian-early Bashkirian of Urals. Asbian-early Serpukhovian of Ireland. ?V3c of Germany. Late Holkerian-early Asbian of Southwestern Spain. C1ve2-Zapaltiubinsky of Donets Basin. Asbian-early Serpukhovian of Maritime Provinces (SE Canada). Asbian-early Bashkirian of Idaho (USA). Viséan of South China. Brigantian of Montagne Noire: Castelsec (MA10.3); Roquemaillère (DV133B, ?DV134E); Japhet (DV126D); Vailhan-Roque de Loup (DV315, DV327A); Les Boutinelles (MA.BOU25.1B, MA.BOU25.5); Les Mentaresses (DV328'C, DV328'D); Saint Rome (DV132C); Roc de Murviel (MA5, MA61, MA82). Late Serpukhovian of Ardengost area: Areng (AH9) (Perret, 1973b); MFP.AH20C (this study).

Genus *Koskinotextularia* Eickhoff, 1968b

Type species. *Koskinotextularia cribriformis* Eickhoff, 1968b.

Synonym. *Cribrostomum* (pars).

Diagnosis. Wall of Koskinobigenerinae with a morphology of *Cribrostomum*.

Occurrence. Middle (MFZ12)-late Viséan (MFZ15) Palaeotethys (but common in Morocco and uncommon in Montagne Noire), North America. Early Serpukhovian in Afghanistan (Termier et al., 1975), Idaho (Mamet et al., 1981), and Malaysia (Fontaine et al., 2003, pl. 9, fig. 4). ?Middle Bashkirian of Alaska (under the name *Cribrostomum bradyi* (von Möller, 1879): Mamet et al., pl. 13, fig. 10).

Koskinotextularia cuneata (Ivanova, 1973)

Pl. 63, fig. 9.

1973 *Cribrostomum cuneatus* n. sp. Ivanova, p. 37-38, pl. 24, figs. 13-14, pl. 33, fig. 9.
v. 1974b *Koskinotextularia* cf. *cribriformis* Eickhoff - Vachard, p. 318, pl. 21, fig. 6.
v. 1977b *Koskinotextularia* cf. *cribriformis* Eickhoff - Vachard, p. 153 (no illustration) .
1988 *Cribrostomum cuneatus* Ivanova - Kulagina, p. 25 (no illustration).
1988b *Cribrostomum cuneatus* Ivanova - Ivanova, pl. 2, fig. 12.

Description. Height (H) = 0.550 mm; width (w) = 0.400 mm; ratio w/H = 0.73; proloculus diameter = 0.020 mm; number of chambers: 8; height of the last whorl = 0.180mm; thickness of wall at the last whorl = 0.015 mm.

Occurrence. Latest Viséan (Venevsky)-late Serpukhovian (Protvinsky) of Urals. Latest Asbian and Asbian/Brigantian boundary of Montagne Noire: Lenses of the road, near Roquessels (DV293B) and Castelsec (MA10.7.2).

Koskinotextularia perforata n. sp.
Pl. 63, figs. 14-19.

v. 1973b *Koskinotextularia* aff. *posteximum* (Reitlinger) - Perret, p. 296, pl. 2, fig. 4.

Etymology. Latine perforatus because of the perforated wall.

Locus typicus. Serre de Castets, near Ardengost (France).

Stratum typicum. Late Serpukhovian.

Diagnosis. A *Koskinotextularia* of great size, wide proloculus and perforated wall.

Description. Height (H) = 0.700-1.300 mm; width (w) = 0.550-1.050 mm; ratio w/H = 0.62-0.81; proloculus diameter = 0.070-0.200 mm; number of chambers: 4-6 pairs; height of the last whorl = 0.160-0.350 mm; thickness of wall at the last whorl = 0.040-0.075 mm; diameter of wall perforations = 0.005 mm.

Holotype. Sample MFP.CAS15 (Photo. 9.9.9.7/24) (Pl. 63, fig. 14).

Type material. 17 specimens.

Repository of the types. Collection of Palaeontology, Köln University.

Comparison. *Koskinotextularia perforata* n. sp. differs from the other species of genus in its large dimensions and its perforated wall. Some incomplete sections seem to be relatively similar to *Palaeotextularia latissima* (Brazhnikova in Aizenverg et al., 1983: p. 43, pl. 18, figs. 1-4) of the Zapaltiubinsky of Donetz Basin, but no perforations are mentioned in the wall of this genus.

Occurrence. Late Serpukhovian of Ardengost: MFP.AH18 (2 specimens), MFP.AH18H (1 specimen), MFP. AH20 (= DV778B) (1 specimen), MFP.AH20A (1 specimen), MFP.AH20B (1 specimen), MFP.AH20C (1 specimen), MFP.CAS15 (1 specimen: holotype).

Koskinotextularia sp.

v. 1993 *Koskinotextularia* aff. *posteximia* (Reitlinger) - Perret, p. 402, pl. F.VII, fig. 4.

Description. Height (H) = 0.900 mm; width (w) = 0.500 mm; ratio w/H = 0.56; proloculus diameter = 0.50 mm; number of chambers: 10; height of the last whorl = 0.200 mm; thickness of wall at the last whorl = 0.030 mm.

Occurrence. Late Serpukhovian of Ardengost area: Bois de Gertous (GER11-12) (Perret, 1973b), Bar1.1 (Perret, 1993).

Genus *Koskinobigenerina* Eickhoff, 1968b

Type species. *Koskinobigenerina breviseptata* Eickhoff, 1968b.

Synonym. *Climacammina* (pars auctorum).

Diagnosis. A morphology of *Climacammina* with a wall of Koskinobigenerinae.

Occurrence. Asbian-Serpukhovian, Palaeotethyan, Uralian and Alaska. FAD at the Asbian/Brigantian boundary (see Cózar and Somerville, 2004) or latest Asbian (see Gallagher and Somerville, 1997; Cózar and Somerville, 2005a), or at the base of MFZ14 (Devuyst et al., 2005, text-fig. 13) or Aleksinsky, zone 15 (Russian authors; Mamet, 1970). Late Bashkirian of Thailand (Vachard, 1990, p. 95). Late Serpukhovian of Idaho (USA) (Skipp and Mamet, 1970, p. B122).

Koskinobigenerina breviseptata Eickhoff, 1968b
Pl. 64, figs. 1-11.

1967 *Koskinobigenerina breviseptata* n. gen. n. sp. Eickhoff, p. 21-22, text-fig. 4 p. 23, pl. 5, figs. 7-8, pl. 6, fig. 7, pl. 7, fig. 3 (nomen nudum, because unpublished).
1968b *Koskinobigenerina breviseptata* n. gen. n. sp. Eickhoff, p. 169-171, text-fig. 4 p. 170, pl. 19, figs. 5-6, pl. 20, figs. 5-6.
1977 *Koskinobigenerina* sp. - Paproth et al., pl. 6, figs. 12-13.
1985 *Climacammina* cfr. *prisca* Lipina - Adachi, p. 93, pl. 11, fig. 10.
? 1989 *Koskinobigenerina* sp. - Fewtrell et al., p. 56, pl. 3.9, fig. 1.
non 1992 *Koskinobigenerina breviseptata* (Eickhoff) (sic for the parentheses) - Somerville et al. , fig. 6a. (= *K. prisca*).
v. 1993 *Koskinobigenerina prisca* (Lipina) - Perret, p. 401-402, pl. F .VII, figs. 1, 3, 10-11.
v. 1993 *Koskinobigenerina* sp. 1 - Perret, pl. F.VII, fig. 2
1993 *Climacammina procera* Reitlinger - Ueno and Nakazawa, p. 18, fig 5. 3-4.
non 1997 *Koskinobigenerina breviseptata* (Eickhoff) (sic for the parentheses) - Gallagher and Somerville, fig. 9a (= *K. prisca*).
2001 *Koskinobigenerina* sp. ex gr. *breviseptata* Eickhoff - Vdovenko, tabl. 1 p. 171, pl. 7, fig. 2.

Description. The uniseriate part has the same width as the biseriate part. Heigth (H) = 1.160-1.680 mm; width (w) = 0.550-0.690 mm; proloculus diameter = 0.090-0.100 mm; number of biseriate chambers: 11-13 pairs; number of uniseriate chambers: 3-4; thickness of wall at the last whorl = 0.040 mm; apical angle = 40-50°.

Occurrence. Late Viséan of Germany. Earliest Serpukhovian of Donets Basin. Ichinotani Formation and Omi Limestone of Japan. Brigantian-early Serpukhovian of Montagne Noire: Roquemaillère (ML.UM.ROQ); Japhet (DV856B); Les Boutinelles (MA.BOU25.14); La Serre de Péret (MA.SP14, MA.SP15, MA.SP30); La Serre (MA.LS.Feldweg. 4). Late Serpukhovian of Ardengost area: AH9, Cas41, Mail15, Bar1d (Perret, 1993).

Koskinobigenerina prisca (Lipina, 1948)
Pl. 64, figs. 12-17.

1948 *Climacammina prisca* n. sp. Lipina, p. 209-210, pl. 11, figs. 8-11.
1966 *Climacammina simplex* Rauser-Cernoussova - Conil and Lys, p. B209-B210, pl. 2, fig. 10.
1970 *Climacammina* of the group *C. prisca* (Lipina) - Mamet, n°15 of text-fig. 3 p. 4-5, pl. 18, fig. 2.
1972 *Climacammina prisca* Lipina - Malakhova, p. 41, pl. 8, figs. 3-4.
v. 1973b *Koskinobigenerina* sp. 1 - Perret, p. 297, pl. 2, figs. 1-2.
non v. 1974b *Koskinobigenerina prisca* (Lipina) - Vachard, p. 319-320, pl. 21, fig. 3.
v. 1977 *Koskinobigenerina* sp. - Perret and Vachard, p. 90 (no illustration).
1977b *Koskinobigenerina prisca* (Lipina) - Vachard, p. 153-154, pl. 6, figs. 1-2 (with 16 references in synonymy).
1978 *Climacammina* cf. *prisca* Lipina - Sultanaev et al., p. 100, pl. 8, fig. 15.
1983 *Climacammina prisca* Lipina - Aizenverg et al., p. 12 (no illustration).
non 1985 *Climacammina* cfr. *prisca* Lipina - Adachi, p. 93, pl. 11, fig. 10 (with synonymy) (= *K. breviseptata*).
1985 *Climacammina prisca* - Ross and Ross, text-fig. 1 p. 195 (no illustration).
?1987 *Climacammina* ex gr. *prisca* Lipina - Sinitsyna and Sinitsyn, pl. 2, fig. 21.
?1988 *Climacammina* cf. *prisca* Lipina - Kulagina, p. 26 (no illustration).
1992 *Koskinobigenerina breviseptata* (Eickhoff) (sic for the parentheses) - Somerville et al., fig. 6a.

non v. 1993 *Koskinobigenerina prisca* (Lipina) - Perret, p. 401-402, pl. F .VII, figs. 1, 3, 10-11 (with synonymy) (= *K. breviseptata*).
1993 *Climacammina* sp. - Ueno and Nakazawa, p. 18, fig 5. 14-15.
1997 *Koskinobigenerina breviseptata* (Eickhoff) (sic for the parentheses) - Gallagher and Somerville, fig. 9a.
v. 1999 *Koskinobigenerina prisca* (Lipina) - Fontaine et al., p. 463, 464 (no illustration).
1999b *Koskinobigenerina prisca* (Lipina) - Cózar and Rodríguez, pl. 3, fig. 1.
2000 *Koskinobigenerina prisca* (Lipina) - Sebbar, pl. 13, fig. 20, 23.
2000a *Koskinobigenerina prisca* (Lipina) - Cózar, p. 57-58, pl. 3, fig. 6 (with synonymy).
2001 *Koskinobigenerina* sp. ex gr. *prisca* (Lipina) - Vdovenko, tabl. 1 p. 171, pl. 8, figs. 2, 5-6.
2002 *Climacammina prisca* Lip. - Shcherbakova and Shcherbakov, p. 310, 313 (no illustration).
v. 2002a Palaeotextulariidae indet. - Aretz, fig. 7. 11.
v. 2002a *Koskinobigenerina prisca* (Lipina) - Berkhli et al., p. 193 (no illustration).
v. 2002b *Koskinobigenerina prisca* (Lipina) - Berkhli et al., p. 139 (no illustration).
2003 *Koskinobigenerina prisca* (Lipina) - Brenckle and Milkina, pl. 5, fig. 14.
2003 *Climacammina prisca* Lip. - Kulagina et al., text-fig. 3 p. 176 (no illustration).
2003a *Koskinobigenerina prisca* (Lipina) - Cózar, fig. 4 B.
2005a *Koskinobigenerina prisca* (Lipina) - Cózar and Somerville, pl. 1, fig. 30.

Description. The uniseriate part is less wide than the biseriate one. Heigth (H) = 1.300-1.500 mm; width (w) = 0.600-0.660 mm; height of biserial part = 0.850 mm; number of biseriate chambers: 12-14; number of uniseriate chambers: 2-4; thickness of wall at the last whorl = 0.040 mm; apical angle: 40-45°.

Occurrence. Aleksinsky-Venevsky of Russian Platform. Late Viséan of Samara Bend and Urals. ?Zapaltiubinsky-early Bashkirian of Urals. Late Holkerian-early Asbian of Southwestern Spain. Protvinsky of Kazakhstan. $C_1^{v}f_2$-early Bashkirian of Donets Basin (limestone D_7^{5}). Asbian-Brigantian of Ireland. V3bγ of Belgium. Asbian-early Serpukhovian of Windsor Group (SE Canada). Omi Limestone of Japan. Late Viséan/Serpukhovian of Thailand. Brigantian-early Serpukhovian of the Montagne Noire: Castelsec (?MA10.12MA10.14, MA10.50); Roquemaillère (DV139A); Japhet (DV164); Roque Redonde (?RR60); Les Boutinelles (MA.BOU3-4); Roc de Murviel (MA82, MA83, MA86, ?MA330.1, MA330.11); La Serre (MA.LSI.top.2049, MA.LS.Feldweg.4). Late Serpukhovian of the Ardengost area: Areng (MFP.AH9), Bois de Gertous (MFP.Ger6-7) (Perret, 1973b); MFP.AH81.2, AH.B/81.6, ?CAS.15bis.A, CAS21(this study).

7.13. Tetrataxoidea

Superfamily Tetrataxoidea Galloway, 1933 nomen translat. Haynes, 1981 (ex sufamily)
Family Tetrataxidae Galloway, 1933 nomen translat. Pokorny, 1958 (ex subfamily)

Synonyms. Pseudotaxidae Mamet, 1974b; Valvulinellidae Loeblich and Tappan, 1984; Abadehellidae Loeblich and Tappan, 1984; and Endotaxidae Bogush and Brazhnikova in Roser-Chernousova et al., 1996.

Remarks. These families are synonyms, because some particular type of attachments ("microaquariums"; see below) are obervable in all taxa (Vachard, pers. comm.).

Occurrence. Late Tournaisian-latest Permian (late Changhsingian; Gaillot, pers. comm.).

Genus *Tetrataxis* Ehrenberg, 1854

Type species. *Tetrataxis conica* Ehrenberg, 1854.

Diagnosis. Test medium to large, trochospirally coiled, with four chambers per whorl. Wall bilayered, granular and pseudofibrous.

Remarks. I tried to biometrically characterize the species of *Tetrataxis*. The generally admitted species or group of species were not re-found during this study. Another important problem is the life position of *Tetrataxis*: e. g., attached, not attached, periodically free or attached, with or without interposition of a microaquarium between the test and the substrate (Kochansky-Devidé, 1970b, pl. 2, fig. 8; Toomey et al., 1977: fig. 8P; Poncet, 1982; Cossey and Mundy, 1990; Ueno and Igo, 1993, fig. 3. 23; Mundy, 1994, text-fig. 12 p. 722; Gallagher, 1998; Vachard and Krainer 2001a; Krainer et al., 2003a, pl. 3, fig. 38, pl. 4, fig. 17; Saïd, 2005, fig. XII.5), significance of the terminal appendices of "*Globotetrataxis*" Brazhnikova in Aisenverg et al., 1983 and species like *Tetrataxis mira* Conil and Lys, 1964 or *T. fortis* Bogush and Yuferev, 1976 [compare with Adachi, 1985, pl. 13, figs. 9-11; or *Globotetrataxis* sp. E (Matsusue, 1992, fig. 3. 27); *Tetrataxis* sp. of Ueno and Igo (1993, fig. 3. 22) and Ueno et al. (1994, fig. 4. 12)]. In Morocco (material D. Vachard, M. Berkhli, I. Saïd), the following observation can be made: during the period of weak development of the corals (i.e. during the Moroccan biozones Cfm1 to Cfm 6 = Arundian to early Asbian), the *Tetrataxis* seem to be free (i. e., any attachment was observed), whereas with the acme of the corals (in the Tizra Formation = biozone Cfm 7 = late Asbian-early Brigantian), the *Tetrataxis* are frequently attached on the corals.

Occurrence. Late Ivorian (MFZ6) to latest Permian (Gaillot, 2006), cosmopolite.

Tetrataxis spp.
Pl. 65, figs. 1-14, Pl. 66, figs. 1-9.

1960 *Tetrataxis paraminima* Vissarionova - Grozdilova and Lebedeva, p. 86-87, pl. 9, fig. 6.
v. 1973b *Tetrataxis acutus* Durkina - Perret, p. 298-299, pl. 2, fig. 5.
v. 1973 *Tetrataxis conica* Erhenberg (sic) - Perret, p. 299, pl. 3, fig. 3 (incomplete photo, the complete specimen looks like *T. mira*).
v. 1973 *Tetrataxis* aff. *conica* Erhenberg (sic) - Perret, p. 299-300, pl. 3, figs. 1-2.
v. 1974b *Tetrataxis* du groupe *paraminima* Vissarionova - Vachard, p. 323-324 (no illustration).
v. 1974b *Tetrataxis conica* Ehrenberg - Vachard, p. 324-326, pl. 22, fig. 1, pl. 23, fig. 1 (with synonymy).
v. 1974b *Tetrataxis angusta* Vissarionova - Vachard, p. 327-328, pl. 22, figs. 6-7 (with synonymy).
v. 1974b *Tetrataxis* cf. *angusta* Vissarionova - Vachard, p. 328, pl. 22, fig. 5 (with synonymy).
v. 1974b *Tetrataxis pressula* Malakhova - Vachard, p. 328-329, pl. 22, fig. 2 (with synonymy).
v. 1974b *Tetrataxis* cf. *pressula* Malakhova - Vachard, p. 329 (no illustration).
v. 1977 *Tetrataxis* ex gr. *palaeotrochus* Ehrenberg - Perret and Vachard, p. 90 (no illustration).
v. 1977 *Tetrataxis* cf. *mira* Conil and Lys - Perret and Vachard, p. 90 (no illustration).
v. 1977b *Tetrataxis* ex gr. *paraminima* Vissarionova - Vachard, p. 154 (no illustration).
v. 1977b *Tetrataxis palaeotrochus* (Enrenberg) = *T. conica* Ehrenberg auct. - Vachard, p. 154 (no illustration).
v. 1977b *Tetrataxis angusta* Vissarionova - Vachard, p. 154, pl. 6 fig. 7.
v. 1977b *Tetrataxis pressula* Malakhova - Vachard, p. 154, pl. 6, fig. 6.
1989 *Tetrataxis conica* s. l. Ehrenberg - Fewtrell et al., p. 44, pl. 3. 4, fig. 17.
?1996 *Tetrataxis conica* Ehrenberg - Gallagher, fig. 2 p. 242 (pars) (no illustration).
v. 2002 *Tetrataxis palaeotrochus* (Ehrenberg) emend. Nestler - Krainer and Vachard, pl. 4, fig. 1.

Occurrence. In all the Viséan of Montagne Noire (Vachard, 1974b, 1977b); and in my material up to the early Serpukhovian: Sommet 224-Valuzières (DV600B); Castelsec (MA10.3, MA10.7.2, MA10.17, MA10.I.2 : with two "species", MA10.II.122, MA11.5.2, MA11.9.1. Längs, MA11.VI, MA11.VIII.1); Roquemaillère (ML764); Japhet (DV126F); Roc du Cayla (DV462B, DV463, DV465B); Roque Redonde (RR51, 53); Vailhan-Château (DV247B); Vailhan-Roque de Loup (DV313B, DV327A); Les Boutinelles (MA.BOU25.1, MA.BOU25.2, MA.BOU25.4); Olistolithe à l'Ouest de Péret (MA.PE5); Péret (ML784); Serre de Péret (MA.SP18, MASP30); Les Pascales (DV601A: 9 specimens, DV601B, DV601C, DV601D, DV601E); Les Mentaresses (DV328'B, DV328'E, DV687A); Mounio (DV344A); Roc de Murviel (MA21- ?, MA33-3, MA50, MA73.2, MA82, MA83, MA330.4); Gare de Laurens (ML789); La Serre (MA.LSV.2007, MA.LS.Feldweg31). Late Serpukhovian

of Ardengost area: Areng (MFP. Ag3), Bois de Gertous (MFP.Ger18-19), Bois de Jezeau (MFP.Jez4), Col de Frechet (Perret, 1973b), MFP.AH18H, AH.B/81.9, AH.E/81, MFP.CAS15, CAS16 (this study).

Genus *Pseudotaxis* Mamet, 1974b

Type species. *Tetrataxis eominima* Rauzer-Chernousova, 1948h.

Diagnosis. Test small, trochospirally coiled, with five to six chambers per whorl. Wall unilayered microgranular. Simple, umbilical aperture.

Synonym. *Endotaxis* Bogush and Brazhnikova in Aizenverg et al., 1983.

Remarks. See discussions in Groves (1988, p. 376), Pinard and Mamet (1998, p. 89) and Brenckle (2005, p. 87-88). For me, *Pseudotaxis* is valid and prioritary. I admit the possible filiation with *Biseriella*, but not with *Tetrataxis* and *Vissariotaxis*, suggested by Mamet (1974b). The derivation from *Pseudotaxis* to *Biseriella* can take place in the late Tournaisian (between *Pseudotaxis eominima* and *Biseriella bristolensis*) or in the late Viséan between *Pseudotaxis brazhnikovae* (relatively common in this period) and *Biseriella parva*. In this latter case, *"Globivalvulina" bristolensis* Reichel, 1946 doesn't belong to *Biseriella* or *Globivalvulina* but to an unpublished genus.

Occurrence. Late Ivorian (MFZ6)-Bashkirian (Pinard and Mamet, 1998), Palaeotethyan, North American, Uralian, Siberian and Australian (Mamet, 1974b). Rather common in the latest Asbian-Brigantian of Morocco (e.g., Berkhli, 1999 and Saïd, 2005).

Pseudotaxis eominima (Rauzer-Chernousova, 1948h)

Pl. 66, figs. 10-11.

1948h *Tetrataxis eominima* n. sp. Rauzer-Chernousova, p. 12-13, pl. 3, figs. 10-11.
1956a *Tetrataxis eominima* Rauzer-Chernousova - Malakhova, p. 45, pl. 5, fig. 6.
1956b *Tetrataxis eominima* Rauzer-Chernousova - Malakhova, p. 119-120, pl. 14, figs. 13-14.
1962 *Tetrataxis eominima* Rauzer-Chernousova - Bogush and Juferev, p. 192, pl. 8, fig. 5.
1963 *Tetrataxis pusillus* Conil and Lys - Conil, pl. 1, fig. 6.
1964 *Tetrataxis pusillus* n. sp. Conil and Lys, p. 95 , pl. 14, figs. 251-255 (preoccupied by *T. pusillus* Golubtsov, 1957 non "Golubsov, 1954" as indicated by Fewtrell et al., 1989).
1967 *Tetrataxis pusillus* Conil and Lys - Conil and Paproth, p. 65, 76 (no illustration).
1970 *Tetrataxis*? of the group *T.*? *eominima* Rauzer-Chernoussova - Mamet, n° 58 of text-fig. 3 p. 4-5, n° 46 of text-fig. 14 p. 28-29, p. 44-45, pl. 4, figs. 10, 14, pl. 17, fig. 1.
1970 *Tetrataxis*? of the group *T.* (sic) *eominima* Rauzer-Chernoussova - Petryk et al., n° 48 of text-fig. 4 p. 92 (no illustration).
1970 *Tetrataxis* of the group *T. eominima* Rauzer-Chernoussova - Skipp and Mamet, p. B122(no illustration).
1972 *Tetrataxis eominima* Rauser - Malakhova, p. 42, pl. 8, fig. 10.
?1977 *Tetrataxis pusillus* Conil and Lys - Paproth et al., p. 61 (no illustration).
1978 *Globivalvulina moderata* Reitl. - Lys et al., pl. 2, fig. 10.
1979 *Tetrataxis eominima* Rauser-Cernoussova - Mansourian, p. 63-64, pl. 4, figs. 61-63.
1980 *Pseudotaxis eominima* (Rauzer-Chernousova) - Rich, p. 78-79, pl. 4, fig. 15 (with synonymy).
? 1981 *Pseudotaxis micra* Conil & Longerstaey - Strank, pl. 6, fig. 23, pl. 7, figs. 4, 25, pl. 10, fig. 17, pl. 13, fig. 8.
1982 *Pseudotaxis eominima* (Rauzer-Chernousova) - Rich, pl. 1, figs. 13-15.
1983 *Tetrataxis pussilla* (sic) Conil and Lys - Aizenverg et al., p. 12 (no illustration).
?1989 *Pseudotaxis* sp. - Fewtrell et al., p. 44, pl. 3. 4, fig. 17.
v. 1993 *Pseudotaxis eominima* (Rauzer-Chernousova) - Perret, p. 435, pl. F.IV, fig. 1, pl. F.XII, fig. 16 (with synonymy).
v. 1993b *Pseudotaxis eominima* (Rauzer-Chernousova) - Vachard et al., pl. 3, figs. 3, 16-17.
v. 1999 *Pseudotaxis eominima* (Rauzer-Chernousova) - Berkhli, p. 103 (no illustration).
2001 *Tetrataxis pusillus* Conil and Lys - Vdovenko, tabl. 1 p. 175, pl. 4, figs. 4-6, 7? (ex gr.).
2001 *Biseriella parva* (Chernysheva) - Vdovenko, pl. 4, figs. 47-48.
2002 *Tetrataxis eominima* Rauzer-Chernousova - Sergeeva, p. 270 (no illustration).
? 2004 *Tetrataxis* sp. - Piecha et al. pl. 1, fig. 10.
?2006 *Pseudotaxis* sp. with (?) (sic) incipient development of a fibrous layer - Devuyst, fig. 4.26. A. 4.

Description. Heigth (H) = 0.190-0.350 mm; width (W) = 0.250-0.520 mm; ratio W/H = 0.50-0.70; proloculus diameter = 0.038 mm; number of volutions: 3-6; thickness of wall at the last whorl = 0.010-0.015 mm; apical angle = 80-120° (see Perret, 1993, p. 434).

Occurrence. As for the genus (see Groves, 1988). Add: Moliniacian of Germany, Serpukhovian of Kazakhstan and Iran (Eastern Alborz). V3bγ-V3c? of Belgium. Viséan of central Urals. Early Asbian of Libya. Brigantian of Montagne Noire: Roque Redonde (RR56). Late Serpukhovian of Ardengost area: Cas26a (Perret, 1993). Bashkirian of Pyrenees.

Pseudotaxis brazhnikovae (Bogush and Juferev, 1966)

Pl. 66, figs. 12-14.

1951 *Tetrataxis (?) minuta* n. sp. Brazhnikova, p. 85-86, pl. 4, figs. 6-8.
1966 *Tetrataxis ? brazhnikovae* nom. nov. Bogush and Juferev, p. 177-178, pl. 13, figs. 2-7.
v. 1973b *Globivalvulina* sp. 6 - Perret, p. 323, pl. 5, figs. 6-9.
1973 *Tetrataxis* (?) *minuta* Brazhnikova - Popova and Reitlinger in Einor, p. 55, pl. 9, fig. 31 (with synonymy).
1978 Biseriamminidae - Lys et al., pl. 2, fig. 9.
1979 *Tetrataxis (?) minuta* Brazhnikova - Wagner et al., pl. 4, fig. 14, pl. 9, fig. 17.
1983 *Endotaxis brazhnikovae* (Bogush and Juferev) - Aizenverg et al., p. 12-13 , p. 57-58, pl. 7, figs. 1-8, 16-19 (with synonymy).
1988 *Endotaxis brazhnikovae* (Bogush and Yuferev) - Groves, p. 381, figs. 13. 1-6 (with synonymy).
1988 *Endotaxis brazhnikovae* (Bogush et Juferev) - Kulagina, pl. 4, fig. 24.
1988 *Endotaxis brazhnikovae* (Bogush et Juferev) - Kulagina and Pazukhin, p. 41 (no illustration).
1991 *Endotaxis brazhnikovae* (Bogush et Juferev) - Gibshman and Akhmetshina, pl. 3, figs. 23-25.
v. 1991c *Pseudotaxis brazhnikovae* (Bogush and Juferev) - Vachard et al., p. 677 (no illustration).
v. 1992 *Pseudotaxis eominima* (Rauzer-Chernousova) (= *Endotaxis brazhnikovae* (Bogush and Juferev)) - Vachard and Berkhli, pl. 4, fig. 3.
v. 1993 *Pseudotaxis brazhnikovae* (Bogush and Juferev, 1962) (sic) - Perret, p. 432-433, text-fig. 134 p. 434, p. 435, pl. F.IV, figs. 2-19, pl. F.XIII, figs. 6-7.
1996 *Endotaxis brazhnikovae* (Bogush and Juferev) - Reitlinger in Einor, pl. 2, fig. 21.
1997 *Endotaxis brazhnikovae* (Bogush and Juferev) - Harris et al., fig. 8. 22-24.
?1997 *Endotaxis* cf. *brazhnikovae* (Bogush and Juferev) - Mazuno and Ueno, tabl. 2, pl. 2, figs. 10-12.
v. 1999 *Endotaxis* cf. *brazhnikova* (sic) (Bogush and Juferev) - Berkhli, pl. 3, fig. 9.
? 2001 *Biseriella*? sp. - Vdovenko, pl. 4, figs. 49-50.
2001 *Endotaxis brazhnikovae* (Bogush and Juferev) - Kulagina et al., text-figs. 11 p. 37, 16 p. 49, 18 p. 52 (no illustration).
2002 *Endotaxis brazhnikovae* (Bogush and Juferev) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration) .
2003 *Endotaxis brazhnikovae* (Bogush and Juferev) - Kulagina et al., text-fig. 7 p. 180 (no illustration).
2003 *Endotaxis brazhnikovae* (Bogush and Juferev) - Brenckle and Milkina, pl. 6, fig. 9.

Description. The species with the maximal height and the maximal apical angle. Heigth (H) = 0.150-0.430 mm; width (W) = 0.290-0.550 mm; ratio W/H = 0.62-0.80; number of volutions: 3-6; thickness of wall at the last whorl = 0.012-0.033 mm; apical angle = 70-95° (see Perret, 1993, p. 434).

Remarks. Homonym of *Tetrataxis minuta* Morozova, 1949 the species was re-named by Bogush and Juferev (1966).

Occurrence. Viséan of Siberia. Late Viséan of Belgium and Morocco. Early Serpukhovian-early Bashkirian of Donets Basin. Early Serpukhovian-early Bashkirian of Southern Urals. Latest Brigantian of South China. Early Bashkirian of Alaska. Early Serpukhovian of Northern Iran (Eastern Alborz). Protvinsky of Kazakhstan. ?Late Serpukhovian-early Bashkirian of Hina Group in Japan. Late Serpukhovian of Ardengost area: Areng MFP.AH14, MFP.Mar3, Bois de Gertous MFP.Ger5 (Perret, 1973b); Mail 7c, Mail8a, Mail14a, Mail14b, Mail16, Mail16a, Mail16b, Mail22, Mail22a, Mail24,Mail25, Cas22, Cas25a, AH14 (Perret, 1993); MFP.AH2, AH18H, AH.A/81, MFP.ARE1.10 (this study). Bashkirian of Pyrenees.

Pseudotaxis planiformis (Brazhnikova, 1983)
Pl. 66, figs. 15-21.

v. 1979 Biseriamminidé gen. indét. - Bensaïd et al., pl. 15, fig. 9.
1983 *Endotaxis planiformis* n. sp. Brazhnikova in Aizenverg et al., p. 14-15, p. 58, pl. 7, figs. 9-14.
1988 *Endotaxis planiformis* Brazhnikova - Kulagina and Pazukhin, p. 41 (no illustration).
1988 *Endotaxis planiformis* Brazhnikova - Groves, p. 381 (no illustration; synonymized with *"E." brazhnikovae*).
v. 1993 *Pseudotaxis planiformis* (Brazhnikova) - Perret, p. 435-436, pl. F4, figs. 20-28 (with synonymy).

Description. Species small and low. See the discussion in Perret (1993) and the absence of discussion in Groves (1988) and Pinard and Mamet (1998) which consider ex abrupto *P. eominima*, *P. brazhnikovae* and *P. planiformis* as synonyms. Height (H) = 0.190-0.310 mm; width (w) = 0.280-0.340 mm; ratio w/H = 0.50-0.63; number of volutions: 2-2.5; apical angle = 110-120° (see Perret, 1993, p. 435).

Occurrence. Late Serpukhovian (Zapaltiubinsky) of Donets Basin. Serpukhovian of central Morocco. Bogdanovsky of Urals. Late Serpukhovian of Ardengost area: Mail4, Mail10, Mail14, Mail16, Mail18, Mail22B, AH4 (Perret, 1993).

Pseudotaxis sp.
Pl. 66, fig. 22.

Description. Height (H) = 0.175 mm; width (w) = 0.250 mm; ratio w/H = 0.70; apical angle = 90°

Occurrence. Asbian/Briantian boundary of Montagne Noire: Roc du Cayla (DV82B).

Genus *Valvulinella* Schubert, 1908

T ype species. *Valvulina youngi* Brady, 1876.

Diagnosis. Similar to *Tetrataxis* but with a microgranular wall, and chambers subdivided into chamberlets.

Occurrence. From late Ivorian (top of MFZ6; Devuyst et al. 2005, fig. 12) to top of the Viséan. Palaeotethyan. Up to the early Zapaltiubinsky in the Donets Basin (Vachard and Maslo, 1996, text-fig. 1 p. 359). The Permian species belong to *Abadehella* Okimura and Ishii in Okimura et al., 1975.

Valvulinella pozhiensis Grozdilova and Lebedeva, 1954
Pl. 66, figs. 23-24.

1954 *Valvulinella pozhiensis* n. sp. Grozdilova and Lebedeva, p. 70, pl. 8, figs. 5-6.
1960 *Valvulinella pozhiensis* Grozdilova and Lebedeva - Grozdilova and Lebedeva, p. 90, pl. 10, figs. 3-4.
v.1974b *Valvulinella pozhiensis* Grozdilova and Lebedeva - Vachard, p. 329-330, pl. 22, fig. 9 (with synonymy).
v. 1977b *Valvulinella pozhiensis* Grozdilova and Lebedeva - Vachard, p. 154, pl. 6, fig. 8 (with 4 references in synonymy).
2001 *Valvulinella pozhiensis* Grozdilova and Lebedeva - Vdovenko, tabl. 1 p. 175, pl. 22, figs. 16, 18.

Description. Height (H) = 0.500 mm; width (w) = 0.480-0.500 mm; ratio w/H = 1.0.
Occurrence. Viséan of Northern Urals. $C_1^ve_1$-C_1^vg of Donets Basin. Holkerian (Vachard, 1974b) to Brigantian of the Montagne Noire: Roc du Cayla (DV82B, DV82E, DV82F) and Vailhan-Roque de Loup (MA.RL4).

Valvulinella youngi (Brady, 1876)
Pl. 66, figs. 25-27.

1876 *Valvulina Youngi* n. sp. - Brady, p. 86, pl. 4, figs. 6, 8-9.
1956 *Valvulinella youngi* (Brady) - Brazhnikova, p. 60-61, pl. 10, fig. 10.
1960 *Valvulinella youngi* (Brady) - Fomina, pl. 2, figs. 20-22.
1964 *Valvulinella* aff. *youngi* (Brady) - Conil and Lys, p. 97, pl. 14, fig. 262.
1970 *Valvulinella youngi* (Brady) - Mamet, n° 49 of text-fig. 14 p. 28-29, p. 45 (no illustration).
1973 *Valvulinella youngi* (Brady) - Bozorgnia, p. 100, pl. 29, figs. 1-2.
v. 1974b *Valvulinella youngi* (Brady) - Vachard, p. 330-331, pl. 22, figs. 10-13 (with synonymy).
v. 1977b *Valvulinella youngi* (Brady) - Vachard, p. 155-156, pl. 6, fig. 10 (with 29 references in synonymy).
1978 *Valvulinella youngi* (Brady) - Sultanaev et al., p. 104, pl. 8, figs. 3, 5.
1980 *Valvulinella youngi* (Brady) - Skompski and Sobon-Podgorska, pl. 2, fig. 7.
1981 *Valvulinella youngi* (Brady) - Strank, pl. 18, fig. 8.
v. 1990 *Valvulinella youngi* (Brady) - Vachard, pl. 1, fig. 4.
v. 1991 *Valvulinella* ex gr. *youngi* (Brady) - Vachard and Tahiri, pl. 2, fig. 3.
v. 1991c *Valvulinella youngi* (Brady) - Vachard et al., p. 677, pl. 1, fig. 22.
?1992 *Valvulinella* sp. - Somerville et al., fig. 6F.
1993 *Valvulinella youngi* (Brady) - Ueno and Nakazawa, p. 39, fig. 14. 5-10 (with 15 references in synonymy).
v. 1999 *Valvulinella* cf. *youngi* (Brady) - Berkhli, p. 110 (no illustration).
2000 *Valvulinella youngi* (Brady) - Sebbar, pl. 12, fig. 12.
2001 *Valvulinella youngi* (Brady) - Vdovenko, tabl. 1 p. 175, pl. 22, figs. 11, 13-15.
2004 *Valvulinella youngi* (Brady) - Cózar, text-fig. 6 p. 378 (pars) (no illustration).
? 2004 *Valvulinella youngi* (Brady) - Piecha et al. pl. 1, fig. 5.
2005a *Valvulinella youngi* (Brady) - Cózar and Somerville, text-fig. 4 p. 5 (pars), text-fig. 6 p. 8, text-fig. 7 p. 10 (pars) (no illustration).
v. 2005 *Valvulinella youngi* (Brady) - Saïd, p. 176, p. 185, p. 186, p. 188, p. 189 (no illlustration).
? 2005c *Loeblichia*? sp. - Cózar et al., fig. 11. 17 (or another species).
2006 *Valvulinella youngi* (Brady) - Gallagher et al., fig. 14. 13.

Description. Height (H) = 0.630-1.030 mm mm; width (w) = 0.480-0.500 mm; ratio w/H = 0.70-0.90; number of whorls: 8-10.

Occurrence. Tulsky of Moscow Basin. Late Viséan of Ukraine (Galitsie-Volyn; Donets Basin: $C_1^{v}e_1$-$C_1^{v}g$), Urals and Poland. Late Viséan (CuIIIγ) of Germany. Early Asbian of Morocco and Algeria. Late Asbian-late Brigantian of central Morocco. Late Asbian-Brigantian of Ireland. Late Asbian-early Brigantian of Southwestern Spain. V2b of central Alborz (Iran). Late Viséan of Thailand (Loei area). Latest Brigantian of South China. Late Brigantian of Montagne Noire: Les Boutinelles (MA.BOU25.6) and Les Mentaresses (DV328'C, DV328'D, DV687A).

7.14. Biseriamminoids

Superfamily Biseriamminoidea Chernysheva, 1941
nomen translat. Marfenkova, 1991 (ex family)

Diagnosis. A superfamily of Fusulinata Endothyrida characterized by a sligthly trochospiral to planispiral biseriate coiling, eventually uncoiled. Wall very variable, but without clearly established generic criteria. Single, basal terminal aperture.

Composition. 3 families: Biseriamminidae Chernysheva, 1941, Koktjubinidae Marfenkova, 1990, Globivalvulinidae Reitlinger, 1950 nomen translat. herein.

Remarks. The limits of the genera and families and generally poorly established. *Biseriammina* is especially poorly illustrated.

Occurrence. Tournaisian-latest Permian, cosmopolite.

Family Globivalvulinidae Reitlinger, 1950 nomen translat. herein
(pro subfamily *Globivalvulina* e (sic))
Genus *Biseriella* Mamet in Armstrong and Mamet, 1974 emend. herein

Type species. *Globivalvulina parva* Chernysheva, 1948b.

Synonyms. *Globivalvulina* (pars), *Spiroplectammina* (pars), *Dzhamansorina* Marfenkova, 1991.

Diagnosis. Small globivalvulinid test (i.e., biseriate and planispiral involute coiled test). Periphery smooth.Valvular projection absent. Wall black, microgranular.

Remarks. The difference of wall is not a distinctive character with *Globivalvulina* (for instance, *G. kantharensis* Reichel, 1946 has also a microgranular wall), the unique important difference is the absence of the valvular projection. Hence, *Globivalvulina bristolensis* Reichel, 1946, without valvular projection, is probably a species of *Biseriella*, but a diphyletism is possible (see above: *Pseudotaxis*). As redefined here, *Biseriella* is probably composed of *B. bristolensis*, *B. vailhanensis* n. sp. and *B. parva*, since the other species rattached to this genus possess well developed valvular projections: *G. moderata, G. kamensis, G. minima, G. pulchra* and *G. scaphoidea* (and especially this latter).

Occurrence. Latest Ivorian (MFZ8; Devuyst et al., 2005)-Serpukhovian**.** Palaeotethyan (until Tien-Shan and Japan), Georgia and Alaska. Early Bashkirian of Alaska. ?Morrowan-Atokan of Idaho (but probable misinterpretation with *Globivalvulina*). The group is poorly known from Arundian to early Asbian (see some references in Mamet, 1970: *Biseriammina windsorensis*; Meissami et al., 1978: "*Globivalvulina*" cf. *bristolensis*, pl. 1, fig. 5 and Marfenkova, 1991: *Koktjubina, Dzhamansorina*).

Biseriella parva (Chernysheva, 1948b)
Pl. 67, figs. 1-6.

1948b *Globivalvulina parva* n. sp. Chernysheva, p. 249, pl. 18, figs. 1-4.
1956a *Globivalvulina* sp. - Malakhova, p. 44, pl. 4, figs. 5-6.
non 1962 *Globivalvulina parva* Chernysheva - Bogush and Juferev, p. 196, pl. 8, fig. 12 (= *G. minima*).
1968 *Globivalvulina parva* Chernysheva - Aizenverg et al., pl. 16, figs. 11-13.
1969 *Globivalvulina parva* Chernysheva - Manukalova-Grebeniuk et al., pl. 13 (p. 197), fig. 23, pl. 8 (p. 235), fig. 36, pl. 13 (p. 245), fig. 4.
?1970 *Globivalvulina* ? *parva* Chernysheva - Skipp and Mamet, p. B122 (no illustration).
v. 1973b *Globivalvulina parva* Chernysheva - Perret, p. 322, pl. 5, figs. 12-14.
v. non 1974b *Globivalvulina* cf. *parva* Chernysheva - Vachard, p. 335-336, pl. 23, figs. 2-3 (with synonymy; although the species is in fact *Biseriella vailhensis* n. sp., see below).
v. 1977 *Globivalvulina* (= *Biseriella*) ex gr. *parva* Chernysheva - Perret and Vachard, p. 90 (no illustration).
v. non 1977b *Globivalvulina* cf. *parva* Chernysheva - Vachard, p. 156-157, pl. 6, figs. 16-17 (with 14 references in synonymy; one more time for *Biseriella vailhensis* n. sp.).
v. ?1978 "*Globivalvulina*" cf. *bristolensis* Reichel - Meissami et al., pl. 1, fig. 5.
1979 *Globivalvulina parva* Chernysheva - Wagner et al., pl. 2, fig. 15 ? (ex gr.) , pl. 3, figs. 13-14, pl. 5, figs. 22-23?).
non 1980 *Biseriella parva* (Chernysheva) - Rich, p. 79, pl. 5, figs. 2-3, 6-7, 10 (= *Koktjubina?* sp. 2 according to Vachard et al., 2006, fig. 2. 19-21).
1981 *Globivalvulina* ? *parva* Chernysheva - Mamet et al., p. 29 (no illustration).
? 1981 *Biseriella* cf. *parva* (Chernysheva). Strank, pl. 18, fig. 10.
? 1982 *Biseriella minima* (Chernysheva) - Rich, pl. 1 figs. 17-19 (see also *Dzhamansorina* sp. 2 sensu Vachard et al., 2006, fig. 2. 22-23).
? 1982a - *Biseriella parva* (Chernysheva) Brenckle et al., text-figs. 2-3 (no illustration).
non 1983 *Biseriella parva* (Chernysheva) - Groves, p. 381, 383, figs. 14. 1-9 (= ?a *Globivalvulina kamensis* or *G. bulloides* sensu lato) (with incorrect synonymy).
1983 *Globivalvulina parva* Chernysheva - Aizenverg et al., p. 14-15 (no illustration).
non 1984 *Globivalvulina parva* Chernysheva - Zhao et al., p. 104, pl. 17, figs. 7-11 (= *G. moderata* or *G. kamensis*).

non 1984 *Biseriella parva* (Chernysheva) - Groves, text-fig. 6 p. 287, text-fig. 7 p. 289, pl. 5, figs. 1-6 *(= ?G. minima*).
1985 *Biseriella* of the group *B. parva* (Chernysheva) - Skipp et al., pl. 2, figs. 5-9.
non 1988 *Biseriella parva* (Chernysheva) - Groves, p. 381, 383, figs. 14. 1-9 (= ? a *Globivalvulina kamensis* or *G. bulloides* sensu lato) (with incorrect synonymy).
1988 *Globivalvulina parva* Chernysheva - Kulagina, p. 26, pl. 2, figs. 25-26.
1989 *Biseriella parva* (Chernysheva) - Fewtrell et al., p. 56, p. 64, pl. 3. 9, fig. 4, pl. 3. 12, fig. 3.
1991 *Biseriella parva* (Chernysheva) - Gibshman and Akhmetshina, pl. 2, figs. 9?, 10-15.
v. 1991c *Globivalvulina parva* Chernysheva - Vachard et al., p. 677, pl. 1, figs. 16-17.
v. 1992 Bisériamminidé indéterminé N° 2 - Vachard and Berkhli, pl. 1, fig. 10.
non 1992 *Biseriella parva* (Chernysheva) - Groves, p. 150, pl. 4, figs. 8-13 (all these specimens have developed valvular projections and consequently belong to *Globivalvulina* emend. here).
non 1993 *Biseriella* of the group *B. parva* - Mamet et al., pl. 13, figs. 1-3, 5-6 (all these specimens have developed valvular projections and consequently belong to *Globivalvulina* emend. here. The fig. 1 is a *G. moderata*; figs. 2-3, 5-6 are a larger species maybe *G. kamensis* Reitlinger, 1950).
v. 1993 *Globivalvulina parva* Chernysheva - Perret, p. 449-450, pl. F4, figs. 60, 62-64 (with synonymy) (non fig. 61 = *Globivalvulina minima*).
1996 *Globivalvulina parva* Chernysheva - Marfenkova in Einor, pl. 41, fig. 35.
1996 *Biseriella parva* (Chernysheva) - Cózar-Maldonado, pl. 2, fig. 12.
?1996b *Biseriella* of the group *B. parva* (Chernysheva) - Mamet, pl. 1, fig. 28 (or *Globivalvulina moderata*).
1997 *Biseriella parva* (Chernysheva) - Harris et al., fig. 8. 26.
?1997 *Biseriella* ex gr. *parva* (Chernysheva) - Brenckle et al., pl. 1, fig. 22 (most probably *G. minima*).
?1997 *Biseriella parva* (Chernysheva) - Ueno and Igo, pl. 1, fig. 9 (most probably *G. minima*).
?1997 *Biseriella* ex gr. *parva* (Chernysheva) - Mazuno and Ueno, tabl. 2, pl. 3, figs. 18-20 (most probably *G. minima*).
1998 *Biseriella* du groupe *B. parva* (Chernysheva) - Pinard and Mamet, p. 116-117, pl. 27, figs. 1-4 (with synonymy).
v. 1999 *Biseriella parva* (von Möller) - Berkhli, p. 110, 113 (no illustration).
non 2000 *Biseriella* gr. *parva* (Chernysheva) - Sebbar, pl. 13, fig. 17 (profile more inflated, sutures absent).
non 2000a *Biseriella* ex gr. *parva* (Chernysheva) - Cózar, figs. 3. 7-9 (= *B. vailhensis* n. sp. and? other species).
non 2001 *Biseriella parva* (Chernysheva) - Vdovenko, pl. 4, figs. 47-48 (= *Pseudotaxis eominima*).
?2002 *Biseriella parva* (Chernysheva) - Kulagina and Gibshman, text-fig. 3 p. 186 (no illustration).
?2002 *Biseriella parva* (Chernysheva) - Marfenkova, p. 193, 195, 196 (no illustration).
2002 *Biseriella parva* (Chernysheva) - Pazukhin et al., p. 221 (no illustration).
?2003 *Biseriella parva* (Chernysheva) - Kulagina et al., text-fig. 7 p. 180 (no illustration).
v. 2003 *Globivalvulina parva* Chernysheva - Vachard et al., p. 654 (no illlustration)
non 2003 *Biseriella* of the group *parva* (Chernysheva) - Brenckle and Milkina, pl. 6, figs. 1-3. (1 and 3 corresponds to another species of *Biseriella*, 2 is yet a *Globivalvulina* ex gr. *moderata* Reitlinger, 1949).
non 2003a *Biseriella* ex gr. *parva* (Chernysheva) - Cózar, fig. 5P (= *B. vailhensis* n. sp.).
non 2004 *Biseriella* ex gr. *parva* (Chernysheva) - Cózar and Rodríguez, fig. 9. 7 (= *B. vailhensis* n. sp.).
? 2004 *Biseriella* cf. *parva* (Chernysheva) - Cózar and Somerville, text-fig. 4 p. 46 (pars), fig. 10. 22 (oblique section, difficult to determinate).
p. ? 2004 *Biseriella parva* (Chernysheva) - Cózar and Somerville, text-fig. 6 p. 47 (pars), text-fig. 15 p. 61 (pars), fig. 10. 24? (non fig. 10-23 = *B. vailhensis* n. sp.).
v. 2005 *Biseriella parva* (Chernysheva) - Saïd, p. 178, p. 182? (ex gr.), p. 184, p. 186, p. 188, p. 189, p. 191, fig. X. 1. 17 (typical although listed as "ex gr."), 18, 22.
v. 2005 *Biseriella* sp. - Saïd, p. 180 (no illustration).
?2005 *Biseriella parva* (Chernysheva) - Brenckle, tabl. 1 p. 170 (no illustration).
? 2005 *Biseriella parva* (Chernysheva) - Orlov-Labkovsky, p. 23, 24, 25, 26 (no illustration).
v. ? 2006b *Globivalvulina*? ex gr. *parva* Chernysheva - Vachard et al., p. 466-469, fig. 4. 3, 5. 6-8, 11-12, 6. 8-12, 15 (with 128 references for the group *G.? parva*).
v. 2006b *Globivalvulina*? *parva* Chernysheva - Vachard et al., figs. 5. 13-14, 6. 14-15.
v. ? 2006b *Dzhamansorina* aff. *kipshakensis* Marfenkova - Vachard et al., fig. 4. 5, 5. 4.

Description. Diameter (D) = 0.170-0240 mm; width (w) = 0.110-0.150 mm; ratio w/D = 0.60-0.70; proloculus diameter = 0.015 mm; number of whorls: 1-1.5; number of chambers at the last whorl: 4-5 pairs; height of the last whorl = 0.050mm; thickness of wall at the last whorl = 0.010-0.015 mm.

Occurrence. "Late Asbian-early Namurian" of England (Fewtrell et al., 1989). Late Viséan of Submoscovite Basin, Uzbekistan. ?Latest Venevsky to latest Serpukhovian of Southern Urals. ?C_1^vg-earliest Serpukhovian of Donets Basin (limestones B4, B-10, C1) to early Bashkirian (D_7^2 limestone). Late Viséan of Southern Spain. ? Upper Mobarak Formation (Cf4δ = MFZ11) of central Alborz (Iran). Latest Viséan-early Serpukhovian of USA. Early-late Brigantian of central and Eastern Morocco (the populations of the Idmarrach Formation are especially interesting, see Saïd, 2005). Serpukhovian of Kazakhstan. Earliest Sertpukhovian of Tien-Shan (local FAD according to Orlov-Labkovsky, 2005). ?Serpukhovian of Thailand (Chiang Dao area). Latest Brigantian of South China. Early Serpukhovian-base of late Serpukhovian of Tien-Shan. Early Serpukhovian of northwest China. Earliest Serpuhkhovian of Northern England. ?Late Serpukhovian of Idaho (USA). ?Late Serpukhovian-early Bashkirian of Alaska and Hina Group of Japan. ?Bashkirian of Bolivia. Early Serpukhovian of Montagne Noire: Gare de Laurens (ML789); La Serre (DV227C, ?MA.LS.Feldweg17). Late Serpukhovian of Ardengost area: Bois de Gertous Ger5, Areng AH14, Mar3 (Perret, 1973b); Cas26d, Mail2, Mail7d (Perret, 1993); ?MFP. Mar 3B, ?MFP.AH18D, MFP.AH20'F, AH.E/81 (this study).

Biseriella lenticularis n. sp.
Pl. 67, figs. 10-11.

v. p. 1977b *Biseriammina* sp. 1 - Vachard, p. 156 (non pl. 6, figs. 4-5; probably *Biseriammina windsorensis* Mamet, 1970); i. e., only the specimens of "lentilles de la route") (with 1 reference in synonymy).
v. 2006b *Dzhmansorina* cf. *minima* (Vdovenko) - Vachard et al., fig. 4. 1-2, 5. 3.

Locus typicus. Lenses of the road, near Roquessels, Hérault, France.

Stratum typicum. Latest Asbian.

Diagnosis. A small *Biseriella* characterized by the planispiral evolute whorls.

Description. Diameter (D) = 0.275-0.500 mm; width (w) = 0.230-0.290 mm; ratio w/D = 0.60-0.85; proloculus diameter = 0.025-0.030 mm; number of whorls: 1.5-2; number of chambers at the last whorl = 4-5 pairs; height of the last whorl = 0.100-0.150 mm; thickness of wall at the last whorl = 0.010-0.015 mm.

Holotype. Sample DV293F; Pl. 67, fig. 10.

Type material. Three specimens.

Repository of the types. Collection of Palaeontology of Lille University.

Comparison. The rare specimens of Montagne Noire looks like *Biseriella minima* sensu Rich (1982), but according to Brenckle (2005, p. 62) this species has truly a wall of *Koktjubina*.

Occurrence. Latest Asbian of Montagne Noire: Lenses of the road, near Roquessels (DV293F, DV293H); sommet 224-Valuzières (DV600E). ?Late Serpukhovian of Ardengost area: MFP.AH.B/81.6.

Biseriella vailhanensis n. sp.
Pl. 67, figs. 12-16.

v. 1974b *Globivalvulina* cf. *parva* (Chernysheva) - Vachard, p. 335-336, pl. 23, figs. 2-3.
v. 1977b *Globivalvulina* cf. *parva* (Chernysheva) - Vachard, p. 156-157, pl. 6, figs. 16-17.
p. ?2000a *Biseriella* ex gr. *parva* (Chernysheva) - Cózar, figs. 3. 7?, 8, 9?
? 2003 *Biseriella bristolensis?* (Reichel) - Brenckle and Milkina, pl. 3, fig. 12.
2003a *Biseriella* ex gr. *parva* (Chernysheva) - Cózar, fig. 5P.
2004 *Biseriella* ex gr. *parva* (Chernysheva) - Cózar and Rodríguez, fig. 9. 7.
p. 2004 *Biseriella parva* (Chernysheva) - Cózar and Somerville, fig. 10. 23 (non? fig. 10-24 = difficult to identify).
v. 2006b *Globivalvulina*? aff. *bristolensis* Reichel - Vachard et al., fig. 4. 6-8, 5. 9-10.

Etymology. From the vicinity of Vailhan (Hérault, France).

Locus typicus. Mentaresses Hill, near Vailhan, Hérault, France.

Stratum typicum. Late Brigantian.

Diagnosis. A small *Biseriella* characterized by relatively numerous pairs of chambers and their elongate shape.

Description. Diameter (D) = 0.110-0.270 mm; width (w) = 0.175-0.180 mm; ratio w/D = 0.79-0.88; number of whorls: 1-1.5; number of chambers: 5-7 pairs; height of the last whorl = 0.050-0.110 mm; thickness of wall at the last whorl = 0.005-0.010 mm.

Holotype. DV328'A (Mentaresses), photo 9.9.6/1, Pl. 67, fig. 13.

Type material. Twelve specimens.

Repository of the types. Collection of Palaeontology of Lille.

Comparison. *Biseriella vailhanensis* n. sp. differs from *B. parva* in more numerous chambers, and from *B. bristolensis* (Reichel, 1946), which is very similar, in the entirely planispiral coiling, the shape of the chambers (triangular in *B. bristolensis*, see Fewtrell et al., 1989, pl. 3. 3, fig. 2; with a less voluminous last chamber) and the different age (*B. bristolensis* is characteristic of the late Chadian = latest Tournaisian = latest Ivorian = MFZ8).

Occurrence. Questionable in the early Tulsky of Kazakhstan. Late Serpukhovian of Southwestern Spain. Latest Brigantian of Northern England. Brigantian in Montagne Noire: Roquemaillère (?DV130G); Japhet (?DV350A); Vailhan-Château (?DV248, ?DV248E, DV327A); Roque Redonde (?RR61); Les Batailles (?DV609); Jeantels (DV690C); Les Mentaresses (DV328'A); Roc de Murviel (?MA34). Late Serpukhovian of Ardengost area: ?MFP.AH18F.

Biseriella? *eogranulosa* (Reitlinger, 1949)
Pl. 67, fig. 17.

1949 *Globivalvulina eogranulosa* n. sp. Reitlinger, p. 12 (French translation), pl. 1, figs. 3a-c.
? 1985 *Biseriammina*? sp. - Adachi, p. 103-104, pl. 14, fig. 18 (with synonymy).
?1988 *Globivalvulina eogranulosa* Reitlinger - Kulagina, p. 26 (no illustration).
?1993 *Globivalvulina eogranulosa* Reitlinger - Perret, p. 450-451, text -figs. 136-137 p. 446-447, pl. F.IV, figs. 29-32, pl. F.XII, fig. 15 (with synonymy).
?v. 2006b *Globivalvulina* aff. *eogranulosa* Reitlinger - Vachard et al., fig. 5.5, 6. 13.

Description. The genus is doubtful because the wall can be agglutinated (Perret, 1993). The species is small, not sutured, and with falciform septa. Diameter (D) = 0.200-0.310 mm; width (w) = 0.100-0.110 mm; ratio w/D = 0.35-0.50; proloculus diameter = mm; number of whorls: 1-1.5; number of chambers at the last whorl: 5-6; height of the last whorl = mm; thickness of wall at the last whorl = 0.018-0.022mm.

Occurrence. Zapaltiubinsky-Bashkirian of Urals, ?Ichinotani Formation of Japan, and late Serpukhovian of Ardengost area: Mail7c, Mail20, Cas15bis, AA4 (Perret, 1993). Baskhkirian of Pyrenees.

7. 15. Ozawainelloids

Suborder Fusulinina Wedekind, 1937 nomen translat. Hohenegger and Piller, 1975
Superfamily Ozawainelloidea Thompson and Foster, 1937 nomen translat. Solovieva, 1978 (pro family)
Family Eostaffellidae Mamet in Mamet et al., 1970

Genus *Mediocris* Rozovskaya, 1961

Type species. *Eostaffella mediocris* Vissarionova, 1948.

Diagnosis. Test discoidal with rounded periphery, planispiral, involute. Numerous chambers. Axial filling well developed covering all the lateral parts. Wall microgranular. Simple terminal aperture.

Remarks. Genus easy to identify in axial sections whereas the corresponding transverse section are poorly known and often confused with « *Endostaffella* » or « *Loeblichia* » especially in the early Viséan. *Mediocris* was generally considered as the ancestor of *Eostaffella* until the revision of Cózar and Vachard (2001), which proposed a derivation from *Lysella*. Despite the existence of more than twenty species, *M. breviscula* and *M. mediocris* are probably sufficient to characterize the variability of the genus (see the synonymies of Niko, 1985).

Occurrence. Early Viséan-Moscovian. Palaeotethyan, Alaska and Ozarks regions in the USA, Sverdrup Basin in Canada.

Mediocris breviscula (Ganelina, 1951)
Pl. 68, figs. 1-4.

1951 *Eostaffella mediocris* var. *breviscula* n. var. Ganelina, p. 197-198, pl. 3, figs. 1-3.
1956 *Eostaffella breviscula* Ganelina - Ganelina, p. 44-45 (French translation), pl. 11, figs. 6-7.
1963 *Mediocris breviscula* (Ganelina) - Rozovskaya, p. 108-109, pl. 19, figs. 14-17.
1964 *Mediocris breviscula* (Ganelina) - Conil and Lys, p. 238, pl. 40, figs. 840-841.
1970 *Mediocris breviscula* (Ganelina) - Rumyantseva, pl. 5, figs. 6-9.
1973 *Mediocris breviscula* (Ganelina) - Bozorgnia, p. 147-148, pl. 20, figs. 5, 7.
v. 1974b *Mediocris breviscula* (Ganelina) - Vachard, p. 309, pl. 20, figs. 16, 18 (with synonymy).
1975a *Mediocris breviscula* (Ganelina) - Malakhova, p. 37, pl. 25, figs. 27-30.
v. 1977b *Mediocris breviscula* (Ganelina) - Vachard, p. 153, pl. 5, fig. 29.
1978 *Mediocris breviscula* (Gan.) - Sultanaev et al., p. 102-103, pl. 7, fig. 8.
1979 *Mediocris breviscula* (Ganelina) - Mansourian, p. 89, pl. 12, fig. 181.
1979 *Mediocris breviscula* (Ganelina) - Wagner et al., pl. 13, fig. 22.
1981 *Mediocris breviscula* (Ganelina) - Strank, pl. 5, fig. 3, pl. 7, fig. 32.
v. 1982 *Mediocris breviscula* (Gan.) - Fontaine and Vachard, p. 192 (no illustration).
1985 *Mediocris breviscula* (Ganelina) - Niko, p. 168, pl. 1, figs. 1-6, 7 ?, 8-9.
1986 *Mediocris breviscula* (Ganelina) - van Ginkel, figs. 5. 33-34.
1987 *Mediocris* aff. *breviscula* (Ganelina) - van Ginkel, p. 201-202, figs. 3. 3-4.
1988 *Mediocris breviscula* (Ganelina) - Groves, p. 384-385, figs. 15. 1-14 (with synonymy).
1988 *Mediocris breviscula* (Ganelina) - Kulagina, p. 25, 26 (no illustration).
1988 *Mediocris breviscula* (Ganelina) - Kulagina and Pazukhin, p. 39 (no illustration).
1988b *Mediocris breviscula celsa* Pojarkov - Ivanova, pl. 3, fig. 13.
1989 *Mediocris breviscula* (Ganelina) - Fewtrell et al., p. 44, pl. 3. 4, fig. 21.
1989 *Mediocris evolutis* Rozovskaya - van Ginkel, p. 349-350, 352, figs. 10. 24-30.
1991 *Mediocris breviscula* (Ganelina) - Gibshman and Akhmetshina, pl. 3, figs. 26-30.
1992 *Mediocris breviscula* (Ganelina) - Vachard and Berkhli, pl. 1, fig. 3, pl. 3, fig. 6.
1992 *Mediocris breviscula* (Ganelina) - Matsusue, text-fig. 2 p. 383, fig. 3. 10.
1993 *Mediocris breviscula* (Ganelina) - Mamet et al., pl. 10, figs. 19-22.
1993 *Mediocris breviscula* (Ganelina) - Ueno and Nakazawa p. 40-41, figs. 15. 6-26 (with 48 references in synonymy).

1994 *Mediocris terminalis* n. sp. Ueno in Ueno et al., p. 21, 23, figs. 6. 1-9.
1994 *Mediocris breviscula* (Ganelina) - Kobayashi, fig. 2. 15-16.
v. 1996 *Mediocris breviscula* (Ganelina) - Proust et al, p. 348 (no illustration).
1996 *Mediocris breviscula* (Ganelina) - Rui Lin et al, p. 37, pl. 1, figs. 1-7.
1997 *Mediocris breviscula* (Ganelina) - Harris et al., figs. 7. 6-11.
1997 *Mediocris breviscula* (Ganelina) - Ueno et al., figs. 3. 10-11.
1997 *Mediocris breviscula* (Ganelina) - Mazuno and Ueno, tabl. 2, pl. 5, figs. 1-4.
2000c *Mediocris breviscula* (Ganelina) - Cózar, p. 334, 336, pl. 5 figs. 5-6.
2001 *Mediocris* (*Mediocris*) *breviscula* (Ganelina) - Vdovenko, tabl. 1 p. 175, pl. 23, figs. 41, 56.
2002 *Mediocris breviscula* (Ganelina) - van Ginkel, p. 67, figs. 5. Q, fig. 12 I-N.
2002 *Mediocris breviscula* (Ganelina) - Pazukhin et al., p. 221 (no illustration).
2002 *Mediocris breviscula* (Ganelina) - Ponomareva et al., p. 240 (no illustration).
2002 *Mediocris breviscula* (Ganelina) - Shcherbakova and Shcherbakov, p. 310, 312, 313 (no illustration).
2003 *Mediocris breviscula* (Ganelina) - Kulagina et al., text-fig. 6 p. 179 (no illustration).
v. 2005 *Mediocris breviscula* (Ganelina) - Saïd, p. 185 (no illustration).
2005 *Mediocris breviscula* (Ganelina) - Brenckle, p. 63-64, pl. 10, figs. 6-7.
2006 *Mediocris breviscula* (Ganelina) - Devuyst, fig. 3. 17B. 8.

Description. Diameter (D) = 0.178-0.350 mm; width (w) = 0.076-0.150 mm; ratio w/D = 0.43-0.52; proloculus diameter = 0.013-0.040 mm; number of whorls: 3-4 thickness of wall at the last whorl = 0.005-0.008 mm.

Remarks. *Mediocris terminalis* corresponds exactly to small specimens of *M. breviscula* and is synonym. *M. breviscula* is relatively abundant in the late Moscovian (Vachard, pers. comm., 2005).

Occurrence. As for the genus. Viséan-Bashkirian of Urals. $C_1^ve_1$-C_1^vg of Donets Basin. V2a-V2b of Belgium. V2a of Germany. Serpukhovian-early Bashkirian of Uzbekistan. Serpukhovian-Bogdanovsky (earliest Bashkirian) of Urals. Bashkirian-Moscovian of Algeria (Bechar Basin). Early Bashkirian of Sverdrup Basin. Moscovian of Spain, Japan and Northeastern Thailand. V2a-V2b of central Alborz (Iran). Ichinotani Formation and Akiyoshi Group of Japan. Lower Viséan (MFZ8) of South China. Early Bashkirian of Viet-Nam. From the Arundian in Montagne Noire (Vachard, 1974b). Here Asbian/Brigantian boundary, Brigantian indet., and latest Brigantian: Castelsec (MA10.7.2); Roque Redonde (RR73); and Roc de Murviel (MA50, MA76).

Mediocris mediocris (Vissarionova, 1948)
Pl. 68, figs. 5-13.

1948 *Eostaffella mediocris* n. sp. Vissarionova, p. 222-223, pl. 14, figs. 7-9.
1956a *Eostaffella mediocris* Vissarionova - Malakhova, p. 51, pl. 8, fig. 2.
1960 *Eostaffella mediocris* Vissarionova - Grozdilova and Lebedeva, p. 109, pl. 13, fig. 13.
? 1963 *Eostaffella mediocris* Vissarionova - Conil and Pirlet, pl. 3, fig. 42.
1963 *Mediocris mediocris* (Vissarionova) - Rozovskaya, p. 103-104, pl. 18, figs. 26-33.
1964 *Mediocris mediocris* (Vissarionova) - Conil and Lys, p. 239, pl. 40, fig. 843, pl. 41, figs. 844-846.
1967 *Mediocris mediocris* (Vissarionova) - Conil and Paproth, p. 62, 71, 72 (no illustration).
1970 *Mediocris mediocris* (Vissarionova) - Rumyantseva, pl. 5, figs. 1-3.
1972 *Eostaffella mediocris* Vissarionova - Malakhova, p. 40, pl. 6, figs. 7-11.
v. 1974b *Mediocris mediocris* (Vissarionova) - Vachard, p. 309-310, pl. 20, figs. 16, 18 (with synonymy).
v. 1974b *Mediocris ovalis* (Vissarionova) - Vachard, p. 310-311, pl. 20, figs. 15, 17 (with synonymy).
1975 *Mediocris mediocris* (Vissarionova) - Mikhno and Balakin, p. 44, pl. 11, fig. 11-14.
1975 *Mediocris mediocris* (Vissarionova) - Grozdilova et al., p. 43, pl. 7, figs. 9-10.
1975a *Mediocris mediocris* (Vissarionova) - Malakhova, p. 36, pl. 25, figs. 11-20.
v. 1977 *Mediocris mediocris* (Vissarionova) - Perret and Vachard, p. 90 (no illustration).
v. 1977b *Mediocris mediocris* (Vissarionova) -Vachard, p. 153, pl. 5, fig. 27.
1978 *Mediocris mediocris* (Viss.) - Sultanaev et al., p. 103, pl. 7, figs. 6-7.
1979 *Mediocris mediocris* (Vissarionova) forma *regularis* - Wagner et al., pl. 9, fig. 7.
1983 *Mediocris mediocris* (Viss.) - Aizenverg et al., p. 16-17 (no illustration).
v. 1983 *Mediocris* ex gr. *mediocris* (Viss.) - Fontaine et al. , p. 14, pl. 1, figs. 3, 14.

1983 *Mediocris parallela* Conil and Lys - Conil and Paproth, fig. 3. 12.
1985 *Mediocris mediocris* (Viss.) - Adachi, p. 127-128, pl. 22, figs. 10-17 (with synonymy).
1985 *Mediocris medicris* (sic) (Vissarionova) - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1985 *Mediocris mediocris* (Vissarionova) - Niko, p. 170, pl. 2, figs. 1-17.
1989 *Mediocris mediocris* (Vissarionova) - Fewtrell et al., p. 48, p. 52, p. 54, pl. 3. 6, fig. 4, pl. 3. 7, fig. 10, pl. 3.8, fig. 5.
1991 *Mediocris mediocris* (Vissarionova) - Sánchez et al., p. 130-131, pl. 4, fig. 12.
1992 *Mediocris mediocris* (Vissarionova) - Matsusue, text-fig. 2 p. 383, fig. 3. 9.
v. 1993 *Mediocris* sp. - Perret, pl. F3, fig. 27.
v. ? 1993 *Eostaffella postmosquensis* Rauzer-Chernousova - Perret, pl. F3, fig. 28.
1993 *Mediocris mediocris* (Vissarionova) - Ueno and Nakazawa, p. 41, 43, fig. 15. 1-5 (with 49 references in synonymy).
v. 1996 *Mediocris mediocris* (Vissarionova) - Vachard and Maslo, text-fig. 1 p. 359.
1997 *Mediocris mediocris* (Vissarionova) - Ueno and Igo, pl. 1, fig. 11.
1997 *Mediocris mediocris* (Vissarionova) - Mazuno and Ueno, tabl. 2, pl. 5, figs. 17-18.
v. 1999 *Mediocris mediocris* (Vissarionova) - Fontaine et al., p. 464 (no illustration).
v. 1999 *Mediocris mediocris* (Vissarionova) - Berkhli, p. 107, 109, 110 (no illustration).
2000c *Mediocris mediocris* (Vissarionova) - Cózar, p. 336, pl. 5 figs. 1-12.
2001 *Mediocris* (*Mediocris*) *mediocris* (Vissarionova) - Vdovenko, tabl. 1 p. 175, pl. 23, figs. 44, 53.
2002 *Mediocris mediocris* (Vissarionova) - Pazukhin et al., p. 221 (no illustration).
2002 *Mediocris mediocris* (Vissarionova) - Ponomareva et al., p. 240, text-fig. 2 p. 241 (no illustration).
2002 *Mediocris mediocris* (Vissarionova) - Shcherbakova and Shcherbakov, p. 307 312 (no illustration).
p. 2002 *Mediocris mediocris* (Vissarionova) - Van amerom et al., pl. 3, figs. 25-26.
v. 2005 *Mediocris mediocris* (Vissarionova) - Saïd, p. 175, p. 176, p. 178, p. 179, p. 185, fig. X. 1. 18 (as *Mediocris* sp.).
? 2005 *Mediocris mediocris* (Vissarionova) - Sanz-Lopez et al., pl. 6, fig. 8.

Description. Diameter (D) = 0.250-0.450 mm; width (w) = 0.150-0.225 mm; ratio w/D = 0.48-0.60; proloculus diameter = 0.035-0.045 mm; number of whorls: 3-5; number of chambers at the last whorl = 10; height of the last whorl = 0.035-0.045 mm; thickness of wall at the last whorl = 0.010-0.020 mm. Contrary to Vachard (1974b), I don't find any differences between local *M. mediocris* and local M. *ovalis* (see also Niko, 1985, p. 170).

Occurrence. Tulsky-Protvinsky of Russian Platform, Southern Timan and England. C_1^va-early Bashkirian of Donets Basin. Gubashkinsky-Siuransky of Urals. V2b of Belgium. Late Viséan of Germany. Late Viséan-Serpukhovian of Uzbekistan. Middle-late Viséan of Morocco. Viséan-?Serpukhovian of Thailand (Chiang Dao, Chonburi area, western edge of Khorat Plateau). Ichinotani Formation and Akiyoshi Group of Japan. Latest Asbian-early Serpukhovian of Montagne Noire: Lenses of the road, near Roquessels (?DV332A); Castelsec (MA10.7.2, MA10.8.1, MA10.IV.100, MA11.8); Roquemaillère (DV137A, DV137G); Japhet (DV856.2); Roque Redonde (RR70); Vailhan-Château (DV246G); Les Boutinelles (MA.BOU.25.13.2); Les Batailles (DV608A); Roc de Murviel (MA4, MA5, MA83); Gare de Laurens (ML789); La Serre (MA.LSII.2029). Late Serpukhovian of Ardengost area: CasU (Perret, 1993); MFP.AH2 (this study).

Genus *Eostaffella* Rauzer-Chernousova, 1948h

Type species. *Staffella (Eostaffella) parastruvei* Rauzer-Chernousova, 1948h.

Diagnosis. Test small to medium-sized, lenticular, planispiral, involute, with smooth carinate periphery. No sutures, chambers numerous, quadratic. Wall microgranular, homogenous, unilayered (described differenciations result most probably of diagenetic phenomenons). Chomata present. Simple terminal aperture.

Remarks. The true phylogeny of *Eostaffella* remains unknown. It seems to derive of *Lysella/Paralysella* or *Mediocris/Chomatomediocris* in the early Viséan (Cózar and Vachard, 2001). During the early/middle Viséan, the genus is very rare and can be probably confused with homeomorphs derived from advanced *Eoparastaffella* (see for example the "*Eostaffella*

parastruvei" of Vachard, 1990 and the "*Millerella*" of Conil and Lys, 1964). The first massive occurrence of unquestionable *Eostaffella* seems to be Early Asbian in age; consequently, as from *Biseriella*, it is difficut to affirm if Viséan eostaffellids forms are polyphyletic or not. Vdovenko (pers. comm. to D. Vachard, 1995) opined for a polyphyletism. Similarly, the phylogenies with *Ozawainella* and *Millerella* are poorly established, as well as the differences or similartities between American *Milllerella* and Russian *Eostaffella/Millerella/Seminovella* (see Maslo and Vachard, 1997).

Occurrence. Rare in the early-middle Viséan. Acme in the late Viséan-early Bashkirian, cosmopolite. Up to the Orenburgian (Vachard and Krainer, 2001a), or after with doubtful specimens in the Late Permian (Vachard et al., 2005; Gaillot, in preparation).

Eostaffella proikensis Rauzer-Chernousova, 1948f

Pl. 68, figs. 14-19.

1948f *Eostaffella proikensis* n. sp. Rauzer-Chernousova, p. 237, pl. 16, figs. 21-23.
1951 *Eostaffella proikensis* Rauzer-Chernousova - Ganelina, p. 5-6 (French translation), pl. 1, figs. 4-5.
1960 *Eostaffella proikensis* (Rauzer-Chernousova) - Grozdilova and Lebedeva, p. 107-108, pl. 13, fig. 12.
1967 *Eostaffella* sp. - Conil and Paproth, pl. 4, fig. 10.
1972 *Eostaffella proikensis* Rauser - Malakhova, p. 40, pl. 7, fig. 10.
? 1972 *Eostaffella* sp. - Bertrand, pl. 2, fig. 23.
v. 1974b *Eostaffella ikensis ikensis* Vissarionova - Vachard, p. 305-306, pl. 20, figs. 5-6, 12 (with synonymy of *E. ikensis* and *E . proikensis*).
1975 *Eostaffella proikensis* Rauzer-Chernousova - Grozdilova et al., p. 42, pl. 6, fig. 9.
v. 1977 *Eostaffella* ex gr. *ikensis* Vissarionova - Perret and Vachard, p. 90 (no illustration).
v. 1977b *Eostaffella ikensis ikensis* Vissarionova - Vachard, p. 153, pl. 5, figs. 20-21.
1978 *Eostaffella proikensis* Raus. - Sultanaev et al., p. 102, pl. 7, fig. 14.
1979 *Eostaffella proikensis* Rauser - Wagner et al., pl. 9, fig. 9.
1982 *Eostaffella proikensis* Rauser - Fontaine and Vachard, p. 192? (aff.), 193 (no illustration).
1983 *Eostaffella proikensis* Rauser - Aizenverg et al., p. 16-17 (no illustration).
1985 *Eostaffella proikensis* Rauser - Lys, pl. 1, fig. 12.
1988 *Eostaffella proikensis* Rauser - Kulagina, p. 26, pl. 2, figs. 5-6.
1988 *Eostaffella proekensis* (sic) Rauser - Kulagina and Pazukhin, p. 41 (no illustration).
1989 *Eostaffella* (*Eostaffella*) ex gr. *proikensis* Rauser-Chernousova - Villa, p. 85, pl. 1, fig. 3.
1990 *Eostaffella proikensis* Rauzer-Chernousova - Vdovenko et al., pl. 1, fig. 17.
v. 1992 *Eostaffella* ex gr. *ikensis* (Brady) - Vachard and Berkhli, pl. 3, fig. 3.
v. 1992 *Euxinita* (?) sp. - Vachard and Berkhli, pl. 3, fig. 4.
v. 1993 *Eostaffella* ex gr. *proikensis* Vissarionova - Perret, pl. F3, figs. 11-13, 18.
v. 1993 *Eostaffella prisca* Rauzer-Chernousova - Perret, pl. F3, figs. 1-2.
v. 1993 *Eostaffella prisca ovoidea* Rauzer-Chernousova - Perret, pl. F3, figs. 3-4.
v. 1993 *Eostaffella postmosquensis acutiformis* Rauzer-Chernousova - Perret, pl. F3, figs. 5-7.
1996 *Eostaffella proikensis* Rauser - Reitlinger in Einor, pl. 2, fig. 8.
1996 *Eostaffella proikensis* Rauser - Rumyantseva in Einor, pl. 33, fig. 16.
p. 1997 *Eostaffella ikensis* Vissarionova - Maslo and Vachard, p. 41, text-fig. 1 p. 42 (no illustration).
1998 *Eostaffella proikensis* Rauzer-Chernousova - Pinard and Mamet, p. 80-81, pl. 36, fig. 9, pl. 37, figs. 6-7 (with synonymy).
1999b *Eostaffella proikensis* Rauzer-Chernousova - Cózar and Rodríguez, pl. 3, fig. 5.
1999 *Eostaffella proikensis* Rauzer-Chernousova - Cózar, p. 91, pl. 1, fig. 9, pl. 2, fig. 1 (with synonymy).
2001 *Eostaffella proikensis* Rauzer-Chernousova - Vdovenko, tabl. 1 p. 177, pl. 26, figs. 22-24.
2002 *Eostaffella proikensis* Rauzer-Chernousova - Kulagina and Gibshman, text-fig. 3 p. 186, pl. 1, fig. 10.
2002 *Eostaffella proikensis* Rauzer-Chernousova - Pazukhin et al., p. 221 (no illustration).
2002 *Eostaffella proikensis* Rauzer-Chernousova - Ponomareva et al., p. 240 (no illustration).
2002 *Eostaffella proikensis* Rauzer-Chernousova - Shcherbakova and Shcherbakov, p. 307, 308, 311, 312 (no illustration).
2003 *Eostaffella proikensis* Rauzer-Chernousova - Brenckle and Milkina, pl. 4, figs. 22-24.
2003 *Eostaffella proikensis* Rauzer-Chernousova - Kulagina et al., text-fig. 3 p. 176 (no illustration).
2005 *Eostaffella proikensis* Rauzer-Chernousova - Brenckle, p. 42, pl. 7, figs. 8-10.
? 2005 *Eostaffella* ex gr. *proikensis* Rauzer-Chernousova - Somerville and Cózar, pl. 3, fig. 18 (more similar to *E. ikensis*).
2005 *Eostaffella proikensis* Rauzer-Chernousova - Sanz-Lopez et al., pl. 6, fig. 3, pl. 8, fig. 2.

Description. Small species, weakly carinate in the last whorl and with rounded inner whorls, umbilicus area slightly protruding, spire rather loosely coiled, aperture high and narrow (according to Ganelina, 1951). Diameter (D) = 0.300-0.480 mm; width (w) = 0.200-0.255 mm; ratio w/D = 0.52-0.65; proloculus diameter = 0.020-0.050 mm; number of whorls: 4-4.5 (mainly 4); thickness of wall at the last whorl = 0.007-0.020 mm.

Occurrence. Late Viséan-Bashkirian (Pinard and Mamet, 1998), probably cosmopolite. Gubashkinsky-Ust-ilimsky-early Bashkirian of Urals, Aleksinsky-Protvinsky Submoscovite Basin, Aleksinsky-Mikhailovsky of Samara Bend, $C_1^{v}f_2$-C_2b (F1 Limestone) of Donets Basin. Early Bashkirian of Northern Spain. V3c of Germany. Late Viséan-Serpukhovian of Tien-shan and Viet-Nam. Protvinsky of Kazakhstan. Latest Asbian-Brigantian of Montagne Noire: Lenses of the road, near Roquessels (DV293A, DV293C, ?DV293H, DV293I, ?DV293.2B; Castelsec (MA10.7.2, MA10.8, ?MA10.9, ?MA10.12); Roquemaillère (DV137C); Japhet (?DV857); Vailhan-Château (DV246H); Les Pascales (DV601B); Saint Rome (DV132C). Late Serpukhovian of Ardengost area: Cas47, Cas47b, Mail16, AH2, AH4, AH10, AH11, AH20, Ard2 (Perret, 1993); (MFP.Mar1.16, MFP.AH20E, AH20'F, AH81.1 (this study).

Eostaffella mosquensis Vissarionova, 1948
Pl. 68, figs. 20-27.

? 1876 *Endothyra radiata* n. sp. Brady, p. 97-98, pl. 5, figs. 10-12.
1948 *Eostaffella mosquensis* n. sp. Vissarionova, p. 222, pl. 14, figs. 4-6.
1948f *Eostaffella mosquensis acuta* var. nov. (sic) Rauzer-Chernousova, p. 236 (no illustration, reference to Vissarionova, 1948, p. 222, pl. 14, fig. 5 only).
1951 *Eostaffella mosquensis* Vissarionova - Ganelina, p. 188, pl. 2, fig. 12.
1970 *Eostaffella mosquensis* Vissarionova - Rumyantseva, p. 149, pl. 5, figs. 28-31.
1970 *Eostaffella mosquensis* var. *acuta* Rauser - Rumyantseva, pl. 6, figs. 1-2.
1970 *Eostaffella* of the group *E. radiata* (Brady) - Mamet, n° 33 of text-fig. 3 p. 4-5, p. 11, n° 25 of text-fig. 14 p. 28-29, p. 38, pl. 3, fig. 10, pl. 5, fig. 2.
? 1970 *Eostaffella* of the group *E. radiata* (Brady) - Petryk et al., n° 64 of text-fig. 4 p. 93 (no illustration).
1972 *Eostaffella mosquensis* Vissarionova - Malakhova, p. 40, pl. 7, figs. 1-3.
v. ? 1973b *Eostaffella* cf. *parastruvei* Rauzer-Chernousova - Perret, p. 315-316, pl. 6, figs. 12-13 (with synonymy).
v. ? 1973b *Eostaffella mosquensis* var. *acuta* Rauzer-Chernousova - Perret, p. 317-318, pl. 6, fig. 6 (with synonymy).
v. ? 1973b *Eostaffella cf. mosquensis* Vissarionova - Perret, p. 318-319, pl. 6, fig. 10 (with synonymy).
v. 1974b *Eostaffella mosquensis mosquensis* Vissarionova - Vachard, p. 306-308, pl. 5, figs. 3, 6, pl. 20, figs. 7, 9 (with synonymy).
v. 1974b *Eostaffella mosquensis acuta* Rauzer-Chernousova - Vachard, p. 308, pl. 20, figs. 8, 10-11, 13 (with synonymy).
1975 *Eostaffella mosquensis* Vissarionova - Mikhno and Balakin, p. 47, pl. 13, figs. 3-7.
v. 1977 *Eostaffella* ex gr. *mosquensis* Vissarionova - Perret and Vachard, p. 90 (no illustration).
p. 1977 *Eostaffella mosquensis* Vissarionova - Dil, pl. 7, fig. 108 (non pl. 4, fig. 67: probably *Paralysella*).
v. 1977b *Eostaffella mosquensis mosquensis* Vissarionova - Vachard, p. 153, pl. 5, fig. 23.
v. 1977b *Eostaffella mosquensis acuta* Rauzer-Chernousova - Vachard, p. 153, pl. 5, fig. 22.
1978 *Eostaffella mosquensis* Vissarionova - Sosipatrova, pl. 2, fig. 3.
non 1979 *Eostaffella mosquensis* Vissarionova - Mansourian, p. 88, pl. 12, figs. 179-180 (= *Eoparastaffella ovalis*).
1980 *Eostaffella mosquensis* Vissarionova - Rich, p. 41, pl. 18, figs. 13, 15-16, 20-25 (with synonymy).
?1980 *Eostaffella radiata* (Brady) - Skompski and Sobon-Podgorska, pl. 2, fig. 8.
1981 *Eostaffella mosquensis* Vissarionova - Strank, pl. 13, fig. 4 ? (aff.), pl. 15, fig. 2, pl. 16, fig. 11? (aff.), pl. 17, fig. 3, pl. 18, figs. 13, 20, pl. 19, fig. 8? (aff.), pl. 20, fig. 2? (aff.), pl. 20, fig. 14 .
1982 *Eostaffella mosquensis* Vissarionova - Fontaine and Vachard, p. 192, 194 (no illustration).
1983 *Eostaffella mosquensis* Vissarionova - Conil and Paproth, tabl. 1 p. 35 (no illustration).
1984 *Eostaffella mosquensis* Vissarionova - Zhao et al., p. 55, pl. 1, figs. 1-4.
1985 *Eostaffella mosquensis* Vissarionova - Ross and Ross, text-fig. 1 p. 195 (no illustration).
1987 *Eostaffella mosquensis* Vissarionova - Sinitsyna and Sinitsyn, pl. 1, fig. 17.

1987 *Eostaffella mosquensis* Vissarionova - Niko, p. 123, 125, fig. 5 D, F-G, H? (with synonymy).
1988 *Eostaffella mosguensis* (sic) Vissarionova - Kulagina, p. 25 (no illustration).
1988 *Eostaffella mosquensis* Vissarionova - Groves, p. 387, figs. 15. 23-25 (with synonymy).
1989 *Eostaffella mosquensis* Vissarionova - Fewtrell et al., p. 54, pl. 3. 8, fig. 5.
1989 *Eostaffella* cf. *mosquensis* Vissarionova - Skompski et al., pl. 7, fig. 40.
v. 1990 *Eostaffella mosquensis* Vissarionova - Vachard, pl. 1, fig. 8.
v. 1992 *Eostaffella* ex gr. *mosquensis* Vissarionova - Vachard and Berkhli, pl. 3, figs. 1-2.
1992 *Eostaffella mosquensis* Vissarionova - Matsusue, text-fig. 2 p. 383, fig. 3. 18-19.
1993 *Eostaffella* ex gr. *radiata* (Brady) (= *Eostaffella mosquensis* Vissarionova) - Mamet et al., pl. 10, figs. 1-12, 15.
v. 1993 *Eostaffella* ex gr. *mosquensis* Vissarionova - Perret, pl. F.III, figs. 8-10, 23.
v. 1993 *Eostaffella mosquensis* Vissarionova - Perret, pl. F.XII, fig. 14.
v. 1993 *Eostaffella mosquensis acuta* Rauzer-Chernousova - Perret, pl. F.III, figs. 15-17, pl. F.XII, fig. 18.
v. 1993b *Eostaffella mosquensis* Rauzer-Chernoussova - Vachard et al., pl. 2, fig. 9.
1996 *Eostaffella mosquensis* Vissarionova - Rumyantseva in Einor, pl. 33, fig. 8.
?1997 *Eostaffella mosquensis* Vissarionova - Ueno and Igo, pl. 1, figs. 16-17 (or *E. parastruvei*).
1997 *Eostaffella* ex gr. *mosquensis* Vissarionova - Mazuno and Ueno, tabl. 2, pl. 5, fig. 25.
1997 *Eostaffella mosquensis* Vissarionova - Maslo and Vachard, p. 45, text-fig. 1 p. 42 (no illustration).
v. 1999 *Eostaffella* ex gr. *mosquensis* Vissarionova - Berkhli, p. 112 (no illustration).
p. 1999 *Eostaffella radiata* (Brady) - Cózar, p. 87, pl. 1, fig. 2 (with a debatable synonymy).
2001 *Eostaffella mosquensis mosquensis* Vissarionova - Vdovenko, tabl. 1 p. 177, pl. 25, figs. 22-24, pl. 26, fig. 1?, 8? (ex gr.).
2002 *Eostaffella mosquensis* Vissarionova - Pazukhin et al., p. 221 (no illustration).
2002 *Eostaffella mosquensis* Vissarionova - Shcherbakova and Shcherbakov, p. 307, 308, 312 (no illustration).
2003 *Eostaffella mosquensis mosquensis* Vissarionova - Brenckle and Milkina, pl. 4, fig. 21.
2003 *Eostaffella mosquensis* Vissarionova - Kulagina et al., text-fig. 3 p. 176 (no illustration).
v. p. 2003 *Eostaffella* ex gr. *mosquensis* Vissarionova - Fontaine et al., pl. 7, figs. 1, 4, 10 (non pl. 7, figs. 1, 8-9 = *E. parastruvei*).
? 2004 *Eostaffella* ex gr. *mosquensis* Vissarionova - Cózar and Somerville, text-fig. 15 p. 61 (pars) (no illustration).
2004 *Eostaffella mosquensis* Vissarionova - Cózar, pl. 2, fig. 15.
v. 2005 *Eostaffella* ex gr. *mosquensis* (Brady) - Saïd, p. 176 (no illlustration).
2005 *Eostaffella mosquensis* Vissarionova - Somerville and Cózar, pl. 3, fig. 27.
? 2005 *Eostaffella radiata* (Brady) - Somerville and Cózar, pl. 3, fig. 17 (or *E. proikensis*).

Description. This species is characterized by its medium size (for a late Viséan species), its lateral compression, inner whorls with rounded periphery, small umbilici and discontinuous chomata. Diameter (D) = 0.380-0.500 mm; width (w) = 0.230-0.300 mm; ratio w/D = 0.50-0.56 (0.64); proloculus diameter = 0.030-0.045 mm; number of whorls: 4-5.5; number of chambers at the last whorl: 11-13; thickness of wall at the last whorl = 0.015-0.025 mm.

Remarks. *Endothyra radiata* Brady (1876) is an entire specimen, not a section; consequently, no indication about its wall is given. It can also belong to *Pseudoendothyra*. The synonymy with *Eostaffella mosquensis* proposed by some authors (since Mamet, 1970, p. 38) is not admitted here (see also Maslo and Vachard, 1997). Specimens of Ardengost (Perret, 1973b) can be juveniles of *E. parastruvei*.

Occurrence. Aleksinsky-Venevsky of Submoscovite Basin; late Viséan of Samara Bend; late Viséan-Serpukhovian of central and Northern Urals, Kazakhstan and Uzbekistan; Protvinsky-earliest Bashkirian of Southern Urals; $C_1^{v}e_1$-$C_1^{s}a$ of Donets Basin (from Middle Viséan to early Bashkirian in the former USSR, according to Groves, 1988). Late Viséan of Poland (MFZ14 = Cf6γ). Elegans zone of Germany. Brigantian of Southwestern Spain. Holkerian-Asbian of England (late Asbian-early Brigantian of Northern England). Late Asbian of Morocco. Late Asbian? of Libya. V3bβ of Turkey (Zonguldak). Serpukhovian of Tianshan. Late Brigantian of Malaysia. Late Viséan of Laos (Ban Phit, Tham Heup), Thailand (Loei), and China (Tarim). ?Serpukhovian of Thailand (Chiang Dao). Ichinotani Formation, Akiyoshi Group and Hina Group (late Serpukhovian) of Japan. Brigantian of Windsor Group (SE

Canada). ?Middle-late Viséan of Alberta. Late Serpukhovian-middle Bashkirian of Alaska. Bashkirian of Spitsbergen. Late Serpukhovian of Bangor Limestone (USA). Brigantian of the Montagne Noire: Castelsec (MA10-?, MA10.3, MA10.12, MA10.II.122); Roquemaillère (DV137A, DV137C, DV137D, DV137G, DV137H); Japhet (DV126C, DV126D); Vailhan-Château (DV246A, DV246B, DV246E, DV246G, DV246H); Les Pascales (DV601B); Péret (ML784: 4 specimens); Mounio (DV431D, 431E); Roc de Murviel (MA82, MA83). Late Serpukhovian of Ardengost area: AH4, AH8, AH9, AH10, Mar3A, ARdRC12 (Perret, 1993); Areng MFP.AH8, MFP.AH10, Col de Frechet MFP.Bar1, Bois de Gertous, Ruisseau d'Ardengost MFP.Rui4 (Perret, 1973b); MFP.AH.18A, AH18E (this study). Bashkirian of Pyrenees.

Eostaffella parastruvei Rauzer-Chernousova, 1948h

Pl. 69, figs. 1-3.

1948h *Staffella (Eostaffella) parastruvei* n. sp. Rauzer-Chernousova, p. 15-16, pl. 3, figs. 16-18.
1951 *Eostaffella parastruvei* Rauser - Ganelina, p. 9-10 (French translation), pl. 1, figs. 11, 13.
1956a *Eostaffella parastruvei* Rauser - Malakhova, p. 52, pl. 8, fig. 10.
? 1963 *Eostaffella parastruvei* Rauser - Conil and Pirlet, pl. 3, fig. 41.
non 1964 *Eostaffella parastruvei* Rauzer-Chernousova - Conil and Lys, p. 236, pl. 40, figs. 827-836.
1970 *Eostaffella parastruvei* Rauzer-Chernousova - Rumyantseva, p. 153, pl. 6, figs. 18-19 (with synonymy).
v. 1973b *Eostaffella irinae* Ganelina (sic pro *irenae*) - Perret, p. 314, pl. 6, fig. 2.
v. ? 1973b *Eostaffella ikensis* Vissarionova - Perret, p. 315, pl. 6, fig. 5.
v. 1973b *Eostaffella* sp. - Perret, p. 317, pl. 6, fig. 4.
v. non 1973b *Eostaffella* cf. *parastruvei* Rauzer-Chernousova - Perret, p. 315-316, pl. 6, figs. 12-13 (probably *E.* ex gr. *mosquensis*).
v. ? 1973b *Millerella* cf. *marblensis* Thompson - Perret, p. 319-320, pl. 6, fig. 11 (probably a juvenile of *E. parastruvei*).
v. 1973b ?*Millerella* sp. - Perret, p. 320-321, pl. 6, fig. 7.
non 1973 *Eostaffella parastruvei* Rauzer-Chernousova - Bozorgnia, p. 148-149, pl. 20, fig. 6.
1973 *Eostaffella parastruvei* Rauzer-Chernousova - Browne and Pohl, pl. 31, fig. 7 (refigured holotype).
1973 *Eostaffella parastruvei* Raus. - Maslov, pl. 29, fig. 11.
v. 1977 *Eostaffella parastruvei* Rauzer-Chernousova - Perret and Vachard, p. 90 (no illustration).
?1977 *Eostaffella parastruvei* Rauzer-Chernousova - Dil, pl. 7, fig. 109 (maybe *Pseudoendothyra*).
1978 *Eostaffella parastruvei* Raus. - Sultanaev et al., p. 102, pl. 7, fig. 5.
?1981 *Eostaffella parastruvei* (Rauser) (sic for the brackets: it is the type-species!) - Strank, pl. 5, figs. 16-17, pl. 6, figs. 1, 9, pl. 7, fig. 1? 7?, 10, 16, 31?, pl. 8, fig. 10, pl. 11, fig. 14, pl. 15, fig. 13?.
? v. 1982 *Eostaffella parastruvei* Raus. - Fontaine and Vachard, p. 191 (no illustration).
1983 *Eostaffella parastruvei* Rauser - Conil and Paproth, fig. 3. 9.
1983 *Eostaffella* ex gr. *parastruvei* Raus. - Aizenverg et al., p. 16-17 (no illustration).
1987 *Eostaffella parastruvei* Rauzer-Chernousova - Sinitsyna and Sinitsyn, pl. 1, fig. 18, pl. 4, fig. 8? (ex gr.).
1988 *Eostaffella parastruvei* Rauzer-Chernousova - Kulagina, p. 26, pl. 1, fig. 7, pl. 2, fig. 11.
non 1989 *Eostaffella* sp. cf. *E. parastruvei* (Rauser-Chernoussova) - Fewtrell et al., p. 41, pl. 3.3, fig. 19 (= *Eoparastaffella*).
? p. 1989 *Eostaffella parastruvei* (Rauser-Chernoussova) - Fewtrell et al., p. 47, pl. 3.5, fig. 13 (the minimal indicaed diameter, 0.450 mm is to small to the species, and that depends also of the wall structure).
1989 *Eostaffella* cf. *parastruvei* Rauser-Chernousova - Skompski et al., pl. 7, fig. 24.
v. 1992 *Eostaffella* ex gr. *mosquensis* (Brady) - Vachard and Berkhli, pl. 3, figs. 1-2.
v. 1993 *Eostaffella* ex gr. *parastruvei* Rauser-Chernousova - Perret, pl. F3, figs. 14, 24-25.
v. 1993 *Eostaffella* sp. 1 - Perret, pl. F3, figs. 19-20.
v. 1993 *Eostaffella* sp. 2 - Perret, pl. F3, figs. 21-22.
1996 *Eostaffella parastruvei* Rauzer-Chernousova - Cózar-Maldonado, pl. 2, fig. 9.
1997 *Eostaffella* ex gr. *parastruvei* Rauser-Chernousova - Kulagina and Sinitsyna, pl. 1, fig. 1.
?1997 *Eostaffella mosquensis* Vissarionova - Ueno and Igo, pl. 1, figs. 16-17.
1997 *Eostaffella parastruvei* Rauzer-Chernousova - Mazuno and Ueno, tabl. 2, pl. 5, figs. 11-13.
1997 *Eostaffella parastruvei* Rauzer-Chernousova - Maslo and Vachard, p. 44, text-fig. 1 p. 42 (no illustration).
1998 *Eostaffella parastruvei* Rauzer-Chernousova - Gallagher, pl. 2, fig. 2.
1999 *Eostaffella parastruvei* Rauzer-Chernousova - Cózar, p. 88-89, pl. 1, fig. 6 (with synonymy).
v. 1999 *Eostaffella* ex gr. *mosquensis* (Brady) - Berkhli, p. 112 (no illustration).

2001 *Eostaffella parastruvei* Rauzer-Chernousova - Vdovenko, tabl. 1 p. 177, pl. 25, figs. 17?-21? (all: ex gr.).
? 2001 *Eostaffella* cf. *parastruvei* Rauzer-Chernousova - Villa et al., pl. 12, figs. 5, 15.
2001 *Eostaffella* ex gr. *parastruvei* Rauser - Kulagina et al., text-fig. 11 p. 37, pl. 1, fig. 4 (no illustration).
non 2002 *Eostaffella* ex gr. *parastruvei* (Rauzer-Chernousova) (sic with parentheses; puzzling for the type-species!) - van Ginkel, p. 64-65, figs. 15 F-G.
2002 *Eostaffella parastruvei* Rauzer-Chernousova - Pazukhin et al., p. 221 (no illustration).
2002 *Eostaffella parastruvei* Rauzer-Chernousova - Ponomareva et al., p. 240 (no illustration).
v. p. 2003 *Eostaffella* ex gr. *mosquensis* (Brady) - Fontaine et al., pl. 9, figs. 1, 8-9 (non pl. 7, figs. 1, 4, 10 = *E. mosquensis*, see above).
2003 *Eostaffella parastruvei* Rauzer-Chernousova - Brenckle and Milkina, pl. 4, fig. 18.
2004 *Eostaffella parastruvei* Rauzer-Chernousova - Cózar et al., fig. 3. 7.
2004 *Eostaffella parastruvei* Rauzer-Chernousova - Cózar and Somerville, fig. 14. 30.
2004 *Eostaffella* ex gr. *parastruvei* Rauzer-Chernousova - Cózar, text-fig. 5 p. 376, text-fig. 6 p. 378, p. 383, pl. 2, fig. 14.
2005 *Eostaffella parastruvei* Rauzer-Chernousova - Brenckle, p. 39, pl. 7, figs. 1-2.
2005 *Eostaffella parastruvei* Rauzer-Chernousova - Orlov-Labkovsky, p. 26 (no illustration).
2005 *Eostaffella parastruvei* Rauzer-Chernousova - Somerville and Cózar, pl. 3, fig. 25 ?, 28.

Description. Test rather large and compressed. Diameter (D) = 0.600-1.000 mm; width (w) = 0.300-0.500 mm; ratio w/D = 0,49-0.56; proloculus diameter = 0.036-0.045 mm; number of whorls: 4-5; number of chambers at the last whorl = 15; thickness of wall at the last whorl = 0.010-0.020 mm.

Occurrence. Probable FAD in the Asbian/Brigantian boundary (Robinson Limestone) in Northern England (Cózar and Somerville, 2004; although Strank, 1981 and Fewtrell et al., 1989 indicate a FAD in the Holkerian = Cf5 = MFZ12; and Conil and Lys, 1964: V1b-V3ba in Belgium, and Bozorgnia, 1973: V2b-V3a in central Alborz (Iran), for a taxon which is probably different and corresponding to a new genus of advanced *Eoparastaffella* or to atypical *Eoendothyranopsis*; (see also Vachard, 1990). Aleksinsky-Protvinsky of Submoscovite Basin. Late Viséan-Bashkirian (Cózar, 1999; probably after Sultanaev et al., 1978): Gubashkinsky-Siuransky of Urals. $C_1^{\gamma}f_2$-Serpukhovian (D Limestone) of Donets Basin. Late Viséan of Germany. ?V3bβ of Turkey (Zonguldak). MFZ14 = Cf6δ of Poland. Late Viséan-Serpukhovian of Kazakhstan. Serpukhovian-early Bashkirian of Uzbekistan. Bashkirian of Algeria (Bechar Basin). Late Brigantian of central Morocco (Saïd, 2005). Late Viséan-late Serpukhovian of Southwestern Spain.? Serpukhovian of Thailand (Chiang Dao). ?Late Bashkirian of Viet-Nam. Serpukhovian of Malaysia. Late Serpukhovian of Hina Group (Japan). Latest Viséan-early Serpukhovian of Tien-Shan. Late Serpukhovian of Ardengost area: Areng MFP.AH14, MFP.AH18, Ruisseau d'Ardengost MFP.Rui2, Bois de Gertous MFP.Ger4 (Perret, 1973b); AH4, AH9, AH10, Ard27, Mail4 (Perret, 1993); MFP.AH18C, AH18E, AH 20 (= DV778A), AH20B, AH20E, AH.B/81.9, AH.E/81, ?CAS.15bis.2 (this study).

7.16. Staffelloids

Superfamily Staffelloidea Miklukho-Maklay, 1949 nomen translat. Solovieva, 1978
Family Pseudoendothyridae Mamet in Mamet et al., 1970
Genus *Pseudoendothyra* Mikhailov, 1939

Type species. *Fusulinella struvei* von Möller, 1879.

Synonym. *Parastaffella* Rauzer-Chernousova, 1948h (preferred by Brenckle, 2005, p. 74, without convincing arguments, especially a revision of the type material of Mikhailov, 1939).

Diagnosis. Similar to *Eostaffella* but with a wall trilayered with an intercalated luminotheca (often confused with a diaphanotheca).

Remarks. During the Serpukhovian, *Reitlingerina* replaces *Pseudoendothyra*. *Reitlingerina* in turn gives *Nankinella* and the true Staffellidae (Vachard, 1990; Vachard et al., 2003b). Other distinct genera also confused with *Pseudoendothyra* appear in the Permian (Gaillot, work in progress).

Occurrence. *Pseudoendothyra* sensu stricto is limited to the late Viséan- late Serpukhovian, and is Palaeotethyan (until to Japan: Mizuno and Ueno, 1997), Uralian and Northamerican (Idaho). Possible LAD in the Potts Beck Limestone (early Asbian) of England (see Strank, 1981).

Pseudoendothyra struvei (von Möller, 1879)
Pl. 70, figs. 1-18.

? 1876 *Endothyra ornata* n. sp. Brady, p. 99, pl. 6, figs. 1-4.
1879 *Fusulinella Struvii* n. sp. von Möller, p. 22-25, pl. 2 (no 3 as indicated p. 22) , figs. 1a-c, pl. 5, figs. 4a-c.
1948 *Parastaffella struvei* Moeller (sic) -Vissarionova, pl. 13, figs. 1-3, 5.
1948h *Parastaffella struvei* Moeller (sic) - Rauzer-Chernousova, p. 14, pl. 3, figs. 12-13.
1956a *Parastaffella struvei* (Moeller) - Malakhova, p. 53, pl. 8, fig. 11.
1960 *Pseudoendothyra struvei* (von Möller) - Grozdilova and Lebedeva, p. 101-102, pl. 12, fig. 1.
1964 *Pseudoendothyra struvei* var. *struvei* (von Möller) - Conil and Lys, p. 244-245, pl. 41, fig. 862-863.
1967 *Pseudoendothyra struvii* (von Möller) - Eichkoff, p. 34-36, pl. 5, figs. 3-5, pl. 6, fig. 2-3, 5, 8 (with synonymy: 24 references).
1970 *Pseudoendothyra struvei* (Moeller) - Rumyantseva, pl. 4, figs. 1-2.
1970 *Pseudoendothyra* of the group *P. ornata* (Brady) - Mamet, n° 52 of text-fig. 3 p. 4-5, p. 13, pl. 6, fig. 9.
1972 *Parastaffella struvei* (Moeller) - Malakhova, p. 40, pl. 7, figs. 8-9.
v. 1973b *Pseudoendothyra struvei nodus* (Durkina) - Perret, p. 320-321, pl. 6, figs. 8-9.
1974 *Pseudoendothyra struvei* (Moeller) - Rumyantseva, p. 75-76, pl. 5, figs. 7-8.
? 1974a *Pseudoendothyra* du groupe *P. ornata* Brady (sic without parentheses) (= *Pseudoendothyra struvei* von Möller) - Mamet, p. 402 (no figuration, impossible to demonstrate).
v. 1974b *Pseudoendothyra struvei nodus* (Durkina) - Vachard, p. 302-303, pl. 19, fig. 13.
v. 1974b *Pseudoendothyra* sp. 2 - Vachard, p. 303, pl. 19, figs. 14-15.
1977 *Pseudoendothyra ornata* (Brady) - Armstrong and Mamet, p. 83-84, pl. 34, fig. 19 (with synonymy).
v. 1977 *Pseudoendothyra* ex gr. *struvei* (Moeller) - Perret and Vachard, p. 90 (no illustration).
v. 1977b *Pseudoendothyra struvei nodus* (Durkina) - Vachard, p. 152, pl. 5, fig. 19 (with 4 references in synonymy).
1978 *Pseudoendothyra struvei nodus* (Durkina) - Lys et al., pl. 1, fig. 28.
1978 *Pseudoendothyra* cf. *struvei* (Moeller) - Lys et al., pl. 1, fig. 29.
? 1980 *Pseudoendothyra ornata* (Brady) - Skompski and Sobon-Podgorska, pl. 4, fig. 6.
? 1981 *Eoparastaffella*? aff *simplex* (sic) forma typica Vdovenko - Strank, pl. 7, fig. 33.
v. 1982 *Pseudoendothyra struvei* Moell. (sic) - Fontaine and Vachard, p. 192 (no illustration).
1984 *Pseudoendothyra struvei* (Moeller) - Zhao et al., p. 94-95, pl. 14, fig. 15.
1987 *Pseudoendothyra* ex gr. *struvei* (Moeller) - Sinitsyna and Sinitsyn, pl. 1, figs. 7-8, pl. 4, fig. 2, pl. 15, fig. 3.
? 1988 *Pseudoendothyra* ex gr. *ornata* (Brady) - Groves, fig. 12. 6-11 (probably not recrystallized *Reitlingerina*).
1993 *Pseudoendothyra* of the group *P. ornata* (Brady) [= *Pseudoendothyra* of the group *P. struvei* (von Möller)] - Mamet et al., pl. 11, fig. 20.
1993 *Pseudoendothyra* cf. *struvii* (Moeller) - Ueno and Nakazawa, p. 43-44, fig. 15. 28.31 (with 18 references in synonymy).
1996 *Pseudoendothyra struvei* (von Moeller) - Cózar-Maldonado, pl. 2, fig. 8.
?1997 *Parastaffella struvei* (Moeller) - Kulagina et al., text-fig. 4 (pars) (no illustration).
1997 *Parastaffella struvei* (Moeller) - Kulagina and Sinitsyna, p. 86 (no illustration).
?1997 *Pseudoendothyra struvei* (Möller) - Ueno and Igo, pl. 1, figs. 13-14 (?another species).
1998 *Pseudoendothyra ornata* (Brady) - Pinard and Mamet, p. 87-88, pl. 37, figs. 18-19 (with synonymy).
p. 1999 *Pseudoendothyra ornata* (Brady) - Cózar, p. 92-93, pl. 2, figs. 6-7 (the proposed synonymy is questionable).
2001 *Parastaffella struvei struvei* (Moeller) - Vdovenko, tabl. 1 p. 176, pl. 23, figs. 52? (ex gr.), 60.
non 2002 *Pseudoendothyra* ex gr. *struvii* (von Möller) - van Ginkel, p. 44, figs. 5 R-S (= *Reitlingerina*).
2002 *Pseudoendothyra struvei* (Moeller) - Shcherbakova and Shcherbakov, p. 310, 311, 312 (no illustration).
v. 2002a *Pseudoendothyra* ex gr. *struvei* (von Moeller) - Berkhli et al., p. 193 (no illustration).
v. 2002b *Pseudoendothyra* ex gr. *struvei* (von Moeller) - Berkhli et al., p. 139 (no illustration).

2003 *Pseudoendothyra struvii* (sic) (von Möller) - Brenckle and Miklina, pl. 3, fig. 6.
2003 *Parastaffella struvei* (Moell.) - Kulagina et al., text-fig. 3 p. 176.
2003a *Pseudoendothyra ornata* Brady - Cózar, fig. 4S.
?2004 *Pseudoendothyra* ex gr. *ornata* Brady - Cózar, text-fig. 5 p. 376 (pars), text-fig. 6 p. 378 (pars) (no illustration).
2005 *Pseudoendothyra ornata* (Brady) - Somerville and Cózar, pl. 3, fig. 27.

Description. Diameter (D) = 0.350-0.900 mm; width (w) = 0.250-0.500 mm; ratio w/D = 0.50-0.65; proloculus diameter = 0.020-0.060 mm; number of whorls: 4-6; thickness of wall at the last whorl = 0.020-0.025 mm.

Remark. As well as for *Eostaffella radiata/mosquensis*, the synonymy *P. ornata/P. struvei* is not demonstrated (maybe *radiata* is the *Pseudoendothyra* and *ornata* the *Eostaffella*). Sometimes, the homogeneity itself of the type material of von Möller is discussed (see Rauzer-Chernoussova, 1985).

Occurrence. Tulsky of Kazakhstan. Late Viséan former USSR, Viet-Nam, Germany, England, Spain, ?Poland and Morocco. C_1^{v}d-$C_1^{v}f_2$ of Donets Basin. Early Serpukhovian of Afghanistan (Termier et al., 1975) (see also Armstrong and Mamet, 1977 and Pinard and Mamet, 1998). Viséan-late Bashkirian of Uzbekistan and Southern Urals. ?Early Bashkirian of Southern Urals (or *Reitlingerina*). V3c of Eastern Alborz (Northern Iran). Late Viséan of Tarim (China). ?Serpukhovian of Thailand (Chiang Dao). Late Viséan of Japan. Latest Viséan-early Serpukhovian of Windsor Group (SE Canada). Brigantian-early Serpukhovian of Montagne Noire: Castelsec (MA10.12, ?MA10.50); Roquemaillère (DV137C); Les Pascales (DV601A); Serre de Péret (?MA.SP30); La Serre (MA.LSII.2029, MA.LS.Felgweg10, MA.LS. Felgweg 17). Late Serpukhovian of Ardengost area: Areng MFP.AH20 (Perret, 1973b, confirmed here); MFP.AH20'F, AH.A/81; MFP.CAS15 (this study).

Pseudoendothyra luminosa (Ganelina, 1956)
Pl. 70, fig. 19.

1956 *Parastaffella luminosa* n. sp. Ganelina, p. 53-54 (French translation), pl. 12, figs. 1-2.
1989 *Pseudoendothyra sublimis* (Schlykova) - Skompski et al., pl. 7, fig. 23.
2001 *Parastaffella luminosa* Ganelina - Vdovenko, tabl. 1 p. 176, pl. 23, fig. 48.

Description. Diameter (D) = 1.150-1.320 mm; width (w) = 0.460-0.480 mm; ratio w/D = 0.36-0.40; proloculus diameter = 0.030 mm; number of whorls: 5.5-6; thickness of wall at the last whorl = 0.020 mm.

Occurrence. Venevsky of Moscow Basin. $C_1^{v}f_2$ of Donets Basin. MFZ14 = Cf6δ of Poland. Latest Brigantian of Montagne Noire: Roc de Murviel (MA24).

Pseudoendothyra angulata (Rauzer-Chernousova, 1948g)
Pl. 70, fig. 20.

1948g *Parastaffella propinqua angulata* var. nov. Rauzer-Chernousova, p. 242-243, pl. 17, figs. 17-19.
?1972 *Pseudoendothyra* sp. - Bertrand, pl. 2, fig. 25.
v. 1974b *Pseudoendothyra angulata* (Rauzer-Chernousova) - Vachard, p. 302, pl. 19, figs. 6-7. v. 1977b *Pseudoendothyra angulata* (Rauzer-Chernousova) - Vachard, p. 151, pl. 5, fig. 24 (with 3 references in synonymy).
1981 *Pseudoendothyra angulata* (Rauzer-Chernousova) - Strank, pl. 16, fig. 5
non 1998 *Pseudoendothyra angulata* Rauser (sic without parentheses) - Zhang and Hong, p. 206, pl. 2, figs. 5-7 (a species of *Reitlingerina*).
2001 *Parastaffella angulata* Rauzer-Chernousova - Vdovenko, tabl. 1 p. 176, pl. 25, figs. 4, 6.
2001 *Parastaffella angulata* Rauzer-Chernousova forma minima - Vdovenko, pl. 24, figs. 18, 22.
2001 *Parastaffella angulata* Rauzer-Chernousova forma recta - Vdovenko, pl. 24, fig. 5.
2002 *Pseudoendothyra angulata* (Rauzer-Chernousova) - Marfenkova, p. 195 (no illustration).
2003 *Parastaffella angulata* Raus. - Kulagina et al., text-fig. 3 p. 176 (no illustration).

Description. Diameter (D) = 0.320-0.660 mm; width (w) = 0.270-0.375 mm; ratio w/D = 0.57-0.58; proloculus diameter = 0.025 mm; number of whorls: 3-4; number of chambers at the last whorl: 15; thickness of wall at the last whorl = 0.010-0.020 mm.

Occurrence. $C_1^v e_1$-$C_1^v f_2$ of Donets Basin. Robinson Limestone of England. Late Viséan of Samara Bend. Slope of sommet 224-Valuzières (DV600B).

Pseudoendothyra spp.

1978 *Pseudoendothyra sublimis* (Schlykova) - Sultanaev et al., p. 103, pl. 7, fig. 3.
1978 *Pseudoendothyra sublimis* (Schlykova) - Lys et al., pl. 1, fig. 25.
1981 *Pseudoendothyra sublimis* Schlykova (sic: without brackets) - Strank, pl. 7, fig. 30? (aff.), pl. 13, fig. 3, pl. 19, fig. 9.
1989 *Pseudoendothyra sublimis* (Schlykova) - Fewtrell et al., p. 54, pl. 3. 8, fig. 3.
1992 *Pseudoendothyra sublimis* (Schlykova) - Somerville et al. fig. 6P.
1996 *Pseudoendothyra sublimis* (Schlykova) - Gallagher, text-fig. 2 p. 242 (no illustration).
1997 *Pseudoendothyra sublimis* (Schlykova) - Gallagher and Somerville, text-fig. 4 p. 318, text-fig. 5 p. 320, text-fig. 6 p. 321, text-fig. 7a, c p. 323, text-fig. 8 p. 325 (no illustration).
1998 *Pseudoendothyra sublimis* (Schlykova) - Gallagher, pl. 2, fig. 1.
2001 *Parastaffella sublimis* Schlykova - Vdovenko, tabl. 1 p. 176, pl. 24, figs. 4-6, 11? (ex gr.).
2004 *Pseudoendothyra sublimis* (Rauzer-Chernousova) (sic) - Cózar and Somerville, fig. 14. 29.
2004 *Pseudoendothyra sublimis* (Schlykova) - Cózar, text-fig. 5 p. 376 (pars), text-fig. 6 p. 378 (pars), pl. 2, fig. 17.
2005 *Pseudoendothyra sublinis* (sic) - Orlov-Labkovsky, p. 23 (no illustration).
2005 *Pseudoendothyra sublimis* (Schlykova) - Somerville and Cózar, pl. 3, figs. 32-33.

Remarks. The most advanced specimens of *Pseudoendothyra*, in Ardengost, are passing to *Reitlingerina*, with a completely sparitized wall. The replacement of *Pseudoendothyra* by *Reitlingerina* seems to be total since the Bashkirian (Proust et al., 1996, p. 348).

Occurrence. *P. sublimis* in known in Gubashkinsky-Ladeininsky of Urals. Aleksinsky-Tarussky Russian Plate. Donets Basin $C_1^v f2$-$C_1^v g$. Asbian-Brigantian of Ireland and England. V3c of Eastern Alborz (Iran). Brigantian of Montagne Noire: Castelsec (MA10.7.2, MA10.12); Roquemaillère (DV137C); Laurens (ML.UM.LAU.T); Péret (ML784); 500m E de Vailhan (?ML788); Serre de Péret (MA.SP15); Les Mentaresses (DV328'B, DV328'C, DV328'D); Roc de Murviel (MA24, MA330.4, MA330.8). Late Serpukhovian of Ardengost area: MFP.AH.18i, AH20B, AH20F, AH20'F.

7. 17. Order Miliolids

Class Miliolata Delage and Hérouard, 1896 nomen translat. Saidova, 1981

Order Miliolida Delage and Hérouard, 1896
nomen translat. Calkins, 1909 (fide Loeblich and Tappan, 1987)
Suborder Miliolina Delage and Hérouard, 1896 nom. correct. Loeblich and Tappan, 1961
Superfamily Nubecularioidea Haynes, 1981
Family Calcivertellidae Loeblich and Tappan, 1964
nomen translat. Reitlinger in Vdovenko et al., 1993 (ex subfamily)
Genus *Calcitornella* Cushman and Waters, 1928

Type species. *Calcitornella elongata* Cushman and Waters, 1928.

Diagnosis. Test attached, proloculus followed by a undivided tubular chamber, streptospirally coiled and after uncoiled and diversely elongate upon the substrate. Wall porcelanous. Simple terminal aperture.

Remarks. The genus is generally poorly known in thin sections, and easily confused with *Calcivertella* Cushman and Waters, 1928.

Occurrence. Latest Brigantian to latest Permian, cosmopolite.

Calcitornella (?) sp.
Pl. 71, figs. 1-8.

? 1970 *Calcitornella*? sp. - Skipp and Mamet, p. B121(no illustration).
? 1975 no legend - Ivanova, pl. 1, figs. 12-13.
1982 *Calcitornella/Calcivertella* - Baxter and Brenckle, text-fig. 3 p. 140, text-fig. 6 p. 146.
?v. 1991c "*Warnantella*" sp. - Vachard et al., p. 677 (no illustration).
1992 *Warnantella* sp. - Matsusue, text-fig. 2 p. 383, fig. 3. 25.
v. 1993 Calcivertellidés - Perret, pl. F.XI, fig. 23.
v. 1996 *Calcitornella* sp. - Vachard and Montenat, text-fig. 4 p. 469 (no illustration).
? 1997 calcitornellin/calcivertellin encrusting foraminifer - Harris et al., fig. 8. 20.
2001 *Calcitornella* sp. - Vdovenko, tabl. 1 p. 168, pl. 1, fig. 5.
?2003 Calcivertellidae - Fontaine et al., pl. 7, fig. 2.
p. v. 2003 *Pseudoglomospira* sp. - Fontaine et al., pl. 9, fig. 11 (no pl. 7, fig. 4, nor pl. 9, fig. 12 = true *Pseudoglomospira* spp.).
v. 2005 *Calcitornella* sp. - Saïd, p. 180, p. 186 (no illustration).
v. 2005 *Warnantella* sp. - Saïd, p. 185, fig. X. 1. 3, 21.
2006 encrusting foraminifers - Groves and Beason, pl. 1, figs. 14-15.

Description. These small forms are generally confused with *Pseudoglomospira, Warnantella* or «*Tolypammina*». They are very important since they are the first forms of Miliolida. Their nomenclature is difficult, but they don't seem to be fundamentally different of the Permian *Calcitornella*, although very smaller. Diameter (D) = app. 6.000 mm; width (w) = up to 3.000mm; ratio w/D = 0.500 mm.

Remarks. The replacing of the Fusulinida by the Miliolida is a major biostratigraphical problem to solve in the next years. According to Vachard (pers. comm., 2005) it seemed to take place just at the Serpukhovian boundary, but my material proves a FAD of the Miliolida since the latest Brigantian, and a nearly complete replacment during the late Serpukhovian (with the unsolved problem of my glomospiroid specimens). Moreover, Vdovenko (2001, p. 109, tabl. 1 p. 168) indicates a great diversity of Miliolid genera in the limestone B9 of Donets Basin: *Calcivertella, Calcitornella, Trepeilopsis, Palaeonubecularia*?, very near the first Serpukhovian limestone, i. e., C1 (formerly B12). The FAD of *Calcivertella* is B1 and of *Trepeilopsis* is B7 according to the same work of Vdovenko. Considering the four genera quoted before, which all are attached, we can suggest that the replacing is between attached tubular Fusulinida and attached Miliolida, and consequently the transition *Scalebrina-Calcitornella* seems to be the most logical. True *Cornuspira* seem to appear in the early Bashkirian (with *Ammodiscus* or *Turrispiroides* of the authors; e. g., Reitlinger, 1949, 1950; Groves, 1988). The FAD of *Warnantella* which is a possible synonym of *Calcitornella*, is located at the base of the zone MFZ14 = Cf6δ = "V3c" (Devuyst et al., 2005, text-fig. 13).

Occurrence. $C_1^{v}g$ of Donets Basin. Brigantian of Morocco. Brigantian of Malaysia. Early Serpukhovian of Idaho (USA) and Afghanistan. ?Pella Fn of Iowa (USA). Serpukhovian-earliest Bashkirian of Hina Group (Japan). Latest Brigantian-early Serpukhovian of Montagne Noire: Roc de Murviel (MA50, MA330.11, MA371); Gare de Laurens (ML789). Late Serpukhovian of Ardengost area: Montagne d'Areng MFP.ARE1.10, MFP.AH2, AH18F, AH.18H, AH20A, MFP.CAS13', CAS14.2, CAS14.3.

Genus *Ammovertella* Cushman, 1928b

Type species. *Ammodiscus (Psammophis) inversus* Schellwien, 1898.

Diagnosis. Test attached, proloculus followed by a undivided tubular chambers, initially planispiral and after uncoiled in zigzag fashion. Wall porcelaneous. Simple terminal aperture.

Remarks. Although described as "finely agglutined", the original wall seems to be porcelaneous. The genera *Calcitornella, Calcivertella, Trepeilopsis* and *Ammovertella* are very closely related. After the doubtful forms of the Serpukhovian, true *Ammovertella inversa* seem to appear at the base of the Bashkirian (formerly zone H of goniatites; Lys et al., 1978, pl. 2, fig. 6), but *Ammovertella* remains one of the most primitive forms of Porcelaneous.

Occurrence. Latest Viséan to Early Permian, probably cosmopolite.

Ammovertella (?) sp.

Pl. 71, fig. 9.

?1970 *Ammovertella*? sp. - Petryk et al., n° 92 of text-fig. 4, p. 93 (no illustration).
? 1972 Apterinellidés - Mamet, p. 2, 4 (no illustration).
v. 1973b *Ammovertella* sp.- Perret, p. 295-296, pl. 1, fig. 12.
v. 1977 "*Ammovertella*" sp. - Perret and Vachard, p. 90 (no illustration).
v. 1979 "*Ammovertella*" sp. - Bensaïd et al., pl. 16, fig. 1.
1981 *Ammovertella*? sp. - Mamet et al., p. 28, 29 (no illustration).
?1981 cf. *Warnantella* sp. - Strank, pl. 18, fig. 16.
1985 *Ammovertella* sp. - Adachi, p. 82, pl. 8, figs. 21-23.
?1985 Calcitornellid/calcivertellid - Skipp et al., pl. 5, figs. 14-15.
1989 *Calcivertella* sp. - Skompski et al., pl. 6, fig. 15.
p. 1992 "calcitornellids" - Groves, p. 149, pl. 1, fig. 9 (non figs. 8, 10,13 = *Trepeilopsis*, nec figs. 11-12 = *Calcivertella*).
v. 1993 *Ammovertella* sp.- Perret, pl. F4, fig. 65.
? 1997 *Calcivertella* or *Calcitornella* - Mazuno and Ueno, tabl. 2, pl. 3, fig. 8 (no illustration).
2001 *Calcivertella* sp. - Vdovenko, pl. 1, fig. 9.
v. p. 2006 *Scalebrina* sp. - Sanz-Lopez et al., fig. 8.9 (non fig. 8. 2. 12, maybe true *Scalebrina*).

Description. Diameter (D) = 0.150 mm; height of the last whorl = 0.025 mm.

Occurrence. ?Latest Viséan-earliest Serpukhovian of Reggan Basin (Algeria). C_1^sb of Donbass.?Latest Viséan of Alberta (Canada). Early Serpukhovian-earliest Bashkirian of Idaho. Early Serpukhovian of Poland. Late Serpukhovian of Central Morocco. Serpukhovian of Japan. Atokan of Texas. Late? Brigantian of Roque Redonde (RR2). Late Serpukhovian of Ardengost area: Areng (MFP.AH10) (Perret, 1973b, 1993).

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Thèse de Doctorat

Biodiversité et Ecosystèmes Fossiles et Actuels

par

Lucie Pille

Foraminifères et algues calcaires du Mississippien supérieur (Viséen supérieur-Serpukhovien) : rôles biostratigraphique, paléoécologique et paléogéographique aux échelles locale, régionale et mondiale.

Appendix 2: Atlas of Mississippian Foraminifers and calcareous algae of South France and England.

Thèse dirigée par Daniel Vachard

Soutenue le 8 juillet 2008

Jury :
M. CARIDROIT, Université de Lille 1, Président
D. VACHARD, Université de Lille 1, Directeur de thèse
M. ARETZ, Université de Cologne, Rapporteur
L. HANCE, Carmeuse S.A., Rapporteur
E. POTY, Université de Liège, Rapporteur
R. FEIST, Université de Montpellier 2, Examinateur

Plate 1.

Order indeterminate
Family Renalcidaceae
Genus *Renalcis* Vologdin, 1932 emend. Mamet and Roux, 1983

Figs. 1-17: ***Renalcis nubiformis*** (Antropov, 1955) Vachard, 1993

1. Closely packed colonies. Sample 10-3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/69 (scale bar = 200µm).
2. Dispersed colonies. Sample 10-3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/70 (scale bar = 400µm).
3. Sample LR1.1, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 7/158 (scale bar = 400µm).
4. Sample LR1.1, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 7/159 (scale bar = 200µm).
5. *Renalcis* reworked in an adjacent microbialite. Sample 11-8, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/21 (scale bar = 100µm).
6. Sample PA-8, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/62 (scale bar = 100µm).
7. Sample 136A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/121 (scale bar = 400µm).
8. Sample PE-4, Montagne Noire (France), ouest de Péret, Brigantian. Collection MA, 9.6/13 (scale bar = 300µm).
9. Reworded *Renalcis*. Sample 134A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/148 (scale bar = 100µm).
10. Sample 690D, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/37 (scale bar = 400µm).
11. Sample RR58, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/157 (scale bar = 300µm).
12. Sample RR57, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/153 (scale bar = 100µm).
13. *Renalcis* stage *Shuguria*. Sample RR57, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/155 (scale bar = 100µm).
14. Dendrolites of *Renalcis*. Sample RR79, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/252 (scale bar = 400µm).
15. Sample 341B, Montagne Noire (France), Tourière, Brigantian. Collection DV, 9.9.7/2 (scale bar = 100µm).
16. Sample RR70, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/121 (scale bar = 200µm).
17. Sample RR70, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/120 (scale bar = 200µm).

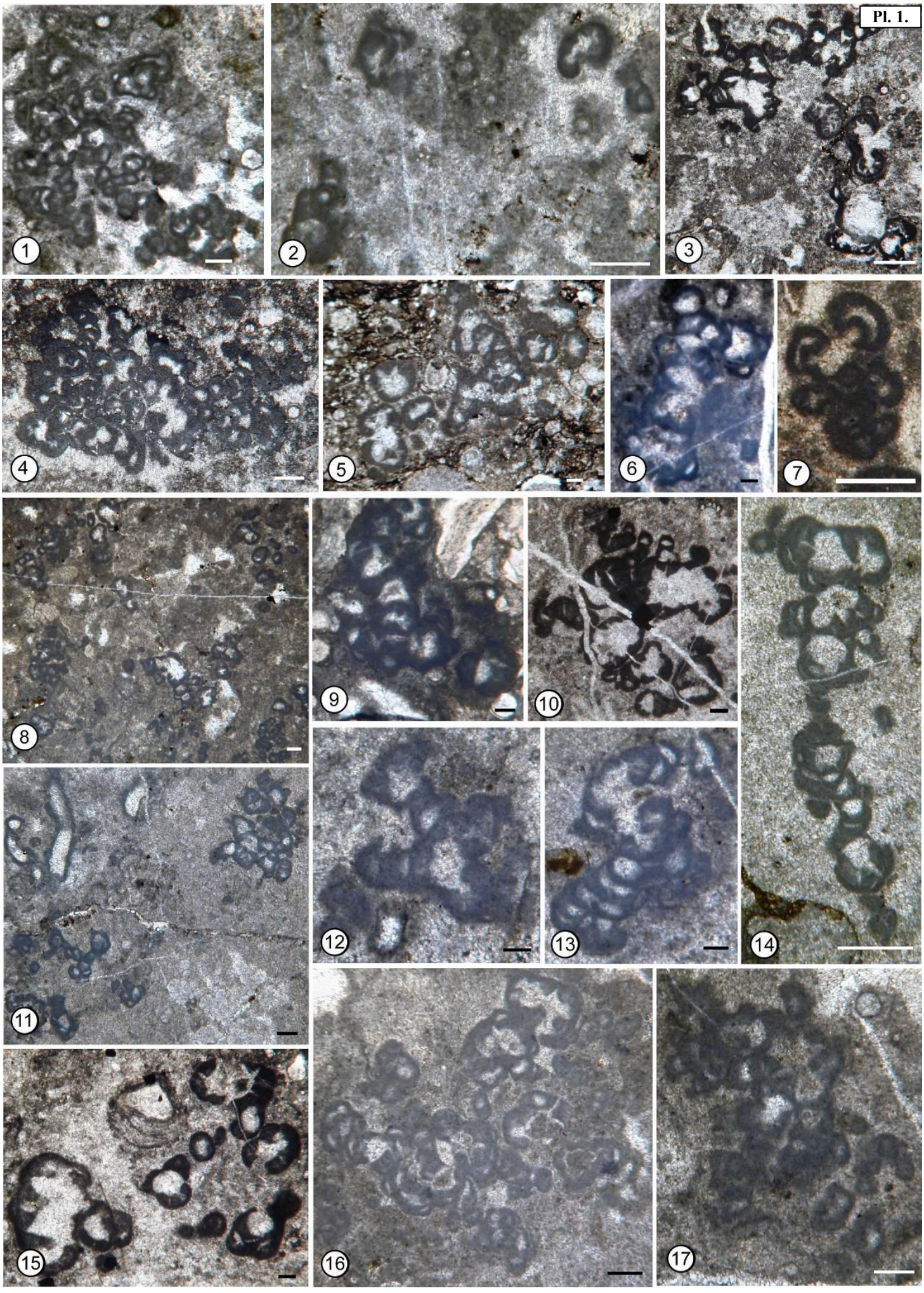

Plate 2.

Genus *Aphralysia* Garwood, 1914

Figs. 1-2: ***Aphralysia carbonaria*** Garwood, 1914

1. Sample 611A, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/81 (scale bar = 100µm).
2. *Aphralysia* and *Girvanella*. Sample 611C, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/93 (scale bar = 100µm).

Figs. 3-9: ***Aphralysia capriorae*** Mamet and Roux, 1975b

3. Sample 126D, Montagne Noire (France), Japhet, earliest Brigantian, late Asbian. Collection DV, 8/51 (scale bar = 100µm).
4. Sample 856A, Montagne Noire (France), Japhet, earliest Brigantian, late Asbian. Collection DV, 9.1/32 (scale bar = 100µm).
5. Sample 330-5, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/18 (scale bar = 100µm).
6. Sample 856C.2, Montagne Noire (France), Japhet, earliest Brigantian, late Asbian. Collection DV, 9.1/41 (scale bar = 200µm).
7. Encrusting *Anchisolenopora* n. gen. Sample 227B, Montagne Noire (France), La Serre (Mas de la Roque), late Brigantian/early Serpukhovian. Collection DV, 9.9.9.9.2/98 (scale bar = 400µm).
8. Sample 227C, Montagne Noire (France), La Serre (Mas de la Roque), late Brigantian/early Serpukhovian. Collection DV, 9.9.9.9.2/105 (scale bar = 100µm).
9. Coral with microbial crusts and crusts of *Aphralysia*. Sample 11-9.1Quer, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/1 (scale bar = 400µm).

Figs. 10-12: ***Aphralysia ferreoli*** Mamet and Roux, 1975b

10. Sample 12-3, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/37 (scale bar = 500µm).
11. Detail of previous one. Sample 12-3, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/38 (scale bar = 100µm).
12. Sample 12-22, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/11 (scale bar = 100µm).

Genus *Sparaphralysia* Vachard in Vachard and Beckary, 1991

Figs. 13-17: ***Sparaphralysia tacania*** Vachard and Beckary, 1991

13. Sample 82, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/47 (scale bar = 400µm).
14. Sample 24, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/68 (scale bar = 200µm).
15. Sample FSL-TIB, Montagne Noire (France), Tiberet, Brigantian. Collection Fac. Sc. Lyon, 9.7/113 (scale bar = 200µm).
16. Sample 25-9B, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.7/6 (scale bar = 400µm).
17. Sample FB3, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB, 7/162 (scale bar = 100µm).

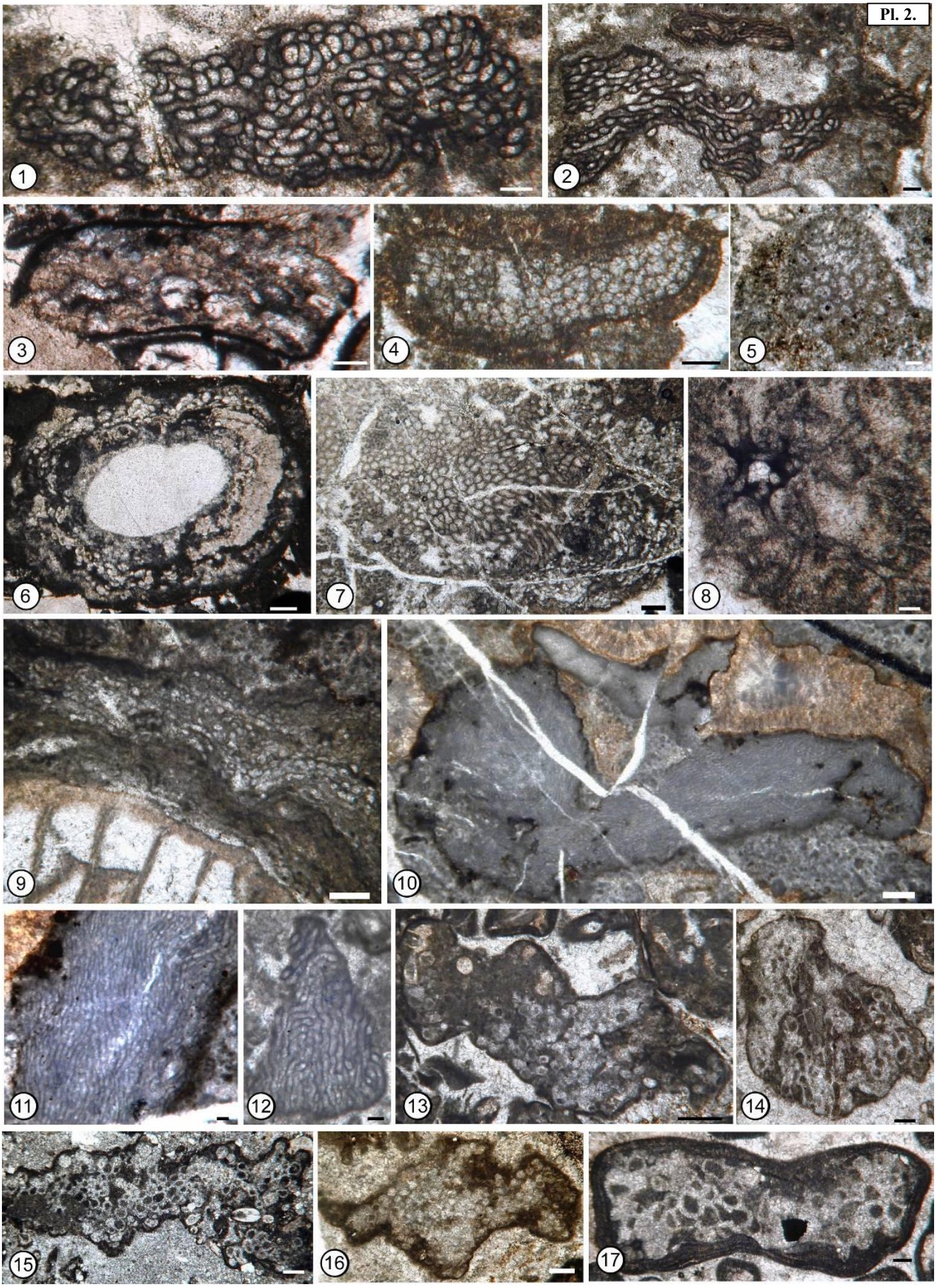

Plate 3.

Genus ***Bacinella*** Radoicic, 1959

Fig.1: ***Bacinella* (?) sp.**

1. Sample 12-15, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/11 (scale bar = 400µm).

Order Proauloporales Luchinina, 1975
Family Girvanellaceae Luchinina, 1975
Genus *Girvanella* Nicholson and Etheridge, 1878

Figs. 2-12: ***Girvanella ducii*** Wethered, 1890

2. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/24 (scale bar = 100µm).
3. Sample 10-IV sup, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.2/54 (scale bar = 100µm).
4. Roof with *Girvanella ducii*. Sample 71, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MLB, 9.9.1/13 (scale bar = 100µm).
5. Sample RR69, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/105 (scale bar = 100µm).
6. Sample ML789, Montagne Noire (France), Gare de Laurens, late Brigantian/early Serpukhovian. Collection MLB, 9.7/101 (scale bar = 100µm).
7. Sample 609.2, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/73 (scale bar = 100µm).
8. Sample 611A, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/85 (scale bar = 200µm).
9. Sample AH18a, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/49 (scale bar = 100µm).
10. Sample RR56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/138 (scale bar = 100µm).
11. Sample AH18f, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/17 (scale bar = 100µm).
12. Sample UM-ROQ, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection Univ. Montpellier, 9.7/138 (scale bar = 100µm).

Figs. 13-14: ***Girvanella wetheredii*** Chapman, 1908

13. Sample RR68, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/88 (scale bar = 100µm).
14. Sample RR70, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/108 (scale bar = 400µm).

Genus *Mitcheldeania* Wethered, 1886 non Wood, 1941 emend. Mamet and Roux, 1975b

Figs. 15-18: ***Mitcheldeania nicholsonii*** Wethered, 1886

15. Sample 857.2, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/64 (scale bar = 100µm).
16. Sample 48, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/125 (scale bar = 500µm).
17. Sample RR62, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.4/7 (scale bar = 100µm).
18. Sample RR82, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/313 (scale bar = 100µm).

Figs. 19-20: ***Mitcheldeania distans*** (Conil and Lys, 1964)

19. Re-illustrated after Perret and Vachard, 1977. Sample 8558, Ardengost (France), late Serpukhovian. Collection RC, (scale bar = 100µm).
20. Re-illustrated after Perret and Vachard, 1977. Detail of previous one. Sample 8558, Ardengost (France), late Serpukhovian. Collection RC, (scale bar = 100µm).

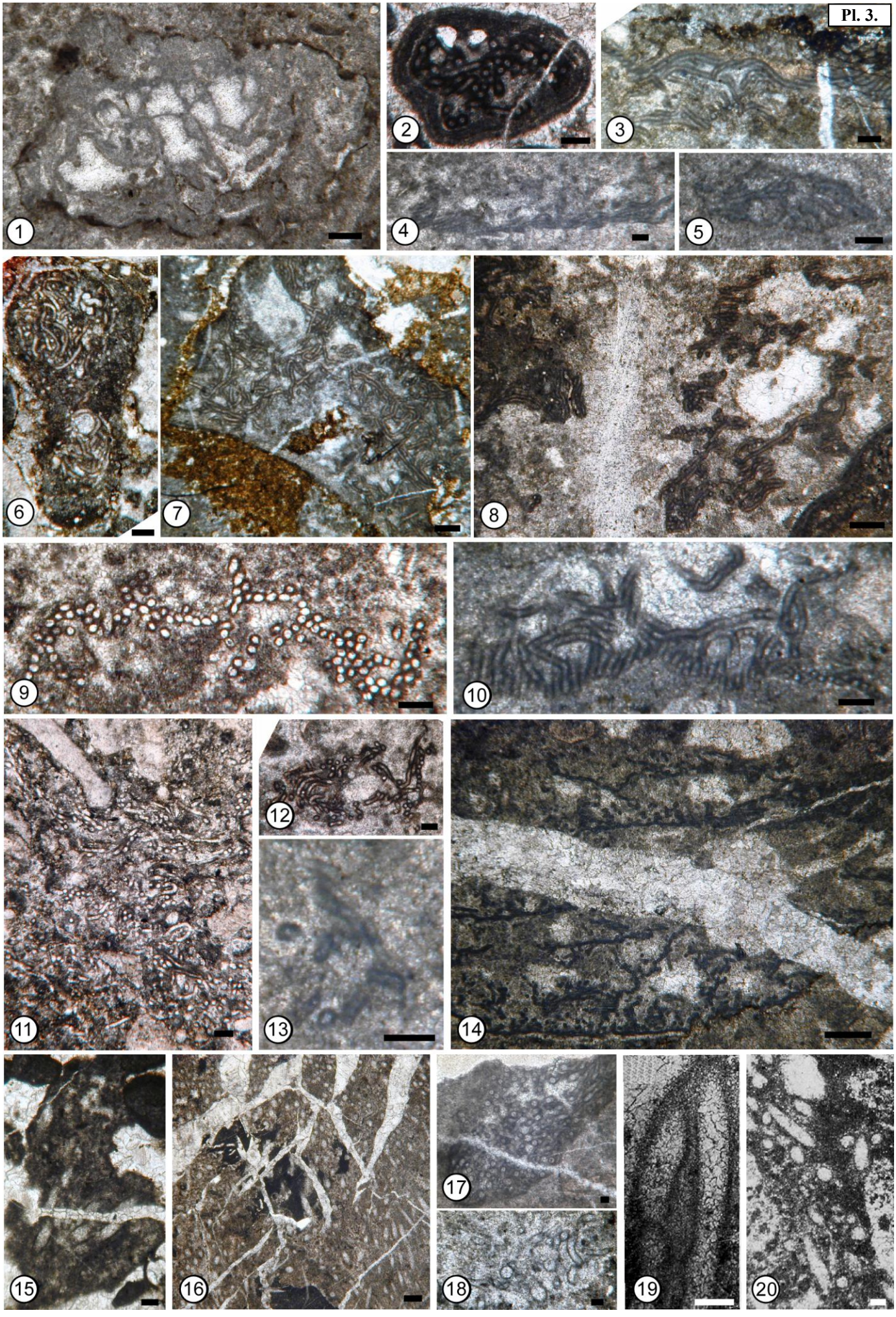

Plate 4.

Family Garwoodiaceae

Genus ***Garwoodia*** Wood, 1941

Figs. 1-7: ***Garwoodia* spp.**

1. Sample 58, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/37 (scale bar = 400µm).
2. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/133 (scale bar = 400µm).
3. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/138 (scale bar = 400µm).
4. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/144 (scale bar = 400µm).
5. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.3/2 (scale bar = 400µm).
6. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.3/6 (scale bar = 200µm).
7. Sample AH81.1, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/42 (scale bar = 100µm).

Genus ***Ortonella*** Garwood, 1914

Figs. 8-16: ***Ortonella* spp.**

8. With *Omphalotis*. Sample 330-4, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/92 (scale bar = 100µm).
9. Sample 70, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/20 (scale bar = 400µm).
10. Sample RR74, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/181 (scale bar = 400µm).
11. Sample LSV (2007), Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/89 (scale bar = 200µm).
12. Sample PE-1(2), Montagne Noire (France), ouest de Péret, late Brigantian. Collection MA, 9.6/11 (scale bar = 300µm).
13. Sample Bou25-5, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/82 (scale bar = 100µm).
14. Sample AH2, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/47 (scale bar = 100µm).
15. Sample 66, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/22 (scale bar = 400µm).
16. Sample 330-6, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/56 (scale bar = 500µm)

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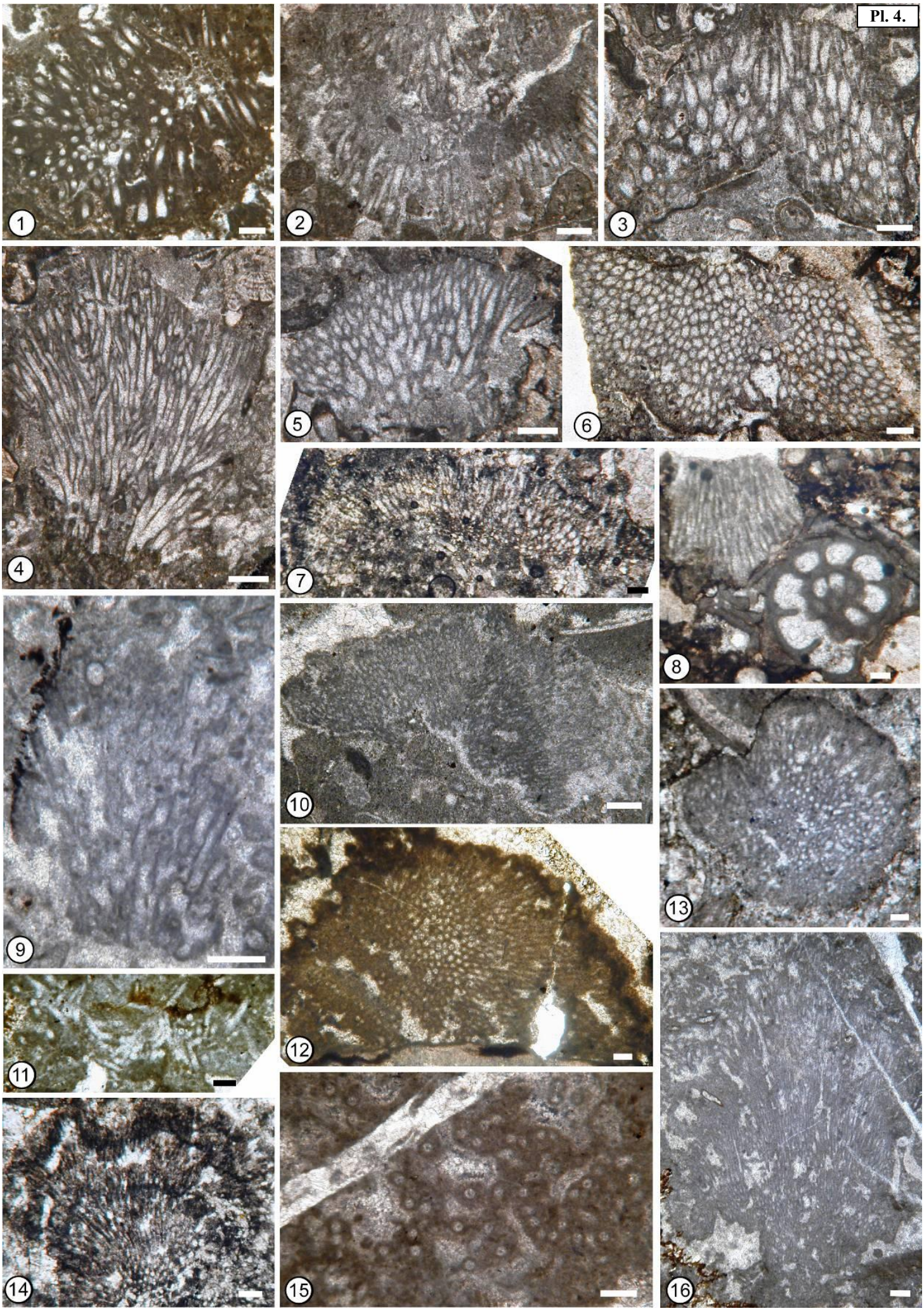


Plate 5.

Figs. 1-2: ***Ortonella* spp.**

1. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/154 (scale bar = 300µm).
2. Sample 78, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/58 (scale bar = 500µm).

Genus *Ortonellopsis* n. gen.

Figs. 3-10: ***Ortonellopsis laxa* n. gen. n. sp.**

3. Paratype. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.3/3 (scale bar = 400µm).
4. Holotype. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/145 (scale bar = 400µm).
5. Detail of previous one. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/146 (scale bar = 100µm).
6. Paratype. Sample RR81, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/310 (scale bar = 200µm).
7. Paratype. Sample 165A, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/2 (scale bar = 200µm).
8. Paratype. Sample 165E, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/7 (scale bar = 200µm).
9. Paratype. Sample 227B, Montagne Noire (France), La Serre (Mas de la Roque), late Brigantian/early Serpukhovian. Collection DV, 9.9.9.9.2/99 (scale bar = 100µm).
10. Paratype. Sample 165B, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/3 (scale bar = 100µm).

Figs. 11-13: **Gen. indet.**

11. Sample RR58, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/160 (scale bar = 100µm).
12. Sample RR58, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/161 (scale bar = 100µm).
13. Sample RR58, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/162 (scale bar = 500µm).

Rhizoconcretions?

Genus *Baccanella* Pantic, 1971

Figs. 14-16: ***Baccanella floriformis*** Pantic, 1971

14. Sample 254D, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection DV, 9.9.3/62 (scale bar = 100µm).
15. Sample RR86, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.8/8 (scale bar = 100µm).
16. Sample 610B, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/50 (scale bar = 100µm).

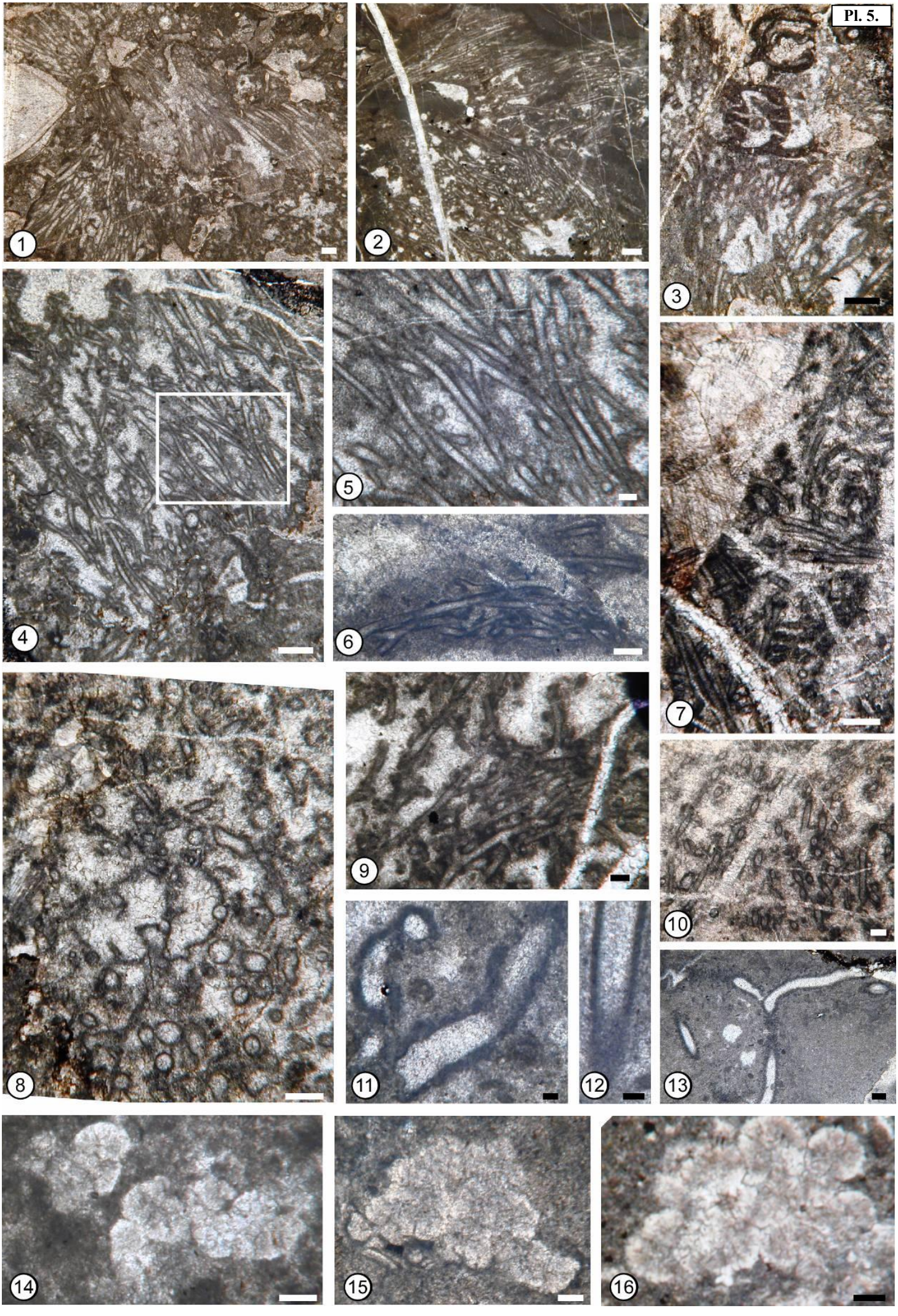


Plate 6.

Chlorophyta
Chlorophycophyta Ulotrichales
Order ?Ulotrichales
Family Anatoliporaceae
Genus *Anatolipora* Konishi, 1956 emend. herein

Figs. 1-12: ***Anatolipora carbonica*** Konishi, 1956

1. Sample 11-10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/100 (scale bar = 400µm).
2. Sample RR55, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/119 (scale bar = 100µm).
3. Sample BOU25.9, Montagne Noire (France), la Boutinelle, Brigantian. Collection MA, 9.6/97 (scale bar = 100µm).
4. Sample RR53, Montagne Noire (France), Roque Redonde. Collection LP, 2.2/93 (scale bar = 100µm).
5. Sample BOU25.9B, Montagne Noire (France), la Boutinelle, Brigantian. Collection MA, 9.7/4 (scale bar = 100µm).
6. Sample RR55. Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/121 (scale bar = 100µm).
7. Sample RR52. Montagne Noire (France), Roque Redonde, Brigantian.Collection LP, 2.2/73 (scale bar = 100µm).
8. Sample 12.18, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/13 (scale bar = 100µm).
9. Sample RR76, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/211 (scale bar = 200µm).
10. Sample RR53, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/93 (scale bar = 100µm).
11. Sample 12.22, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/34 (scale bar = 100µm).
12. Sample 11.9.1 Längs, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/6 (scale bar = 200µm).

Figs. 13-18: ***Anatolipora macroporelloidea*** **n. sp.**

13. Paratype. Sample RR52, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/73 (scale bar = 100µm).
14. Paratype. Sample 605B, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.7/21 (scale bar = 100µm).
15. Paratype. Sample RR52, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/69 (scale bar = 100µm).
16. Paratype. Sample RR176, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/176 (scale bar = 400µm).
17. Holotype. Sample 612A. Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/80 (scale bar = 400µm).
18. Paratype. Sample RR84, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/331 (scale bar = 100µm)

Genus *Richella* Mamet and Roux in Mamet et al., 1987

Figs. 19-20: ***Richella incrustata*** Mamet and Roux in Mamet et al., 1987

19. Sample LSI.2039, Montagne Noire (France), La Serre (Roux vineyard), late Brigantian/early Serpukhovian. Collection MA, 4/116 (scale bar = 200µm).
20. Sample Feldrand 51, Montagne Noire (France), La Serre (Roux vineyard), late Brigantian/early Serpukhovian. Collection MA, 5/67 (scale bar = 100µm).

Pl. 6.

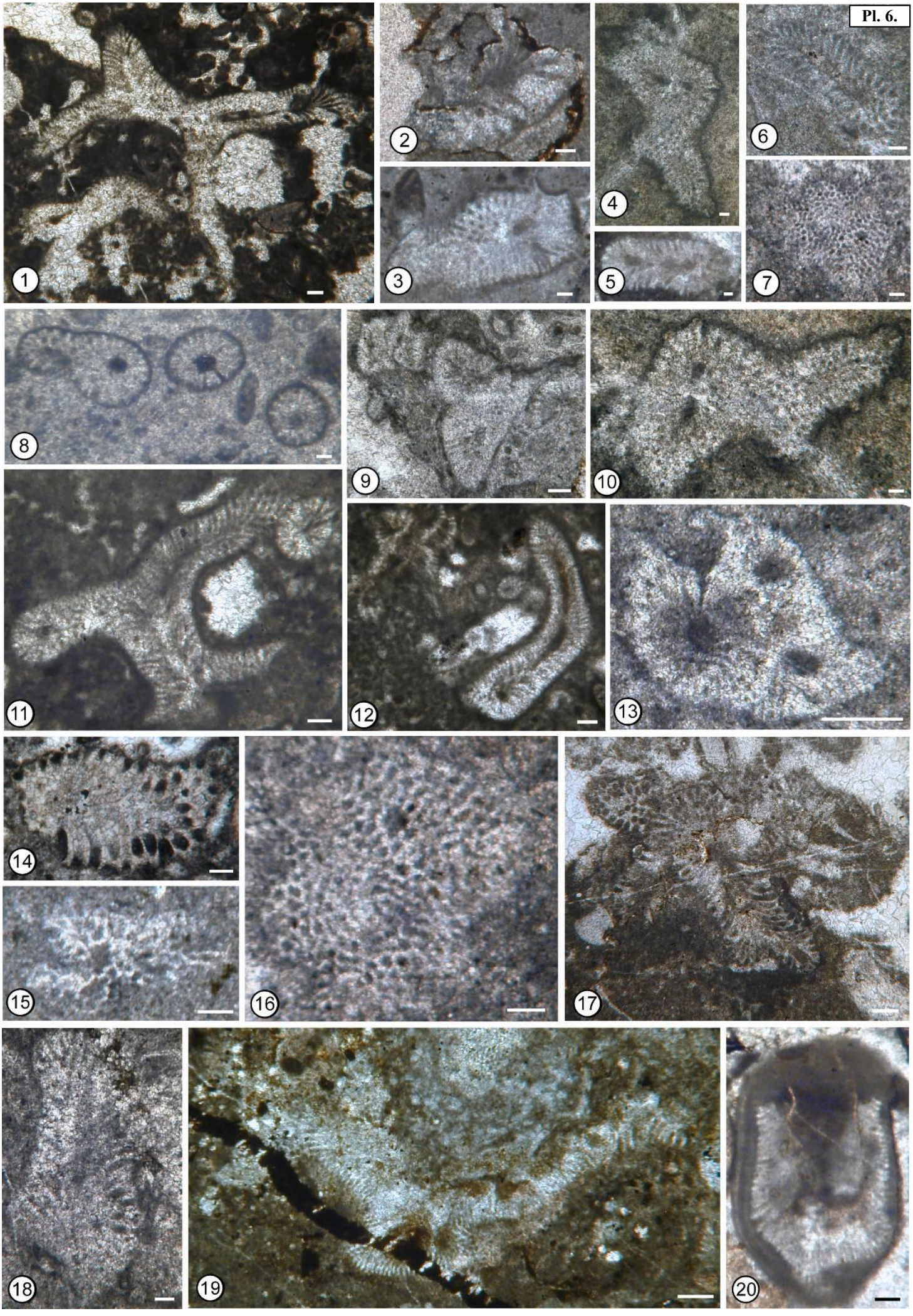


Plate 7.

Chlorophycophyta Caulerpales
Order Caulerpales
Family indeterminate
Genus *Orthriosiphon* Johnson and Konishi, 1956b

Figs. 1-7: ***Orthriosiphon*? spp.**

1. Sample 601B, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/38 (scale bar = 500µm).
2. Detail of previous one. Sample601B, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/39 (scale bar = 200µm).
3. Sample 341B, Montagne Noire (France), Tourière, Brigantian. Collection DV, 9.9.7/24 (scale bar = 500µm).
4. Detail of previous one. Sample 611C, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/91 (scale bar = 100µm).
5. Sample 313B, Montagne Noire (France), Vailhan-Roque de Loup, Brigantian. Collection DV, 9.8/93 (scale bar = 200µm).
6. Sample 83-B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/3 (scale bar = 400µm).
7. Sample RR73, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/156 (scale bar = 200µm).

Genus *Saccamminopsis* Sollas, 1921 emend. Vachard and Cózar, 2003

Figs. 8-20: ***Saccamminopsis fusulinaeformis*** McCoy, 1849

8. Sample 313B, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/94 (scale bar = 400µm).
9. Sample RR50, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/32 (scale bar = 200µm).
10. Sample MN4, Montagne Noire (France), Les Mentaresses, Brigantian. Collection LP, 2.4/3 (scale bar = 200µm).
11. Sample 28, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/74 (scale bar = 200µm).
12. Sample MA12.18, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/12 (scale bar = 200µm).
13. Sample MA.PA5, Montagne Noire (France), Les Pascales, late Brigantian. Collection MA, 9.6/32 (scale bar = 100µm).
14. Sample UM-ROQ, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection Univ. Montpellier, 9.7/135 (scale bar = 200µm).
15. *Saccamminopsis* in connection. Sample 10-2.3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/21 (scale bar = 400µm).
16. *Saccamminopsis* in connection. Sample 10-3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/15 (scale bar = 100µm).
17. Sample 83-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/23 (scale bar = 100µm).
18. Sample 84-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/32 (scale bar = 200µm).
19. Sample 12-26, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/18 (scale bar = 400µm).
20. Sample RL1, Montagne Noire (France), Vailhan (Roque de Loup), Brigantian. Collection MA, 9.6/18 (scale bar = 300µm).

Pl. 7.

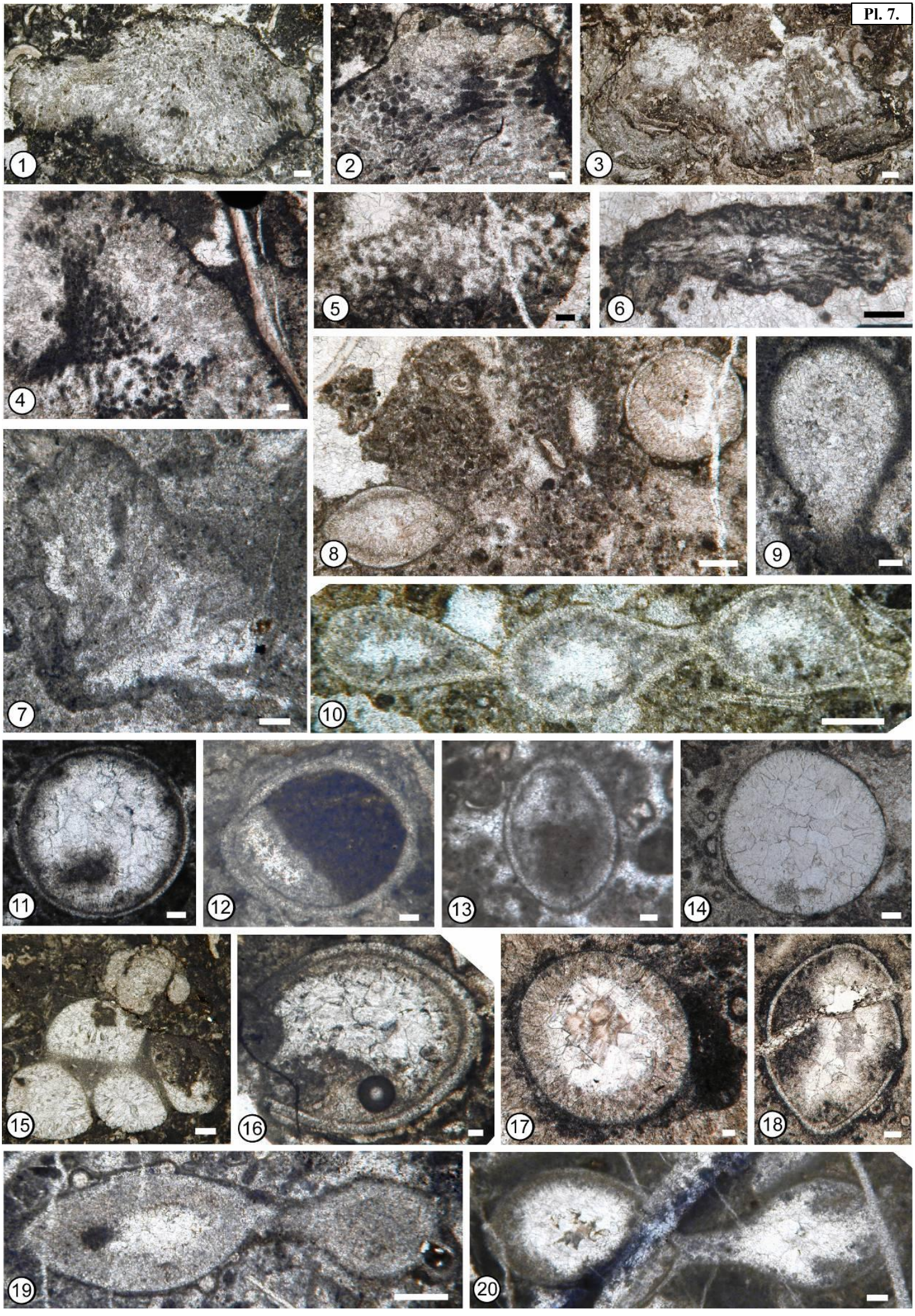


Plate 8.

Chlorophycophyta Dasycladales
Order Dasycladales
Family Seletonellaceae
Tribe ?Macroporelleae
Genus *Arengaepora* n. gen.

Figs. 1-14: ***Arengaepora pyrenaica*** n. gen. n. sp.

1. Paratype. Sample AH,A/81, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/56 (scale bar = 100µm).
2. Paratype. Sample AH,A/81, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/57 (scale bar = 100µm).
3. Paratype. Sample AH,A/81, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/60 (scale bar = 100µm).
4. Paratype. Sample AH,A/81,4, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/74 (scale bar = 100µm).
5. Two paratypes. Sample AH,A/81, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/61 (scale bar = 100µm).
6. Two paratypes. Sample AH,A/81, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/62 (scale bar = 100µm).
7. Paratype. Sample AH,B/81,7, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/99 (scale bar = 400µm).
8. Paratype. Sample AH,B/81,7, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/98 (scale bar = 400µm).
9. Paratype. Sample AH,A/81,4, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/69 (scale bar = 500µm).
10. Paratype. Sample AH,A/81,4, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/73 (scale bar = 100µm).
11. Two paratypes. Sample AH81,3, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/84 (scale bar = 100µm).
12. Two paratypes. Sample AH81,3, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/85 (scale bar = 200µm).
13. Two paratypes. Sample AH,A/81, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/64 (scale bar = 400µm).
14. Holotype. Sample AH,A/81, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/63 (scale bar = 100µm).

Pl. 8.

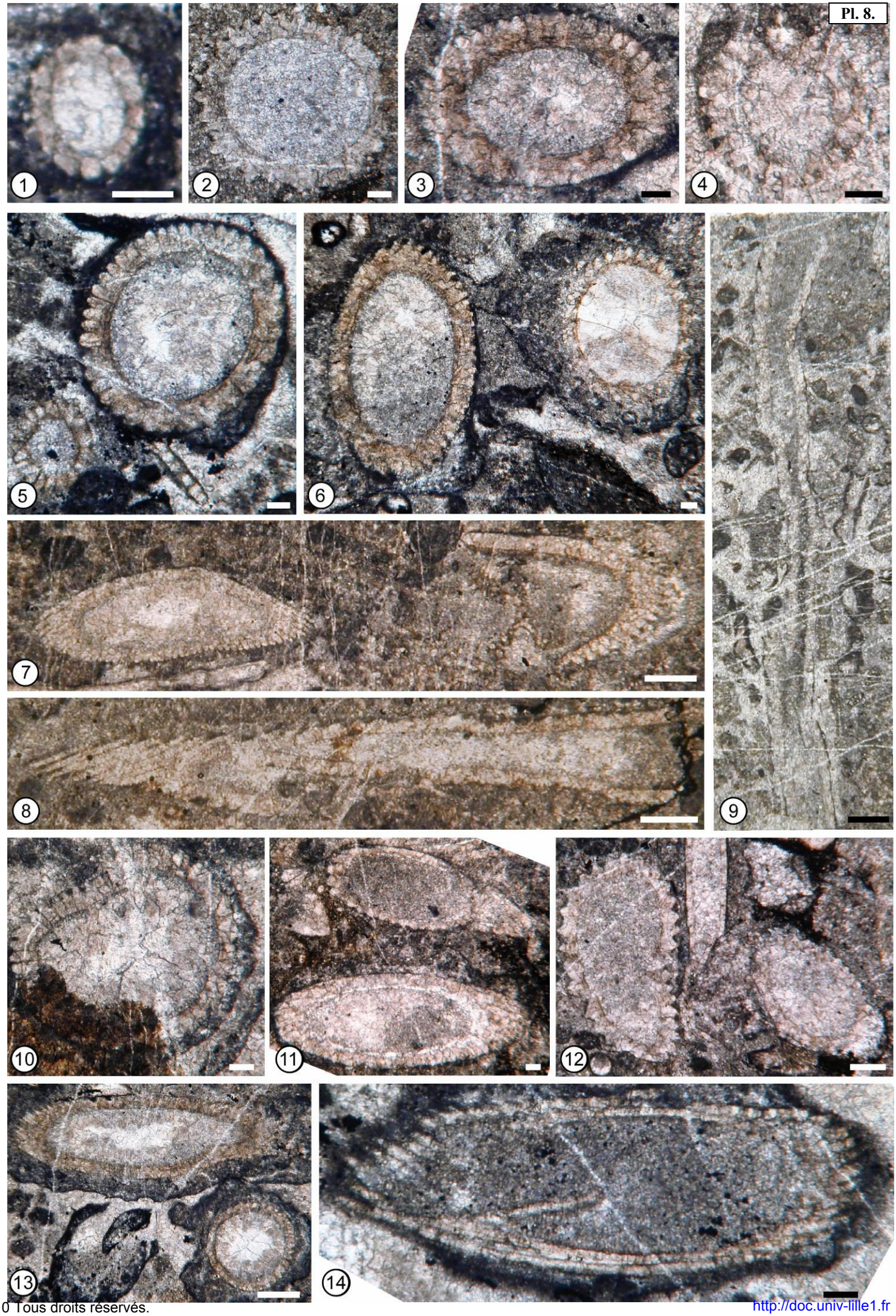


Plate 9.

Tribe Epimastoporelleae

Genus *Palaepimastoporella* Cózar and Vachard, 2004a

Figs. 1-2: ***Palaepimastoporella espielensis*** Cózar and Vachard, 2004a

1. Sample Feldweg-36, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/63 (scale bar = 400µm).
2. Sample Feldweg-36, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/64 (scale bar = 400µm).

Genus *Paraepimastopora* Roux, 1979

Figs. 3-5: ***Paraepimastopora cozarii* n. sp.**

3. Holotype. Sample Bou-25-8, Montagne Noire (France), Les Boutinelles, late Brigantian. Collection MA, 9.6/93 (scale bar = 400µm).
4. Detail of the holotype. Sample Bou-25-8, Montagne Noire (France), Les Boutinelles, late Brigantian. Collection MA, 9.6/94 (scale bar = 100µm).
5. Paratype. Sample Feldweg-10, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/43 (scale bar = 400µm).

?Tribe Epimastoporelleae

Genus *Borisovella* Ivanova, 1988a

Figs. 6-7: ***Borisovella mametii*** (Perret and Vachard, 1977) n. comb., emend herein

6. Sample CAS23, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.8/15 (scale bar = 200µm).
7. Sample AH81.1, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/37 (scale bar = 100µm).

Family Dasycladaceae

Tribe Salpingoporelleae

Subtribe Nanoporinae n. subtrib.

Genus *Nanopora* Wood, 1964

Figs. 8-16: ***Nanopora anglica*** Wood, 1964

8. With *Cabrieropora* (*C.*). Sample 127A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/9 (scale bar = 100µm).
9. Sample 10II, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/35 (scale bar = 100µm).
10. With spicules of sponges. Sample DV127A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/10 (scale bar = 100µm).
11. Sample 127G, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/23 (scale bar = 100µm).
12. With *Cabrieropora* (*C.*). Sample 127C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/25 (scale bar = 100µm).
13. With yellowish crust. Sample 127C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/23 (scale bar = 100µm).
14. ?*Nanopora*. Sample 856C.2, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/42 (scale bar = 100µm).
15. Sample 127C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/28 (scale bar = 100µm).
16. Sample 126F, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/17 (scale bar = 100µm).

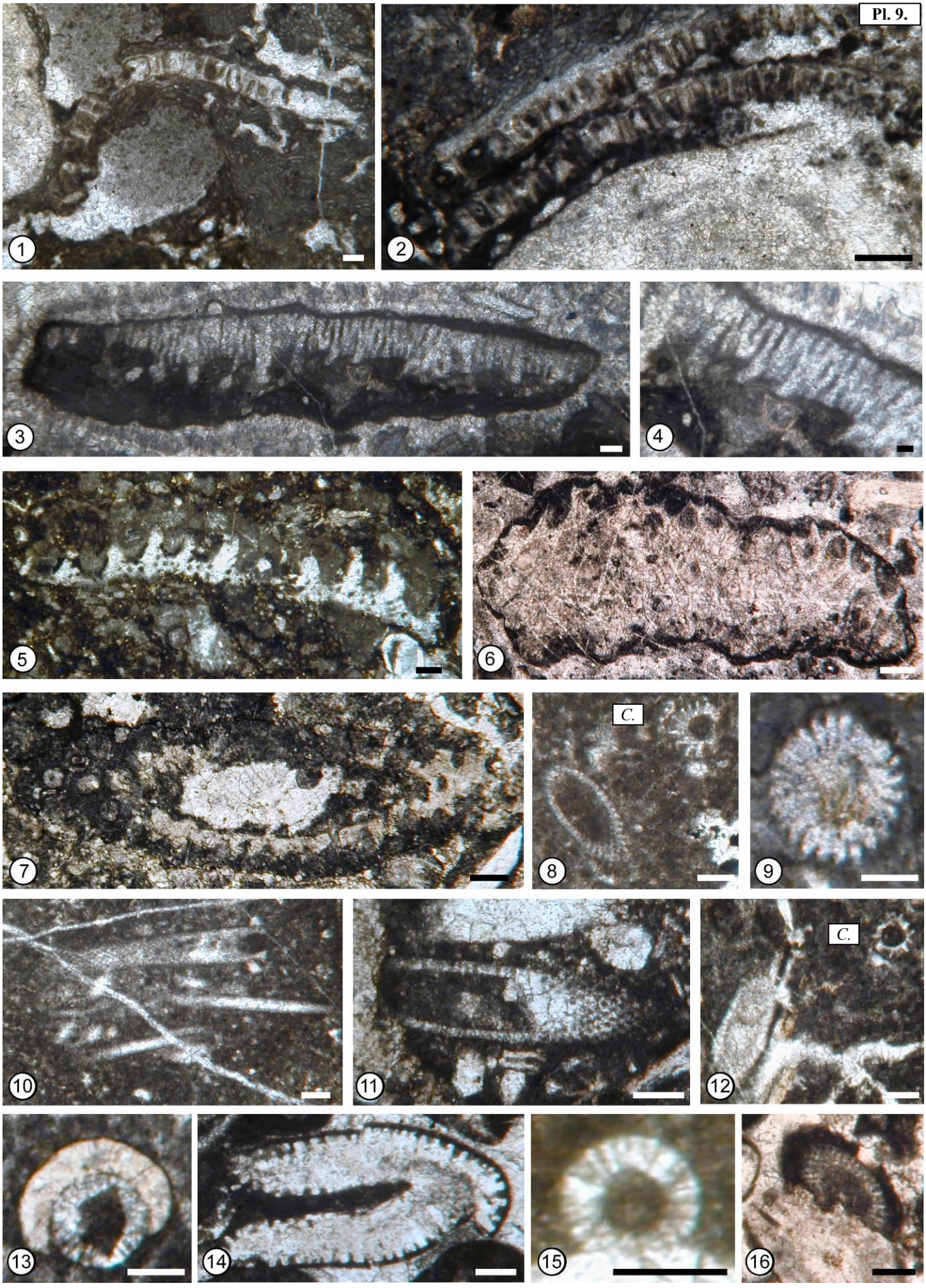


Plate 10.

Family Diploporaceae
Tribe Velebitelleae
Subtribe Velebitellinae
Genus *Windsoporella* Mamet and Rudloff, 1972 emend. Vachard, 1980

Figs. 1-8: ***Windsoporella solida*** n. sp.

1. Paratype with *Japhetellopsis robustus* (*J. r.*). Sample 856(2), Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/24 (scale bar = 100µm).
2. Paratype. Sample 10-9, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/66 (scale bar = 100µm).
3. Paratype. Sample 10-17, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/10 (scale bar = 100µm).
4. Paratype. Sample 856(2), Montagne Noire (France), Japhet, Brigantian. Collection DV, 9.1/15 (scale bar = 200µm).
5. Paratype. Sample 126C, Montagne Noire (France), Japhet, Brigantian. Collection DV, 8/55 (scale bar = 100µm).
6. Paratype. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/34 (scale bar = 100µm).
7. Holotype. Sample 856C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/37 (scale bar = 100µm).
8. Paratype. Sample 10-8.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/61 (scale bar = 100µm).

Figs. 9-13: ***Windsoporella tulayae*** (Chanton-Güvenç, 1972) emend.

9. Sample 9, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/6 (scale bar = 100µm).
10. Sample 856(2), Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/16 (scale bar = 400µm).
11. Sample 10-I, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/84 (scale bar = 100µm).
12. Sample Feldweg 13, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/52 (scale bar = 200µm).
13. Sample 857, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/44 (scale bar = 100µm).

Figs. 14-16: ***Windsoporella longirostris*** n. sp.

14. Paratype. Sample 10-9, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/69 (scale bar = 100µm).
15. Paratype. Sample Feldweg 13, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/51 (scale bar = 100µm).
16. Holotype. Sample FB3, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB, 7/166 (scale bar = 100µm).

Figs. 17-18: ***Windsoporella rara*** n. sp.

17. Holotype. Sample 856(2), Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.2/6 (scale bar = 100µm).
18. Paratype. Sample 856C.2, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/38 (scale bar = 100µm).

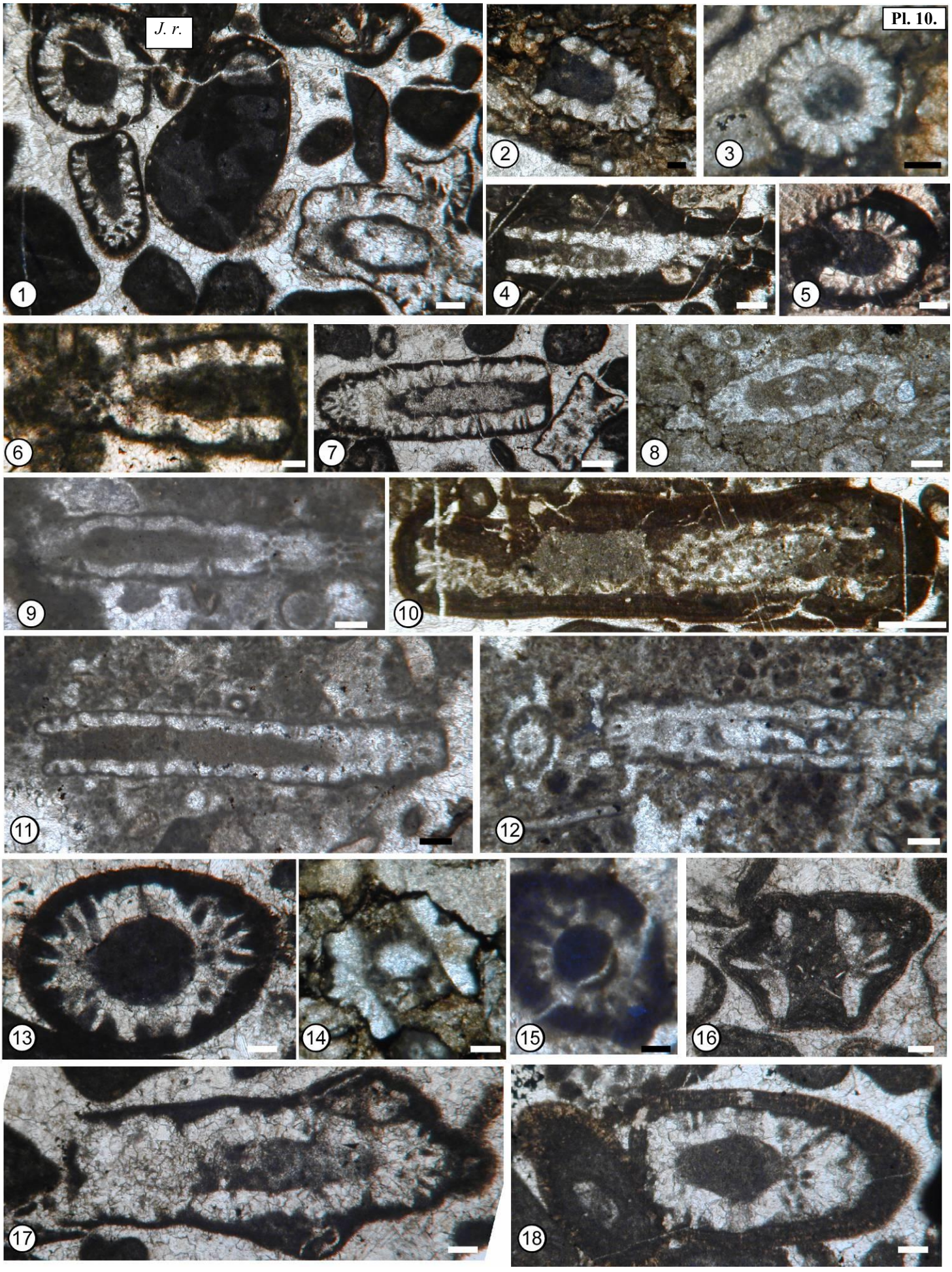


Plate 11.

Genus *Eovelebitella*, Vachard, 1974a

Figs. 1-31: ***Eovelebitella occitanica*** Vachard, 1974a

1. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/23 (scale bar = 100µm).
2. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/72 (scale bar = 400µm).
3. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/14 (scale bar = 400µm).
4. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/19 (scale bar = 100µm).
5. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/15 (scale bar = 300µm).
6. Sample 857, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/45 (scale bar = 100µm).
7. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/59 (scale bar = 400µm).
8. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/110 (scale bar = 400µm).
9. Sample 10-17, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/4 (scale bar = 200µm).
10. Re-illustrated holotype. Sample 246E, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection DV, 4/26 (scale bar = 100µm).
11. Sample 10-2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/85 (scale bar = 400µm).
12. With *Murvielipora* (*M.*). Sample 137E, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection DV, 4/31 (scale bar = 300µm).
13. Sample 137E, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection DV, 4/32 (scale bar = 400µm).
14. Sample 10-6, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/49 (scale bar = 400µm).
15. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/37 (scale bar = 100µm).
16. With *Windsoporella* (*W.*). Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/54 (scale bar = 100µm).
17. Typical form of the article. Sample MA10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/26 (scale bar = 100µm).
18. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/16 (scale bar = 100µm).
20. Well preserved *Eovelebitella*. Sample 164A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/27 (scale bar = 100µm).
21. Sample 10-17, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/14 (scale bar = 100µm).
22. Re-illustrated paratype. Sample 137A, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection DV, 4/27 (scale bar = 100µm).
23. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/126 (scale bar = 300µm).
24. Sample 10-I, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/79 (scale bar = 100µm).
25. Sample 330-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/116 (scale bar = 100µm).
26. Sample 10-2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/76 (scale bar = 400µm).
27. Sample 10-2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/105 (scale bar = 200µm).
28. With *Koninckopora* (*K.*). Sample 137C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/55 (scale bar = 400µm).
29. Sample 10-I, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/85 (scale bar = 300µm).
30. Sample RR6, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/230 (scale bar = 100µm).
31. Sample RR73, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/172 (scale bar = 100µm).

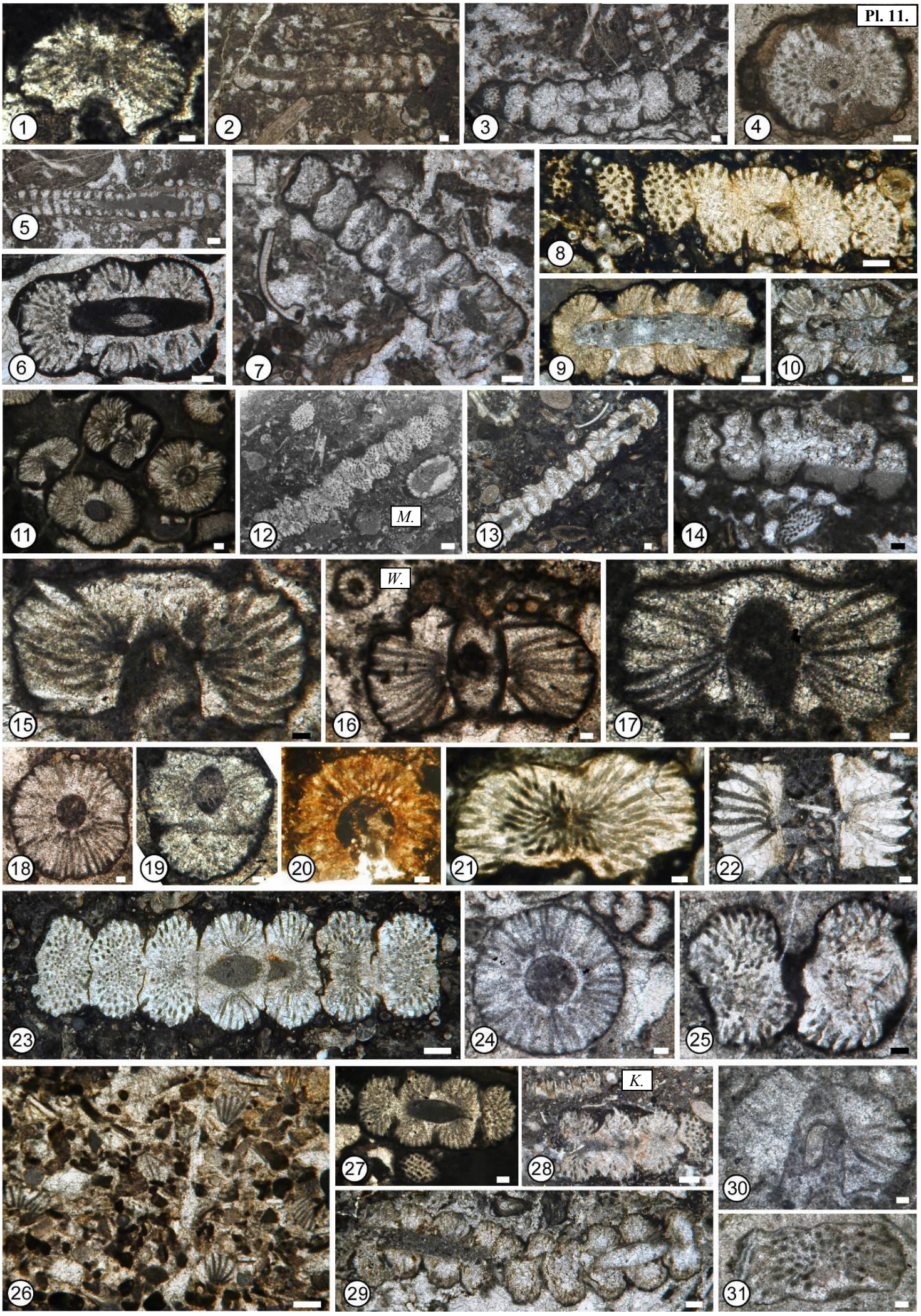


Plate 12.

Subtribe Cabrieroporinae n. subtrib.

Genus *Guadiatella* Cózar, Somerville, Rodriguez and Medina-Varea, in press-b

Figs. 1-4: ***Guadiatella heraldica*** n. sp.

1. Holotype. Sample Feldweg-10, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/46 (scale bar = 100µm).
2. Paratype. Sample 330-9, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.3/32 (scale bar = 400µm).
3. Paratype. Sample Feldweg-13, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/49 (scale bar = 100µm).
4. Paratype. Sample Feldweg-17, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/58 (scale bar = 100µm).

Genus *Cabrieropora* Mamet and Roux, 1975a

Figs. 5-17: ***Cabrieropora pokornyi*** Mamet and Roux, 1975a

5. Sample 127B, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/20 (scale bar = 100µm).
6. Sample 246H, Montagne Noire (France), Vailhan, earliest Brigantian. Collection DV, 9.8/45 (scale bar = 100µm).
7. Sample 127A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/6 (scale bar = 100µm).
8. Sample 127B, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/20 (scale bar = 100µm).
9. Sample 127E, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/31 (scale bar = 100µm).
10. Sample 127E, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/36 (scale bar = 100µm).
11. Sample 127C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV. 8/22 (scale bar = 100µm).
12. Sample 127C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/24 (scale bar = 100µm).
13. Sample 127A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/11 (scale bar = 100µm).
14. Sample 127E, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/32 (scale bar = 100µm).
15. Sample 127B, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/18 (scale bar = 100µm).
16 Sample 127, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/30 (scale bar = 100µm).
17. Sample 608, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/62 (scale bar = 100µm).

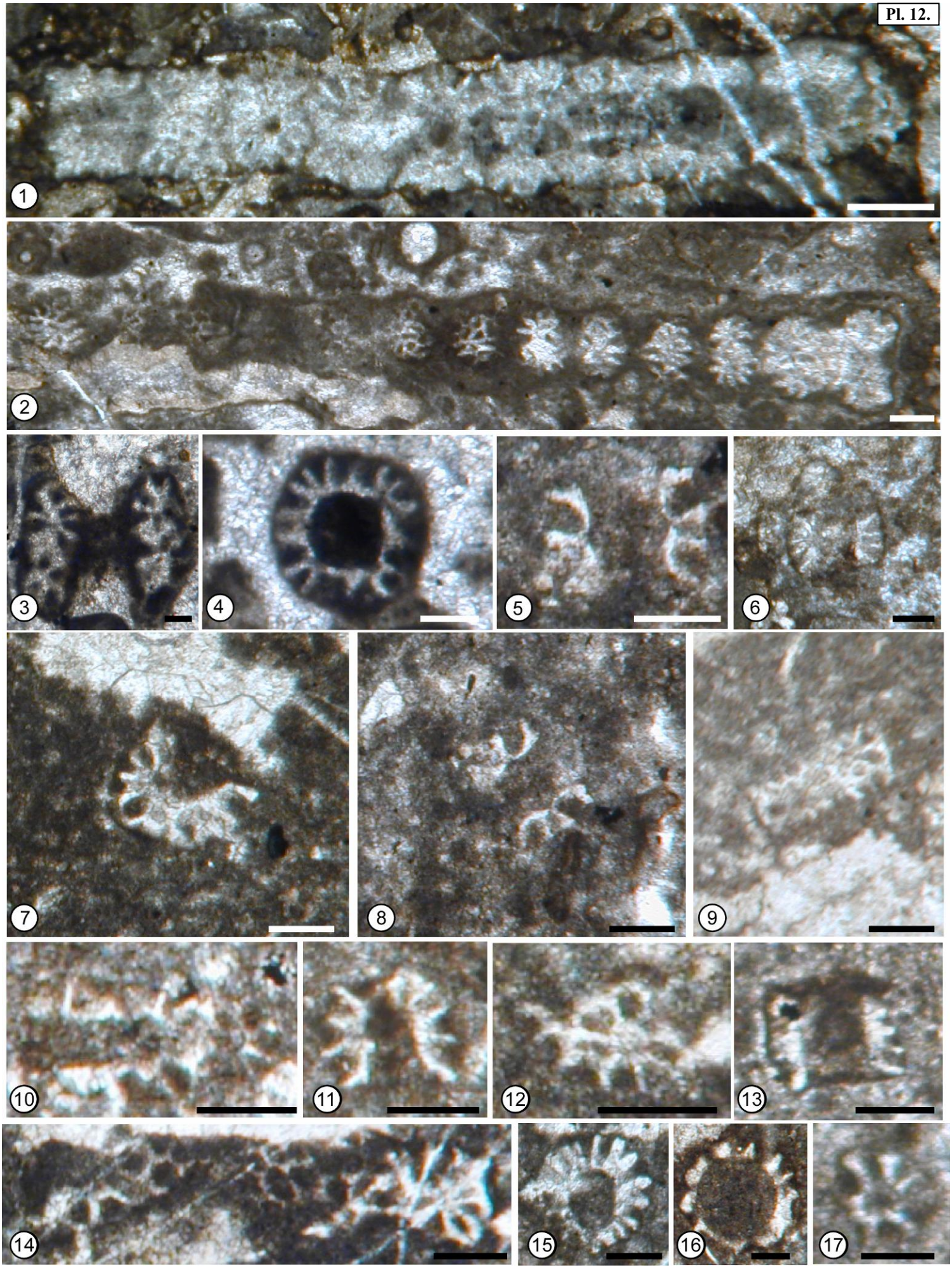


Plate 13.

Subtribe Kulikiinae

Genus *Kulikia* Golubtsov, 1961

Figs. 1-12: ***Kulikia sphaerica*** Golubtsov, 1961 (= *Sphinctoporella* (?) *rozovskaiae* Mamet and Roux, 1975a)

1. Sample 12-1, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/1 (scale bar = 100µm).
2. Sample 687A, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/78 (scale bar = 200µm).
3. Sample PA-2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/30 (scale bar = 100µm).
4. Sample PA-2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/23 (scale bar = 200µm).
5. Sample 84-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/31 (scale bar = 100µm).
6. Sample PA-2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/25 (scale bar = 100µm).
7. Sample 34, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/71 (scale bar = 100µm).
8. Sample PA-2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/24 (scale bar = 100µm).
9. Reelaborated *Kulikia*. Sample MN2, Montagne Noire (France), Les Mentaresses, Brigantian. Collection LP, 2.4/1 (scale bar = 100µm).
10. Damaged *Kulikia*. Sample HS26, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.9/96 (scale bar = 100µm).
11. Sample PA-2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/26 (scale bar = 100µm).
12. Sample PA-2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/27 (scale bar = 100µm).

Genus *Frostereyella* Elliott, 1988

Figs. 13-22: ***Frostereyella diaspora*** Elliott, 1988

13. Sample RR54, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/37 (scale bar = 100µm).
14. Sample RR50, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/104 (scale bar = 100µm).
15. Sample RR56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/130 (scale bar = 100µm).
16. Sample RR62, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.4/15 (scale bar = 100µm).
17. Sample RR63, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/28 (scale bar = 100µm).
18. Sample 22, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.12/16 (scale bar = 100µm).
19. Sample 22, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.12/20 (scale bar = 100µm).
20. Sample 22, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.12/21 (scale bar = 200µm).
21. Detail of previous one, right side. Sample22, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.12/22 (scale bar = 100µm).
22. Detail of 20th, left side. Sample22, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.12/22 (scale bar = 100µm).

Pl. 13.

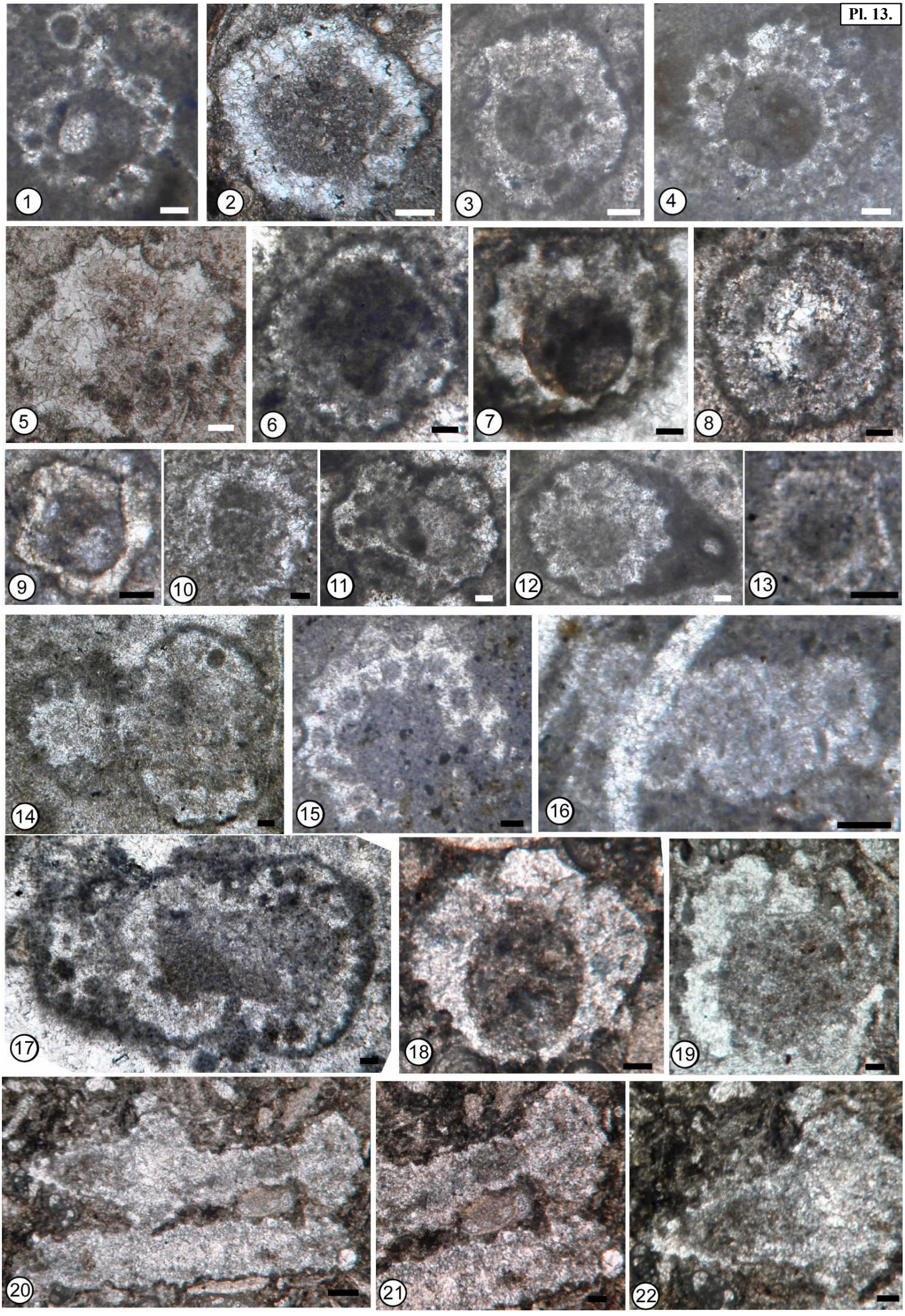


Plate 14.

Subtribe Borladellinae n. subtrib.

Genus *Murvielipora*

Figs. 1-14: ***Murvielopora aretzii*** n. gen. n. sp.

1. Paratype. Sample 330-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/118 (scale bar = 200µm).
2. Holotype. Sample 330-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/119 (scale bar = 100µm).
3. Paratype. Sample 12-4, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/10 (scale bar = 400µm).
4. Paratype. Sample 137E, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/73 (scale bar = 100µm).
5. Paratype with *Ungdarella uralica* (*U. u.*). Sample 53, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/46 (scale bar = 200µm).
6. Paratype. Sample 137E. Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. 9.9.4/77 (scale bar = 100µm).
7. Paratype. Sample 330-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/112 (scale bar = 100µm).
8. Paratype. Sample 53, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/48 (scale bar = 200µm).
9. Paratype. Sample 330-9, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.3/30 (scale bar = 400µm).
10. Detail of previous one. Sample 330-9, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.3/31 (scale bar = 100µm).
11. Paratype. Sample 137A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/18 (scale bar = 100µm).
12. Paratype. Sample 137A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/21 (scale bar = 100µm).
13. Paratype. Sample MN5, Montagne Noire (France), Les Mentaresses, Brigantian. Collection LP, 2.4/4 (scale bar = 100µm).
14. Paratype. Sample 137E, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/74 (scale bar = 200µm).

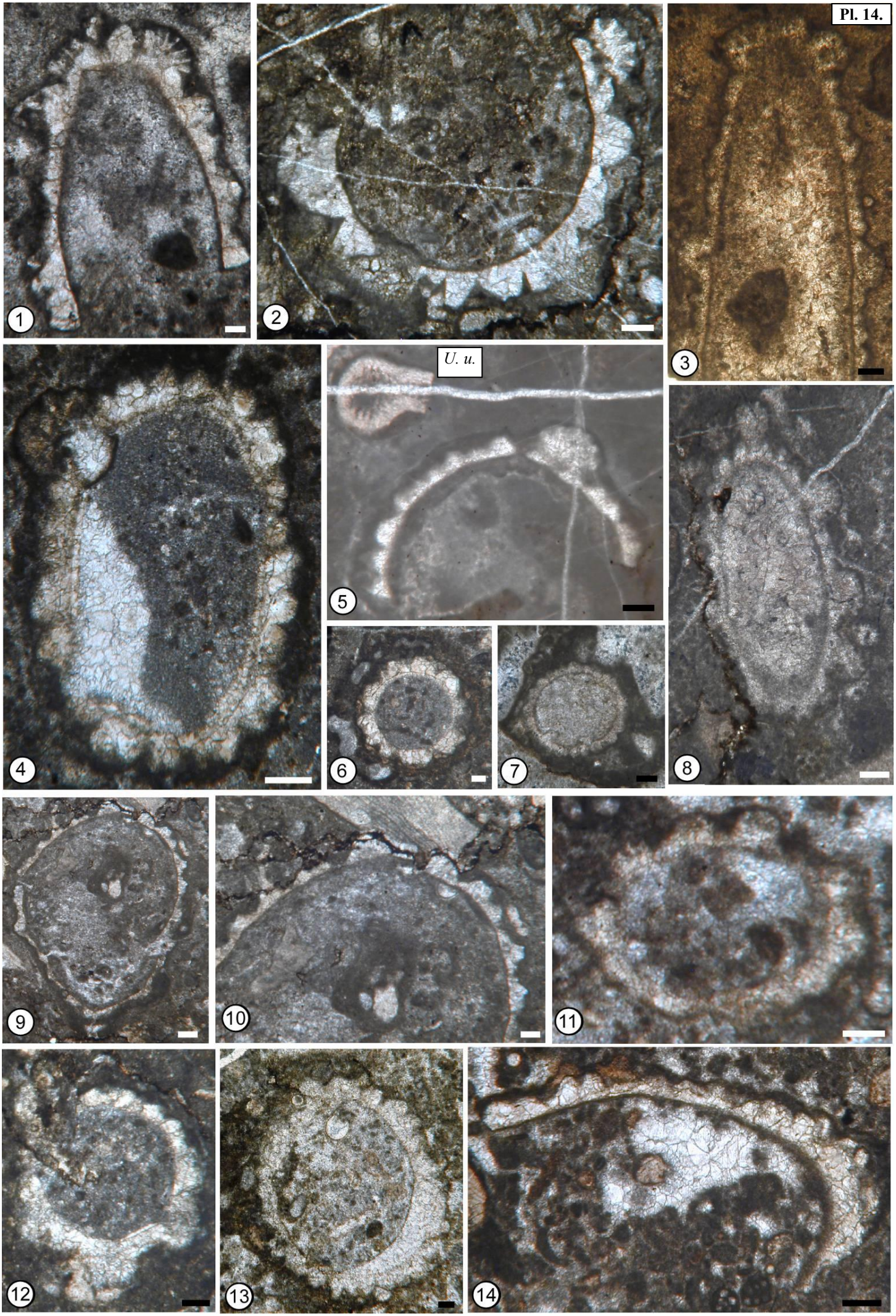


Plate 15.

Genus *Cabrieroporellopsis* n. gen.

Figs. 1-20: ***Cabrieroporellopsis inopinatus*** n. gen. n. sp.

1. Paratype. Sample 857.2, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/65 (scale bar = 400µm).
2. Holotype. Sample 857.3, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/73 (scale bar = 400µm).
3. Paratype. Sample 856D, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/35 (scale bar = 100µm).
4. Paratype. Sample 856, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/57 (scale bar = 100µm).
5. Paratype. Sample 857.2, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/61 (scale bar = 100µm).
6. Paratype. Sample 856, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/58 (scale bar = 100µm).
7. Paratype. Sample 857, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/48 (scale bar = 100µm).
8. Paratype. Sample 856(2), Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/26 (scale bar = 100µm).
9. Paratype. Sample 857, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/46 (scale bar = 100µm).
10. Paratype. Sample 856, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/53 (scale bar = 100µm).
11. Paratype. Sample 856, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/8 (scale bar = 100µm).
12. Paratype. Sample 856A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/30 (scale bar = 100µm).
13. Paratype. Sample 856, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/54 (scale bar = 100µm).
14. Subtangential Paratype. Sample 856, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/59 (scale bar = 100µm).
15. Paratype with *Windsoporella solida* (*W. s.*). Sample 856, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/60 (scale bar = 100µm).
16. Paratype. Sample 856(2), Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/19 (scale bar = 100µm).
17. Paratype. Sample 856(2), Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/19 (scale bar = 100µm).
18. Paratype. Sample LStop-2049, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/33 (scale bar = 100µm).
19. Paratype. Sample 856(2), Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/21 (scale bar = 100µm).
20. Paratype. Sample FB23, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB, 9.9.7/68 (scale bar = 100µm).

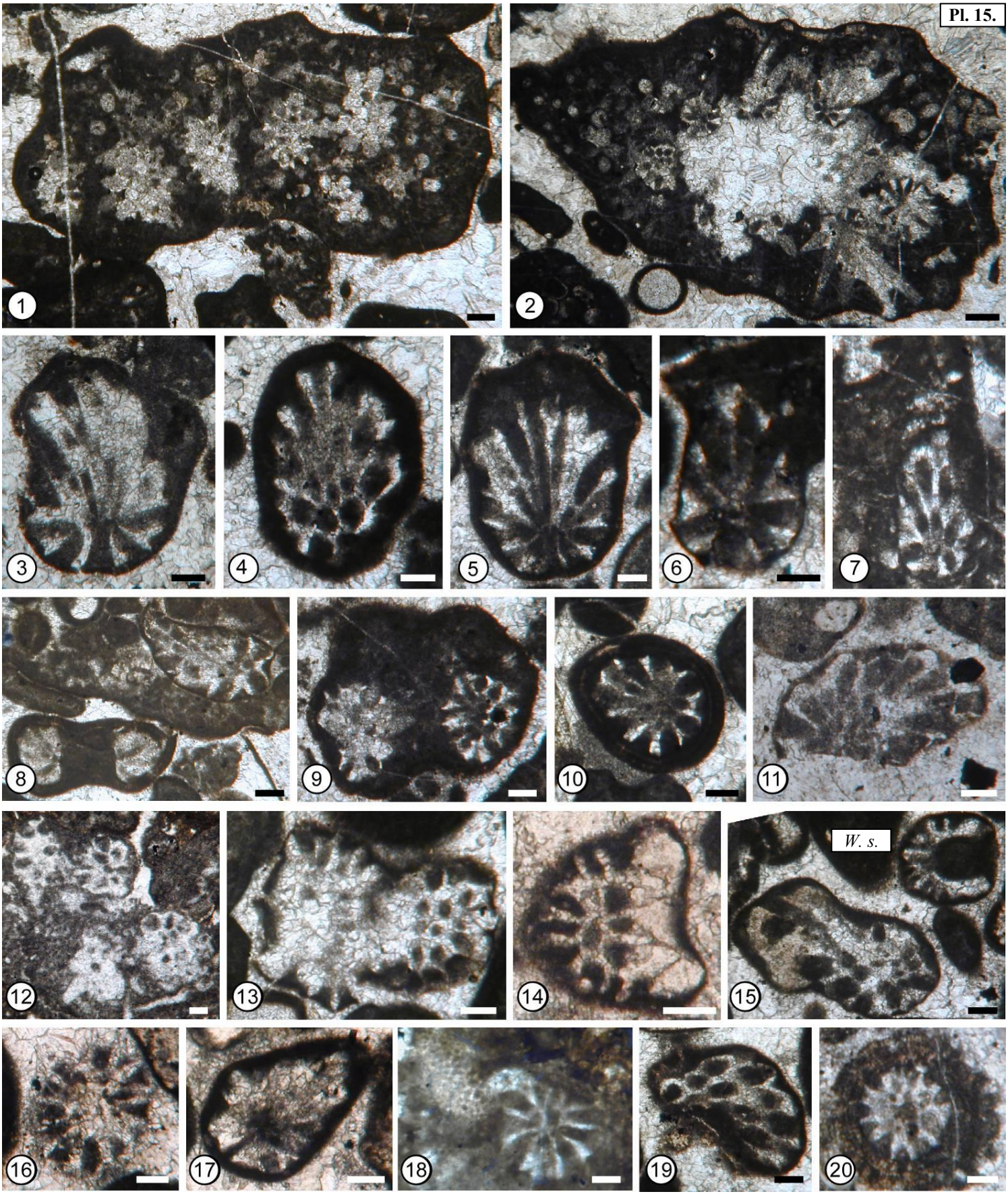


Plate 16.

Tribe Albertaporelleae
Subtribe Japhetellopsinae n. subtrib.
Genus *Japhetellopsis* n. gen.

Figs. 1-5: ***Japhetellopsis robustus*** n. gen. n. sp.

1. Paratype with *Cabrieropora* (*C.*). Sample 856(2), Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/13 (scale bar = 100µm).
2. Holotype. Sample 126G, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/39 (scale bar = 100µm).
3. Paratype. Sample 126D, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/48 (scale bar = 100µm).
4. Paratype. Sample 126G, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/16 (scale bar = 100µm).
5. Paratype. Sample 126G, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/19 (scale bar = 100µm).

Family indeterminate
Tribe indeterminate (Aciculelleae, Epimastoporelleae or new tribe?)
Genus *Coelosporella* Wood, 1940

Figs. 6-18: ***Coelosporella jonesii*** Wood, 1940

6. Sample 332'A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 7/138 (scale bar = 100µm).
7. Sample 350B, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/43 (scale bar = 400µm).
8. Sample 10.9, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/53 (scale bar = 400µm).
9. Sample 350A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/38 (scale bar = 100µm).
10. Sample 11-8, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/22 (scale bar = 100µm).
11. Sample 7, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/14 (scale bar = 400µm).
12. Sample 126G, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/22 (scale bar = 400µm).
13. Sample 126C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/57 (scale bar = 200µm).
14. Sample 164A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/25 (scale bar = 400µm).
15. Sample 164B, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/31 (scale bar = 400µm).
16. Sample 126G, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/41 (scale bar = 400µm).
17. Sample 33-9, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/83 (scale bar = 100µm).
18. Sample 7, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/11 (scale bar = 100µm).

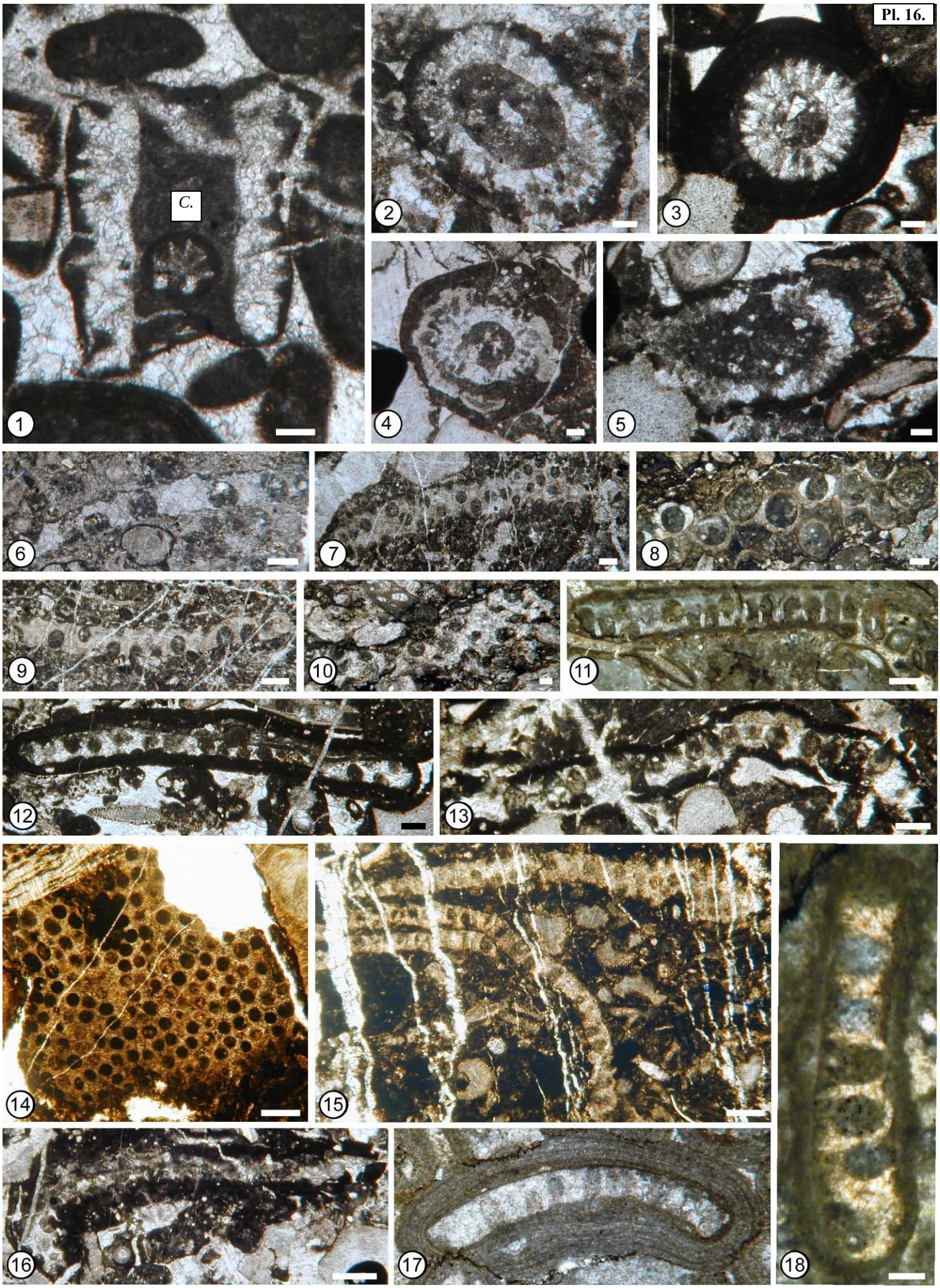


Plate 17.

? Order Dasycladales
Family indeterminate
Genus *Koninckopora* Lee, 1912

Figs. 1-10: ***Koninckopora inflata*** (de Koninck, 1842)

1. Sample 856, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/51 (scale bar = 400µm).
2. Sample 10-7, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/134 (scale bar = 400µm).
3. Sample 28, Montagne Noire (France), Serre de Péret, Brigantian. Collection DV, 9.2/16 (scale bar = 400µm).
4. Sample 2, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/90 (scale bar = 100µm).
5. With *Endothyranopsis*. Sample 82, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/50 (scale bar = 400µm).
6. Sample 2, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.11/6 (scale bar = 100µm).
7. Sample 126D, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/54 (scale bar = 400µm).
8. Sample ML764, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MLB, 9.7/73 (scale bar = 100µm).
9. Sample ML788, Montagne Noire (France), Vailhan, Brigantian. Collection MLB, 9.7/90 (scale bar = 400µm).
10. With *Fasciella*. Sample 33-0, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/147 (scale bar = 300µm).

Figs. 11-13: cf. ***Koninckopora* sp. B**

11. Sample 431D, Montagne Noire (France), Mounio, late Brigantian. Collection DV, 9.9.9.1/15 (scale bar = 100µm).
12. Sample 30, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.12/11 (scale bar = 100µm).
13. Sample 30, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.12/13 (scale bar = 100µm).

Figs. 14-15: ***Koninckopora* sp.**

14. Sample 8, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.11/19 (scale bar = 400µm).
15. Sample 14, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.11/27 (scale bar = 200µm).

Chlorophyta incertae sedis
Genus *Nostocites* Maslov, 1929

Fig. 16: ***Nostocites vesiculosa*** Maslov, 1929

16. Sample 126F, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/9 (scale bar = 100µm).

Pl. 17.

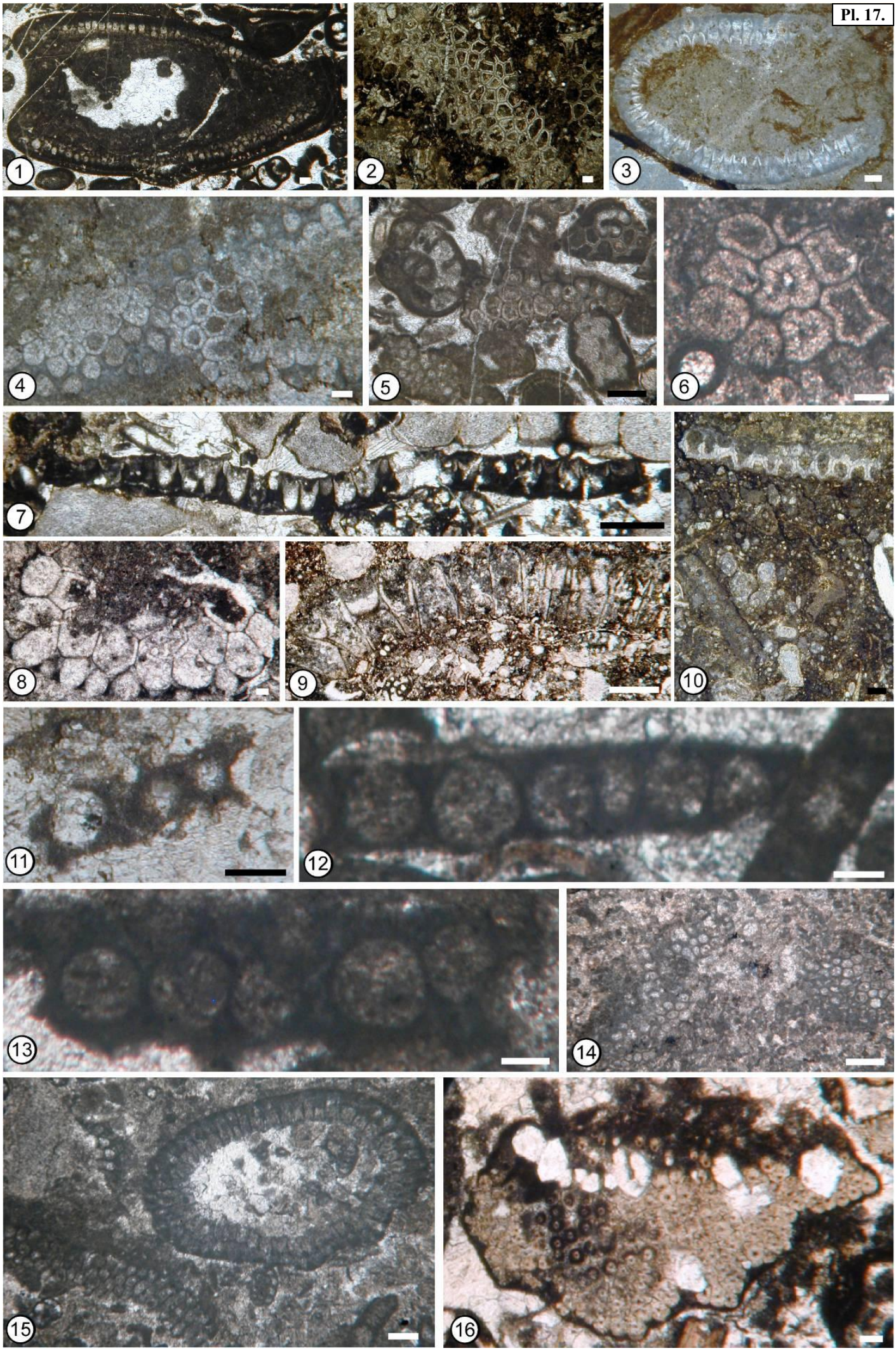


Plate 18.

Rhodophycophyta
Solenoporaceae
Family Solenoporaceae
Genus *Anchisolenopora* n. gen.

Figs. 1-7: ***Anchisolenopora serrana*** (Vachard and Aretz, 2004) emend.

1. Sample 28, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/75 (scale bar = 400µm).
2. Sample 330-4, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/100 (scale bar = 400µm).
3. Sample LSV-2015, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/95 (scale bar = 300µm).
4. Sample LSI-2043, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/19 (scale bar = 1mm).
5. Sample LSV-2015, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/93 (scale bar = 400µm).
6. Sample 82, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/33 (scale bar = 400µm).
7. Sample LSV-2015, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/94 (scale bar = 400µm).

Figs. 8-11: Family "Solenoporaceae"

8. Sample 12-12, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/35 (scale bar = 1mm).
9. Sample 601B, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/31 (scale bar = 400µm).
10. Sample 12-22, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/29 (scale bar = 1mm).
11. Detail of previous one. Sample 12-22, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/29 (scale bar = 400µm).

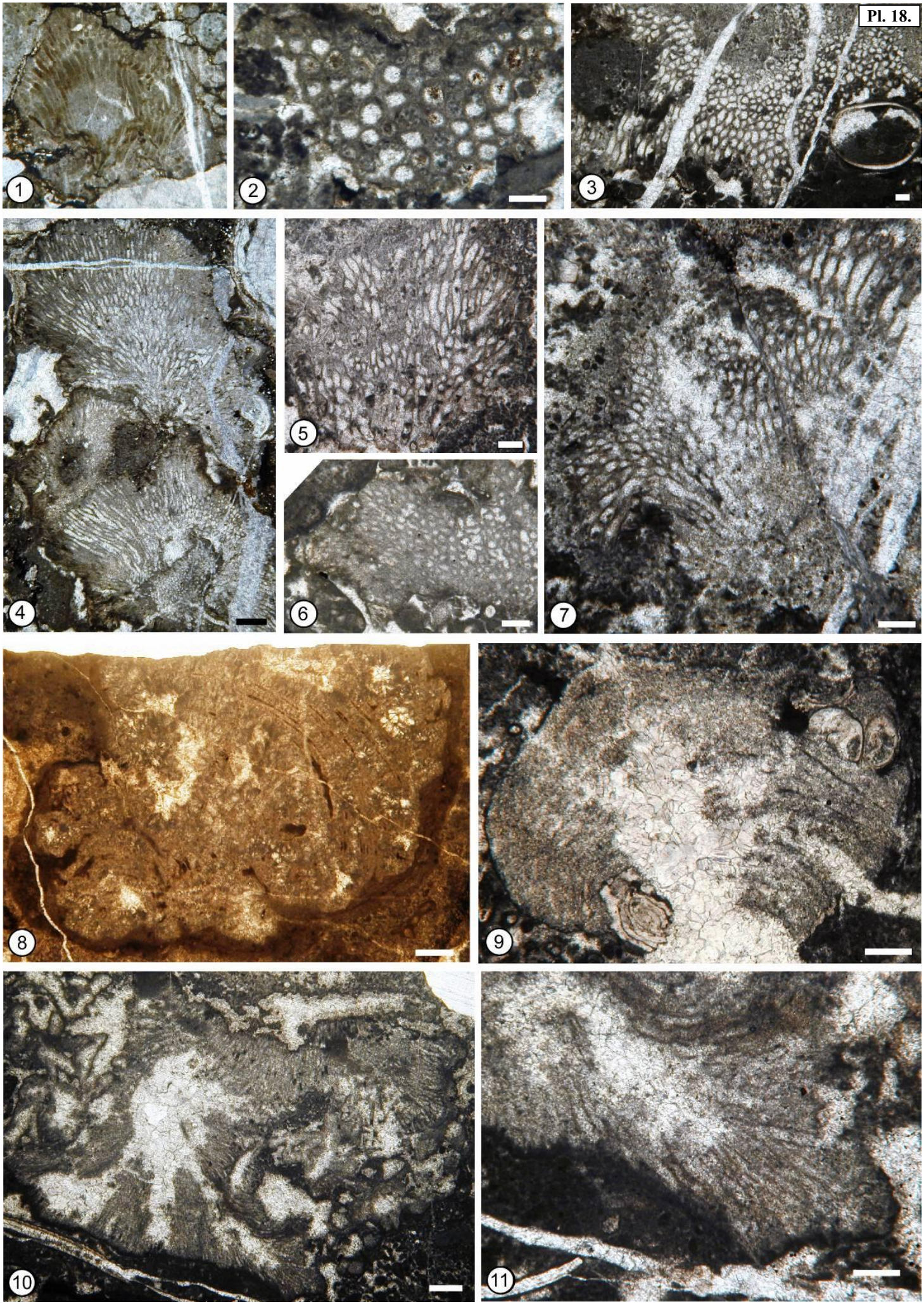


Plate 19.

Archaeolithophyllaceae

Family Archaeolithophyllaceae

Genus *Hortonella* Mamet, 1995b emend. Cózar and Vachard, 2005

Figs. 1-11: ***Hortonella* ex gr. *uttingii*** Mamet, 1995b

1. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/106 (scale bar = 100µm).
2. Sample 226B, Montagne Noire (France), La Serre (Mas de la Roque), late Brigantian/early Serpukhovian. Collection DV, 9.9.9.9.2/96 (scale bar = 100µm).
3. Sample 687A, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/77 (scale bar = 100µm).
4. Sample 130B, Montagne Noire (France), St Rome. Brigantian. Collection DV, 9.9.7/3 (scale bar = 100µm).
5. Sample RR45, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/7 (scale bar = 100µm).
6. Sample RR51, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/54 (scale bar = 100µm).
7. Sample RR45, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/13 (scale bar = 100µm).
8. Forked *Hortonella*. Sample RR79, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/258 (scale bar = 100µm).
9. Sample RR55, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/122 (scale bar = 100µm).
10. Sample RR56. , Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/128 (scale bar = 100µm).
11. Sample RR73, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/158 (scale bar = 100µm).

Genus *Archaeolithophyllum*, Johnson, 1956

Figs. 12-14: ***Archaeolithophyllum lamellosum*** Wray, 1964

12. Sample LSIII-2021, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/102 (scale bar = 500µm).
13. Sample LSI-2040, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/18 (scale bar = 500µm).
14. *Archaeolithophyllum* (*A.*) with *Richella* (*R.*) and *Claracrusta* (*C.*). Sample LSITop-2047, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/24 (scale bar = 200µm).

Pl. 19.

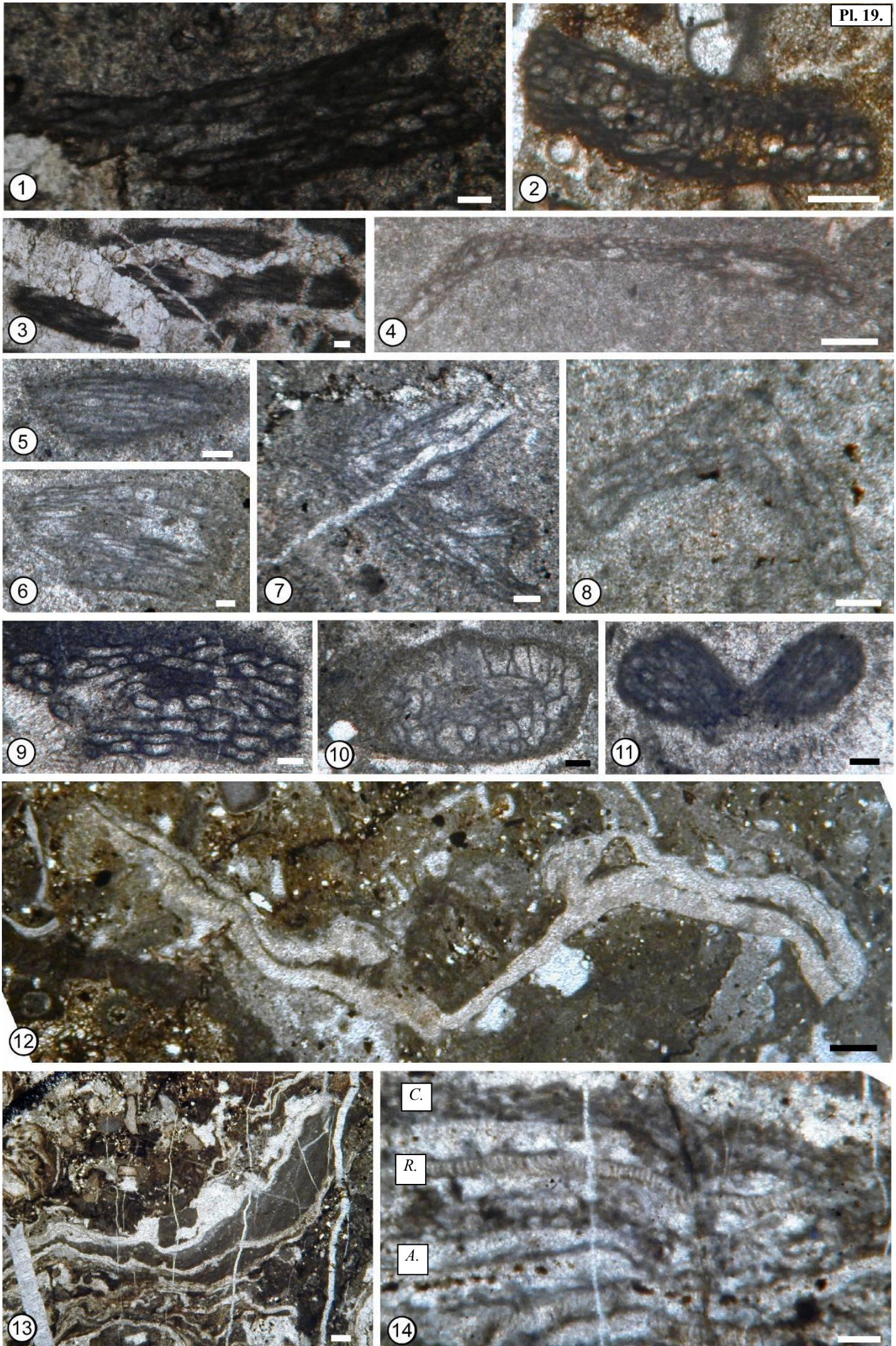


Plate 20.

Genus *Neoprincipia* Cózar and Vachard, 2003

Figs. 1-2: ***Neoprincipia tethysiana*** Cózar and Vachard, 2003

1. Sample 126D, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/47 (scale bar = 100µm).
2. Sample 126F. , Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/14 (scale bar = 100µm)

Figs. 3-6: ***Neoprincipia flugeli*** (Vachard in Krainer and Vachard, 2002)

3. Sample LSIV-2010, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/97 (scale bar = 400µm).
4. Sample LSI-2044, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/21 (scale bar = 200µm).
5. Sample LSI-2039, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/113 (scale bar = 100µm).
6. Surrounded by a crust of *Claracrusta*. Sample LSI-2039, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/114 (scale bar = 100µm).

Figs. 7-11: ***Neoprincipia petschoriaeformis*** Vachard and Aretz, 2004

7. Sample LSItop-2049, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/36 (scale bar = 100µm).
8. Sample LSItop-2049, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/35 (scale bar = 100µm).
9. Sample ML789. Montagne Noire (France), Gare de Laurens, late Brigantian/early Serpukhovian. Collection MLB, 9.7/97 (scale bar = 100µm).
10. Sample Cas15bisa, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.8/4 (scale bar = 100µm).
11. Sample AH20e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/3 (scale bar = 100µm)

Fig. 12: ***Neoprincipia claviformis*** Vachard and Aretz, 2004

12. Re-illustrated after Vachard and Aretz, 2004. Sample Gik 1828, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, (scale bar = 200 µm).

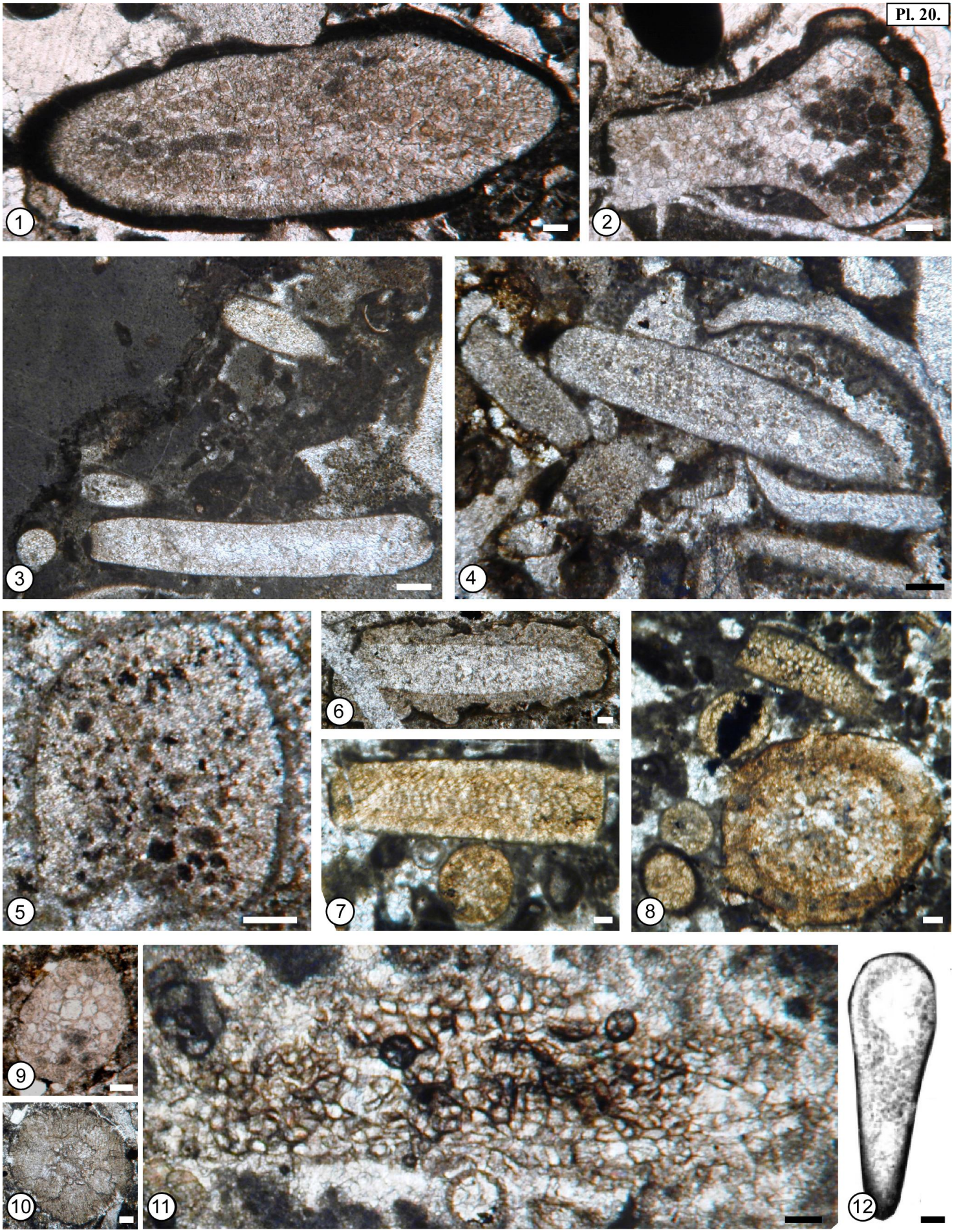


Plate 21.

Algospongia
Beresellales (= Dasycladales auctorum pars)
Order Beresellales
Family Issinellaceae
Tribe Issinelleae
Genus *Issinella* Reitlinger, 1954

Figs. 1-8: ***Issinella* (?) sp.**

1. Sample 248A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/69 (scale bar = 100µm).
2. Sample 601C, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/49 (scale bar = 100µm).
3. Sample AH20 (778C), Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/33 (scale bar = 100µm).
4. Sample AH20a, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/47 (scale bar = 100µm).
5. Sample RR58, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/163 (scale bar = 300µm).
6. Sample RR58, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/163 (scale bar = 100µm).
7. Sample 2, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.11/13 (scale bar = 100µm).
8. Sample 293E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/47 (scale bar = 400µm).

Genus *Zidella* Saltovskaya, 1984a

Figs. 9-17: ***Zidella aurivella*** (Vachard, 1978) emend. herein.

9. Sample 293D, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/37 (scale bar = 100µm).
10. Sample 293E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/48 (scale bar = 100µm).
11. Re-illustrated holotype. Sample 293E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/49 (scale bar = 100µm).
12. Sample 293F, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/50 (scale bar = 200µm).
13. Sample FB4, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB, 7/170 (scale bar = 100µm).
14. Sample 82, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/46 (scale bar = 100µm).
15. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/149 (scale bar = 400µm).
16. Sample 134F, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MA, 9.9.5/30 (scale bar = 100µm).
17. Sample 600B, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/113 (scale bar = 100µm).

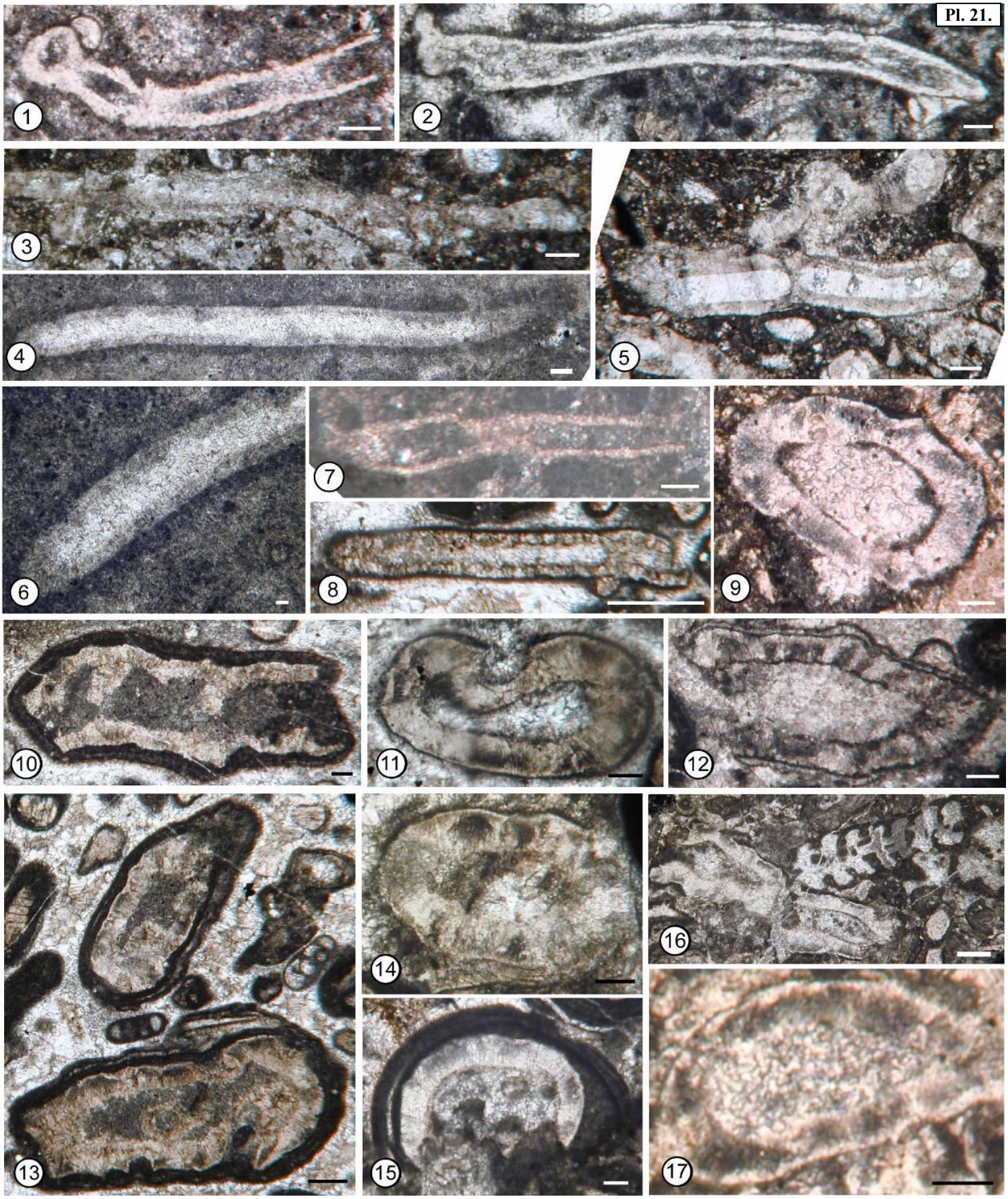


Plate 22.

Family Beresellaceae

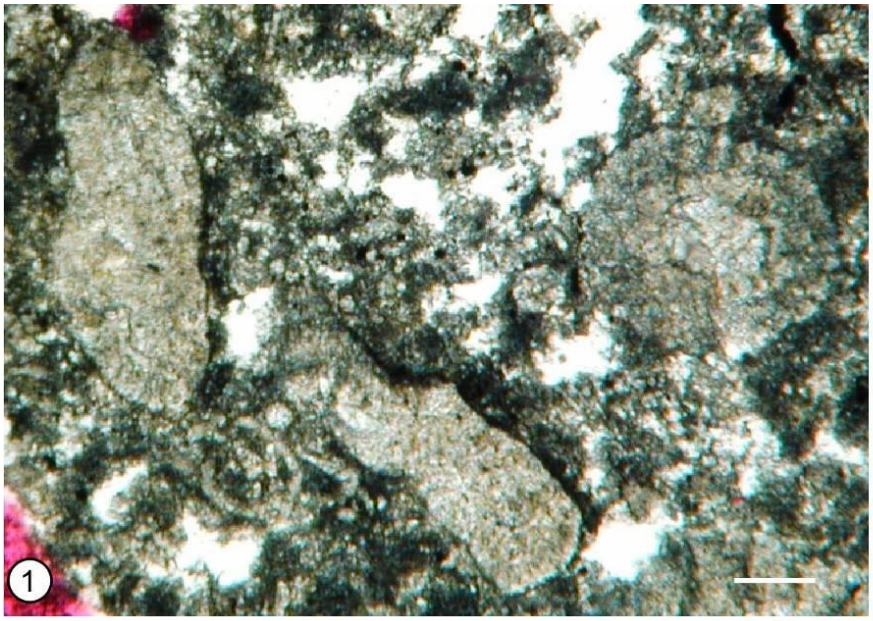
Tribe Bereselleae

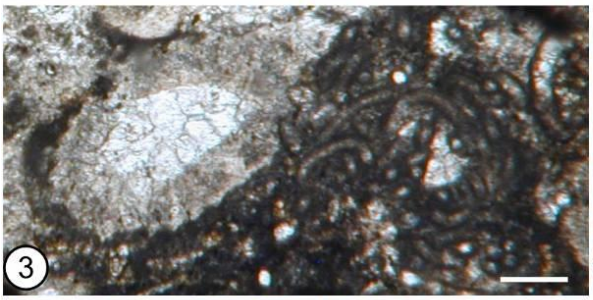
Genus *Ardengostella* Vachard in Perret and Vachard, 1977

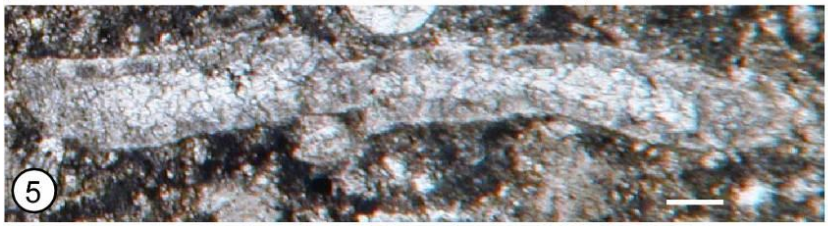
Figs. 1-11: ***Ardengostella perretae*** Vachard in Perret and Vachard 1977

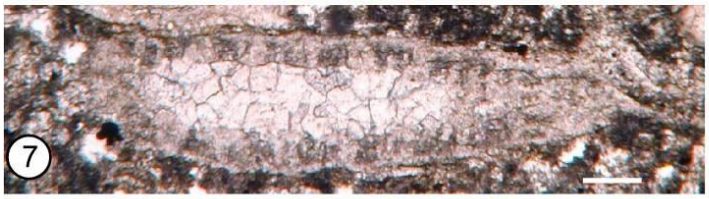
1. Sample AH20c, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/11 (scale bar = 100µm).
2. Sample AH20'f, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/27 (scale bar = 100µm).
3. Sample AH18e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/28 (scale bar = 100µm).
4. Sample AH20'F, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/26 (scale bar = 100µm).
5. Sample AH20(778C), Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/31 (scale bar = 100µm).
6. Sample AH20(778C), Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/32 (scale bar = 100µm).
7. Sample AH18e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/40 (scale bar = 100µm).
8. Sample AH18i, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/39 (scale bar = 100µm).
9. Holotype. Sample AH18e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/41 (scale bar = 100µm).
10. Sample AH20a, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/80 (scale bar = 200µm).
11. Sample AH20f, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/147 (scale bar = 100µm).

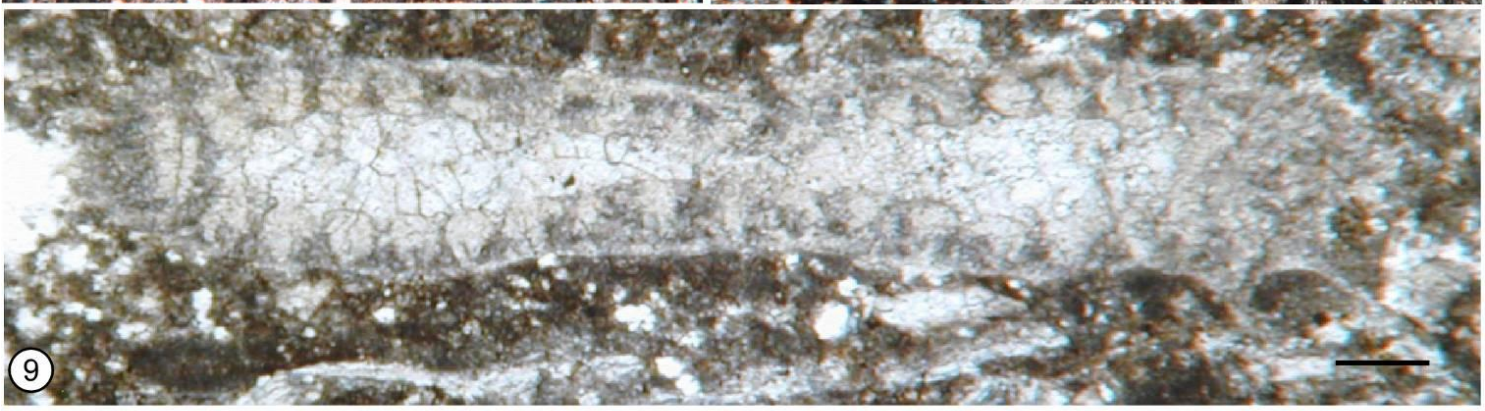
Pl. 22.

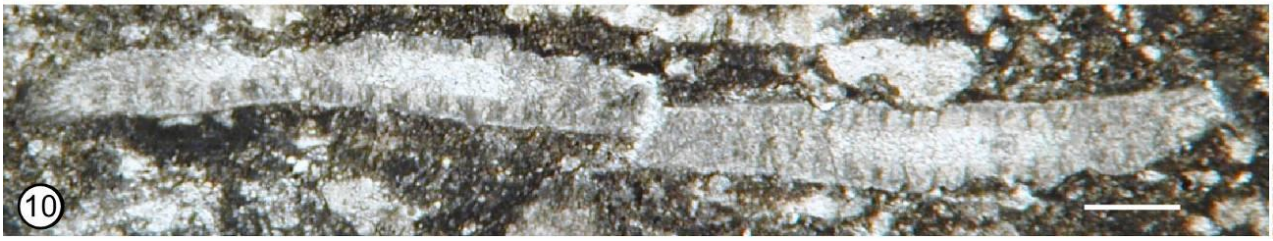












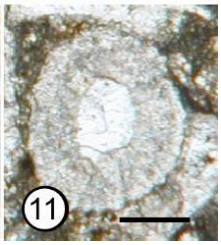


Plate 23.

Algospongia Moravamminales
Order Moravamminales
Family Anthracoporellopsidaceae
Genus *Evlania* Bykova, 1952

Figs. 1-3: ***Evlania*? sp.**

1. Sample 332A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/108 (scale bar = 100µm).
2. Sample 332A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/111 (scale bar = 100µm).
3. Sample 466B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.5/48 (scale bar = 100µm)

Genus *Pseudokamaena* Mamet in Petryk and Mamet, 1972

Fig. 4: ***Pseudokamaena* cf. *armstrongi*** Mamet in Petryk and Mamet, 1972

4. Re-illustrated after Perret and Vachard, 1977. Sample RC 8559, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection RC, (scale bar =100µm).

Family Moravamminaceae
Tribe Moravammineae
Genus *Moravammina* Pokorny, 1951 emend. Vachard, 1991

Figs. 5-10: ***Moravammina* cf. *carbonica*** Fomina, 1960

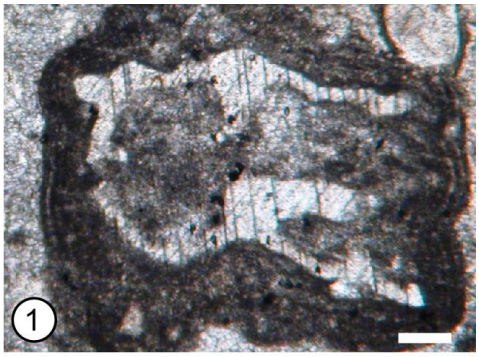
5. Sample 132C, Montagne Noire (France), St Rome. Brigantian. Collection DV, 9.9.7/6 (scale bar = 100µm).
6. Sample AH18e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/27 (scale bar = 100µm).
7. Sample 350A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/39 (scale bar = 100µm).
8. Sample RR61, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/198 (scale bar = 100µm).
9. Sample 134F, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/32 (scale bar = 100µm).
10. Sample UM-LAU-T, Montagne Noire (France), Laurens, Brigantian. Collection Fac. Sc. Lyon, 9.7/120 (scale bar = 100µm).

Genus *Kamaena* Antropov, 1967

Figs. 11-15: ***Kamaena* aff. *magna*** Ivanova, 1988a

11. Sample 293.2C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/101 (scale bar = 100µm).
12. Sample 327A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/110 (scale bar = 100µm).
13. Sample 856A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/31 (scale bar = 100µm).
14. Sample RM1, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection LP, 2.10/116 (scale bar = 100µm).
15. Sample 350A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/41 (scale bar = 100µm)

Pl. 23.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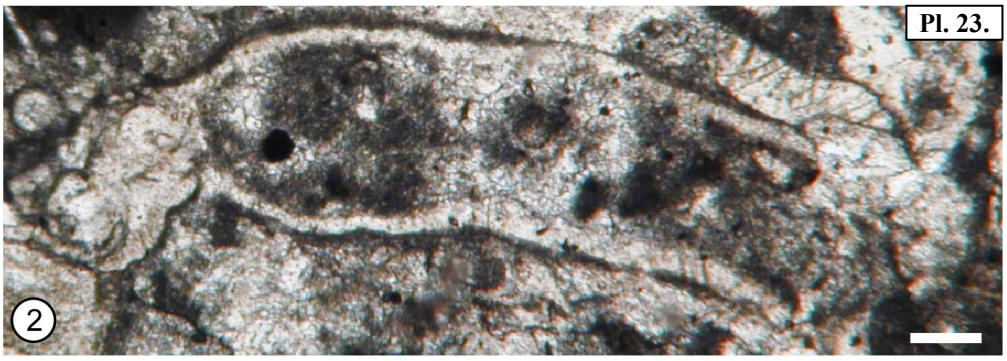
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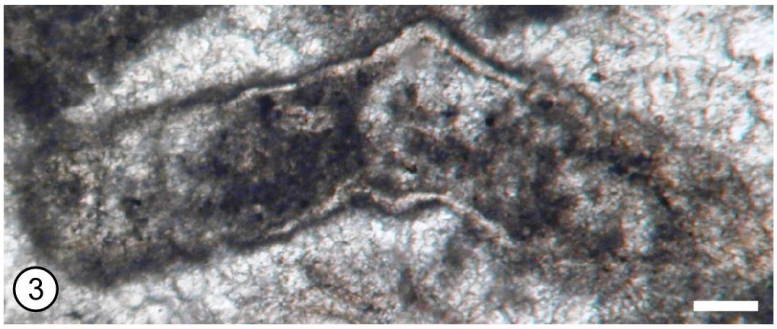
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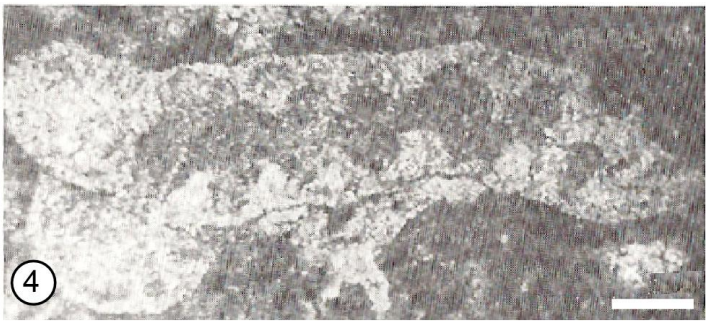
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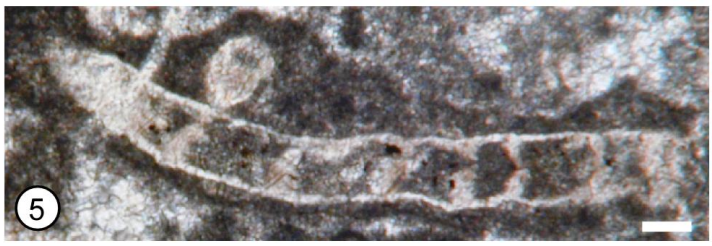
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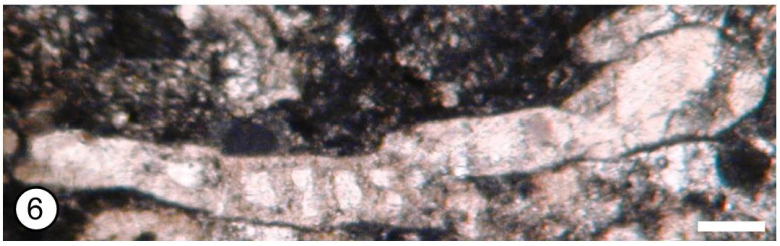
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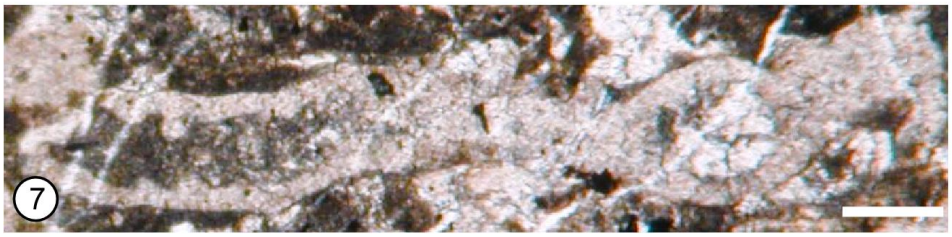
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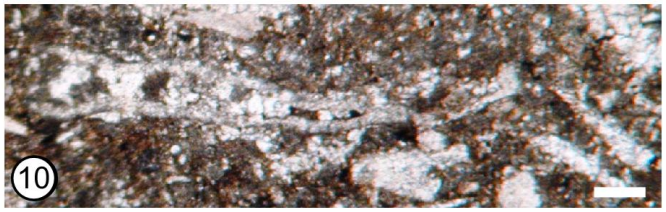
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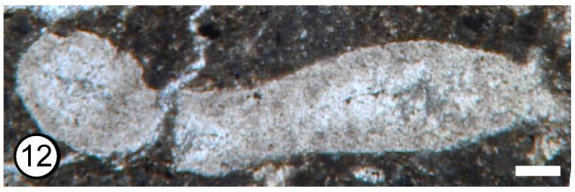
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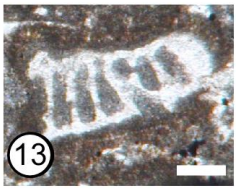
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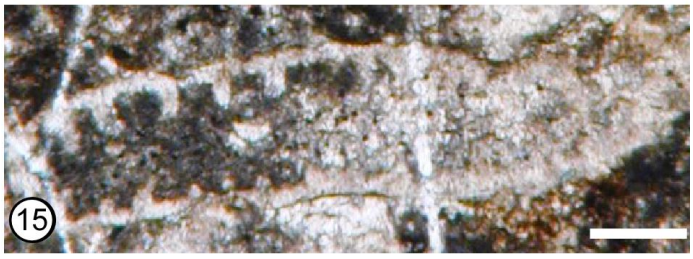
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Plate 24.

Genus *Exvotarisella* Elliott, 1970

Figs. 1-9: ***Exvotarisella index*** (Ehrenberg, 1854 sensu von Möller, 1879) Mamet and Roux, 1974

1. Sample 601A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/6 (scale bar = 100µm).
2. Sample 328'C, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/27 (scale bar = 100µm).
3. Sample UM-ROQ, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection Univ. Montpellier, 9.7/127 (scale bar = 100µm).
4. Sample 328'B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/21 (scale bar = 100µm).
5. Sample 328'E, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/48 (scale bar = 100µm).
6. Sample 328'D, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/35 (scale bar = 100µm).
7. Sample 328'E, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/49 (scale bar = 100µm).
8. Sample 687A, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/78 (scale bar = 200µm).
9. Sample 30, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.12/7 (scale bar = 100µm)

Family Donezellaceae

Tribe Pokorninelleae

Genus *Asphaltinella* Mamet and Roux, 1978b

Figs. 10-14: ***Asphaltinella*? sp.**

10. Sample LSItop-2048, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/28 (scale bar = 100µm).
11. Sample 134F, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/36 (scale bar = 100µm).
12. Sample 328'C, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/25 (scale bar = 100µm).
13. Sample 328'D, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/36 (scale bar = 100µm).
14. Sample 600B, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/114 (scale bar = 100µm)

Genus *Pokorninella* Vachard in Perret and Vachard, 1977

Fig. 15: ***Pokorninella strigosa*** Vachard in Perret and Vachard, 1977

15. Sample AH2, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/51 (scale bar = 100µm)

Pl. 24.

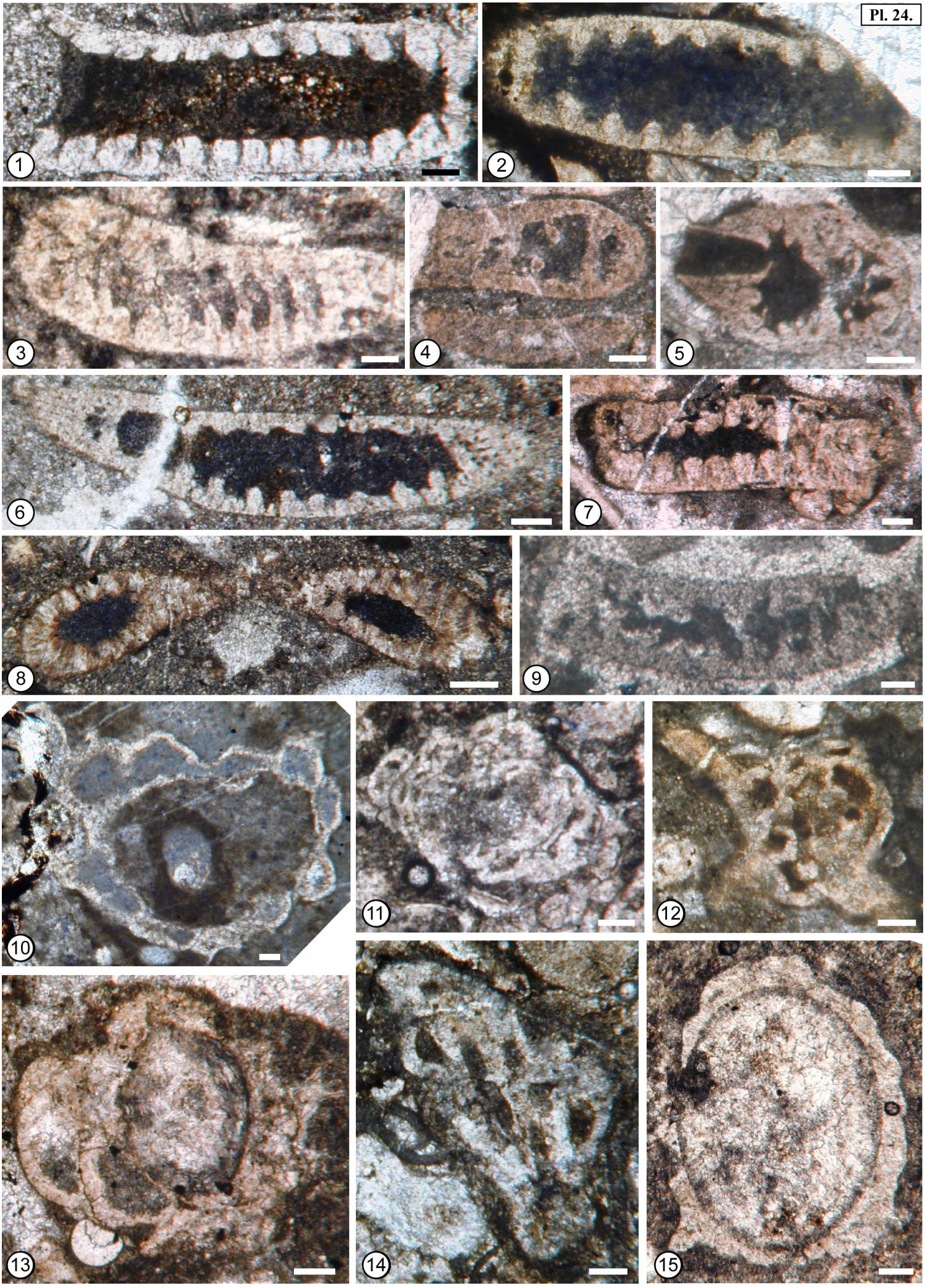


Plate 25.

Tribe Donezelleae

Genus *Kamaenella* Mamet and Roux, 1974

Figs. 1-8: ***Kamaenella denbighi*** Mamet and Roux, 1974

1. Sample 10-6, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/37 (scale bar = 100µm).
2. Sample 10-6, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/40 (scale bar = 400µm).
3. Sample 332B, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/115 (scale bar = 100µm).
4. Sample RR4, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/222 (scale bar = 100µm).
5. Sample 848, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 7/154 (scale bar = 400µm).
6. Sample 40, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/56 (scale bar = 100µm).
7. Sample 246D, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/20 (scale bar = 100µm).
8. Sample 44, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/54 (scale bar = 100µm).

Tribe Claracrusteae

Genus *Claracrusta* Vachard in Vachard and Montenat, 1981

Figs. 9-15: ***Claracrusta* ex gr. *catenoides*** (Homann, 1972) Vachard in Vachard and Montenat, 1981

9. Sample 601D, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/54 (scale bar = 100µm).
10. Sample 10-I, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/90 (scale bar = 100µm).
11. Sample 24, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/66 (scale bar = 200µm).
12. Sample 602A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/81 (scale bar = 200µm).
13. On a coral. Sample LSI-2040, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/17 (scale bar = 200µm).
14. Sample 857.2, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/63 (scale bar = 200µm).
15. Crust with *Aphralysia* and *Claracrusta*. Sample 341B, Montagne Noire (France), Tourière, Brigantian. Collection DV, 9.9.7/25 (scale bar = 100µm).

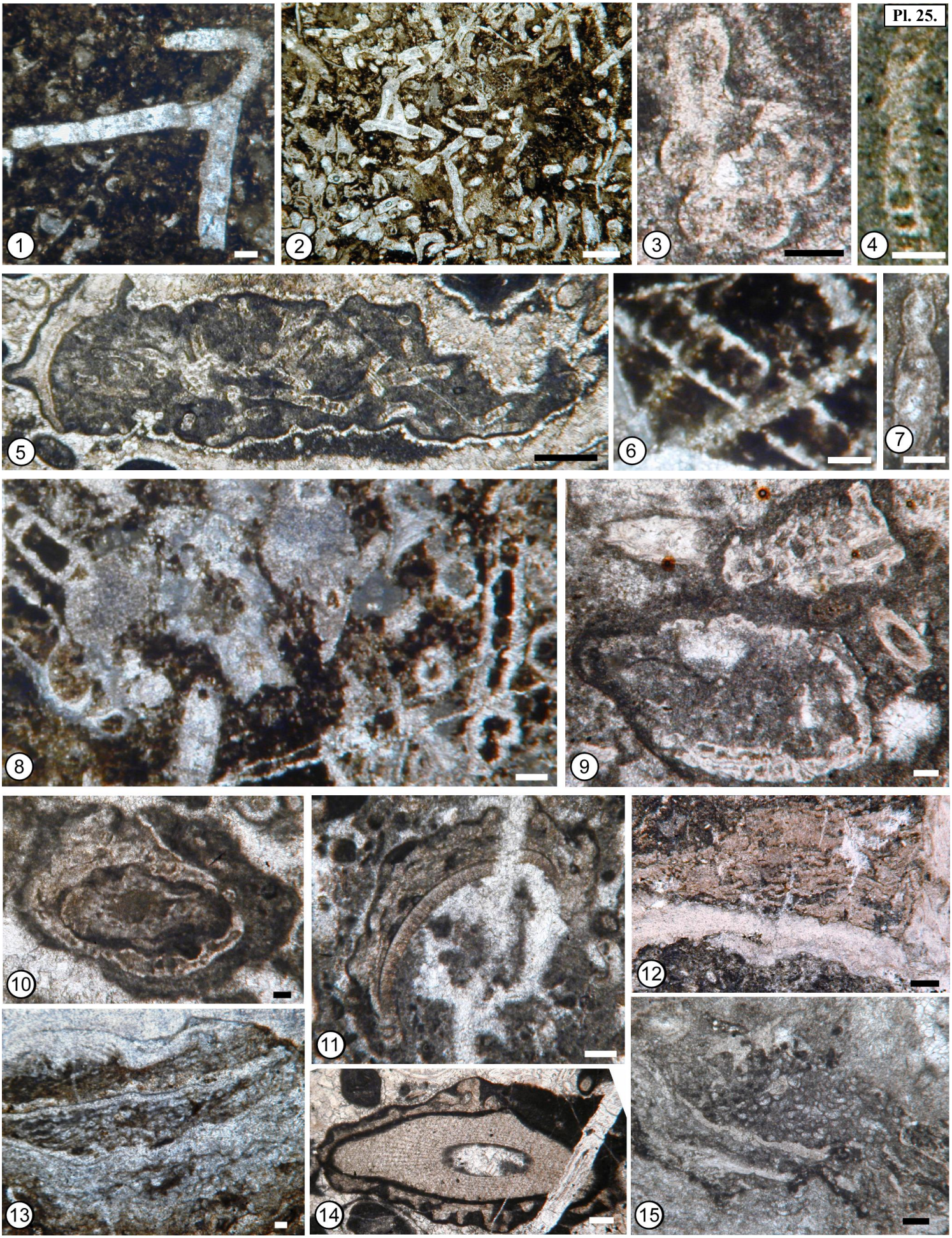


Plate 26.

Algospongia Aoujgaliales
Order Aoujgaliales
Family Aoujgaliaceae
Tribe Pseudostacheoidideae
Genus *Stacheoides* Cummings, 1955c

Figs. 1-3: ***Stacheoides polytrematoides*** (Brady, 1876)

1. Sample 10-9, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/57 (scale bar = 100µm).
2. Sample 10-10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/99 (scale bar = 100µm).
3. Sample 82-F, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/15 (scale bar = 100µm).

Figs. 4-5: ***Stacheoides tenuis*** Petryk and Mamet, 1972

4. Sample 293E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/47 (scale bar = 400µm).
5. Sample RR77, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/231 (scale bar = 100µm).

Figs. 6-8: ***Stacheoides cannindahensis*** Mamet and Roux, 1983

6. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/119 (scale bar = 100µm).
7. Sample 327B, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/118 (scale bar = 100µm).
8. Sample LS II-2029, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/108 (scale bar = 100µm).

Genus *Stacheoidella* Mamet and Roux in Mamet et al., 1987

Fig. 9: ***Stacheoidella spissa*** (Petryk and Mamet, 1972)

9. Sample GIK1818, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, (scale bar = 500µm).

Tribe Aoujgalieae
Genus ***Aoujgalia*** Termier and Termier, 1950

Figs. 10-12: ***Aoujgalia* ? sp.**

10. Sample 134E, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/15 (scale bar = 100µm).
11. Sample RR77, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/237 (scale bar = 100µm).
12. Sample RR51, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/52 (scale bar = 200µm).

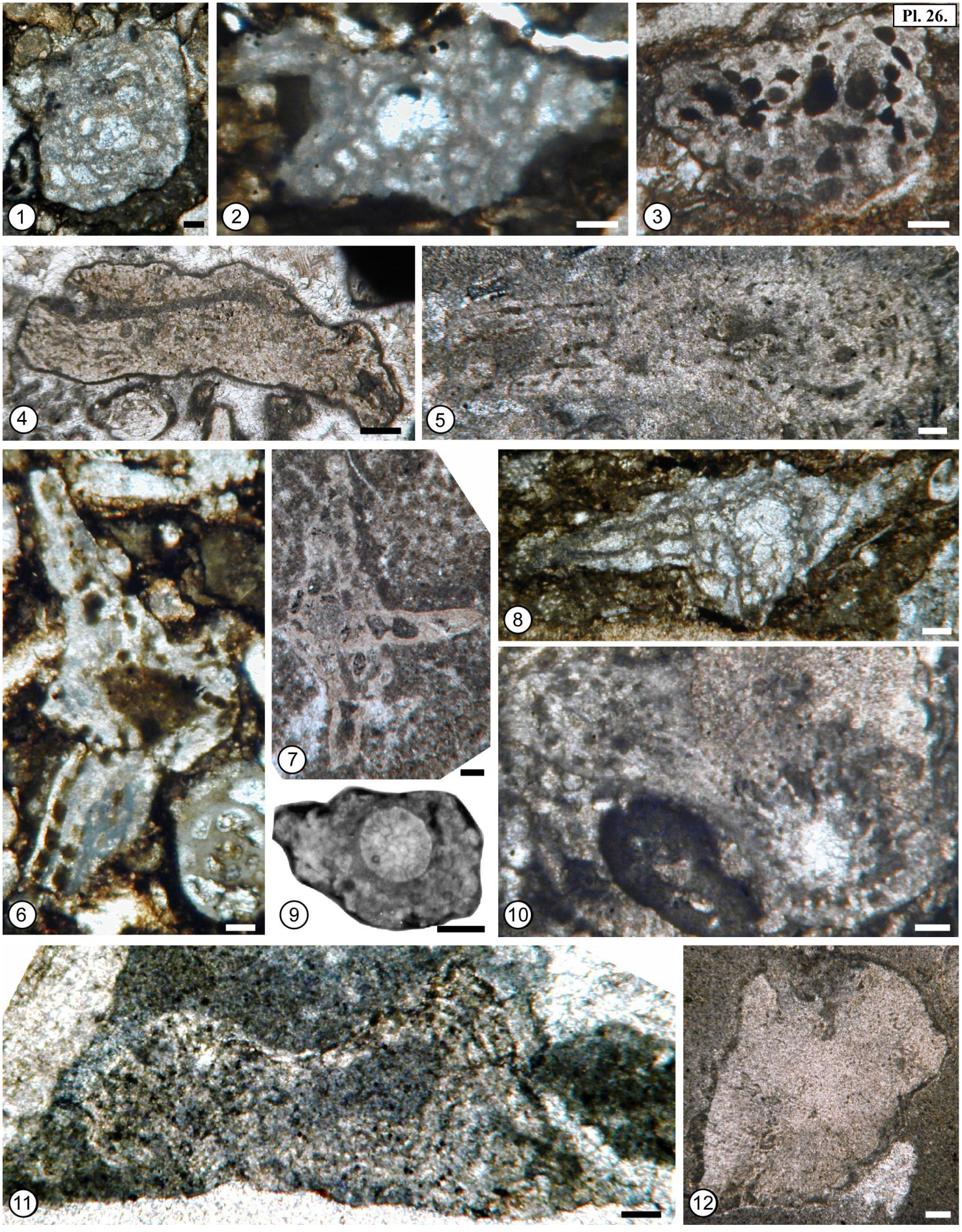


Plate 27.

Genus *Valuzieria* G. Termier, Termier and Vachard, 1977

Figs. 1-5: ***Valuzieria sescenti*** G. Termier, Termier and Vachard, 1977

1. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/131 (scale bar = 100µm).
2. Sample 690C, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/35 (scale bar = 100µm).
3. Sample 690C, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/36 (scale bar = 100µm).
4. Sample 600A, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/110 (scale bar = 100µm).
5. Sample 600B, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/118 (scale bar = 400µm).

Family Pseudokomiaceae
Tribe Pseudokomieae
Genus *Roquesselsia* G. Termier, Termier and Vachard, 1977

Figs. 6-16: ***Roquesselsia radians*** G. Termier, Termier and Vachard, 1977

6. Re-illustrated holotype. Sample 332'B, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 7/140 (scale bar = 200µm).
7. Sample 10-14.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/155 (scale bar = 400µm).
8. Sample 10-3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/76 (scale bar = 200µm).
9. Re-illustrated paratype. Sample 332'B, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 7/141 (scale bar = 200µm).
10. Sample 33-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/120 (scale bar = 400µm).
11. Sample 33-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/128 (scale bar = 100µm).
12. Sample 10-50, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/40 (scale bar = 100µm).
13. Sample 33-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/122 (scale bar = 400µm).
14. Sample 33-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/125 (scale bar = 200µm).
15. Sample 33-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/131 (scale bar = 100µm).
16. Sample 10-7, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/136 (scale bar = 200µm).

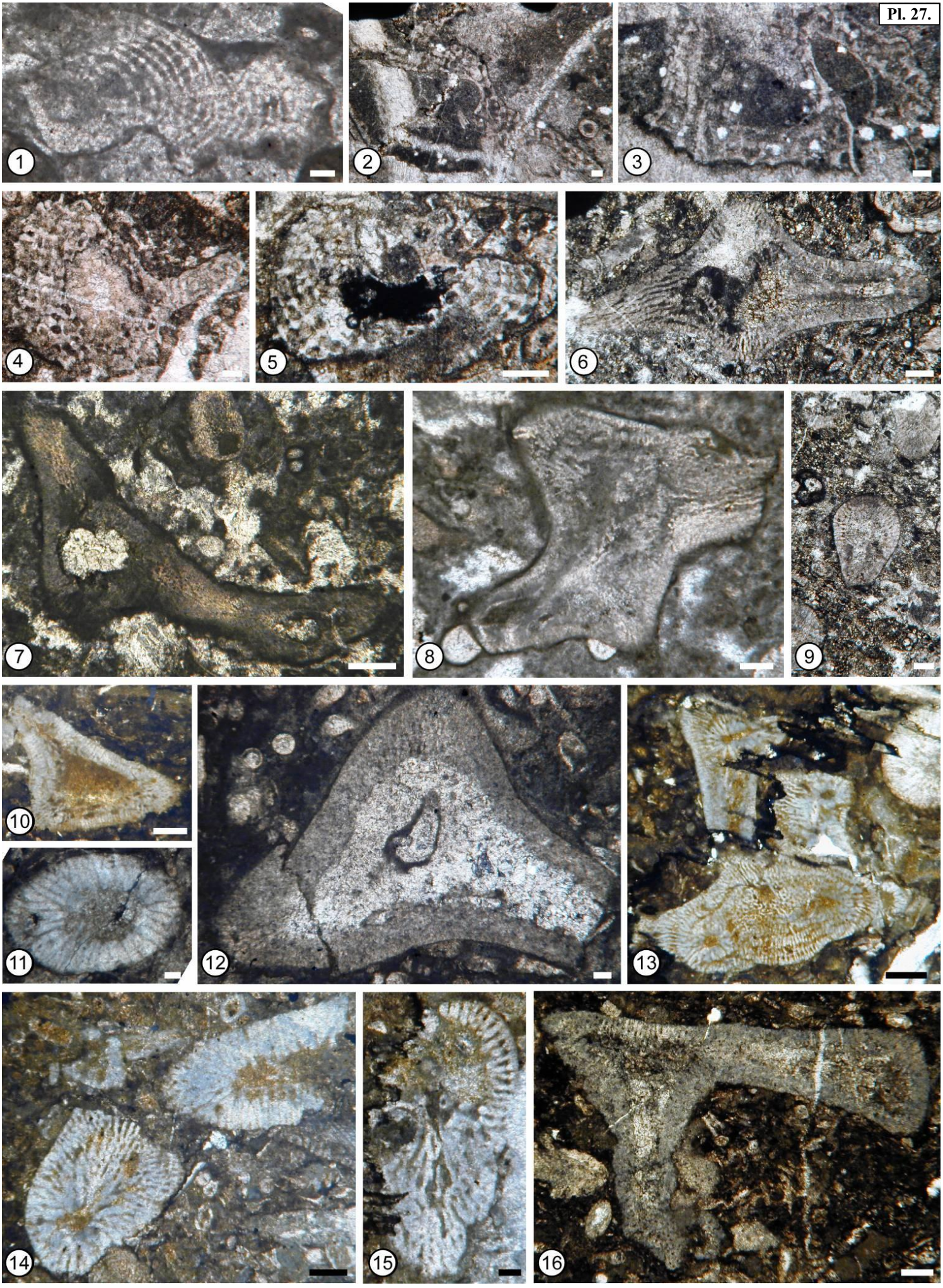


Plate 28.

Genus *Dromastacheoides* Vachard in Perret and Vachard, 1977

Figs. 1-2: ***Dromastacheoides wilsoni*** Vachard in Perret and Vachard, 1977

1. Sample CAS14.2, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.7/20 (scale bar = 400µm).
2. Sample AH20e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/7 (scale bar = 100µm).

Family Stacheiaceae

Genus *Stacheia* Brady, 1876

Fig. 3: ***Stacheia marginulinoides*** Brady, 1876

3. Sample 10-9. Montagne Noire (France), Castelsec, Asbian-Brigantian boundary. Collection MA. 2/71 (scale bar=100µm).

Genus *Fourstonella* Cummings 1955a

Figs. 4-6: ***Fourstonella fusiformis*** (Brady, 1876)

4. Sample RR53, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/87 (scale bar = 100µm).
5. Sample AH20a, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/78 (scale bar = 100µm).
6. Sample AH20 (778C), Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/154 (scale bar = 100µm).

Figs. 7-10: ***Fourstonella irregularis*** Mamet and Roux, 1977

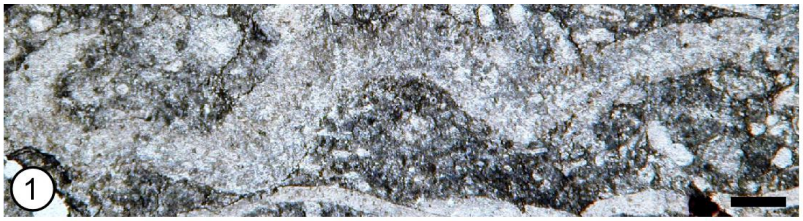
7. Sample 248B, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/64 (scale bar = 100µm).
8. Sample 139A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.3/73 (scale bar = 100µm).
9. Sample 328'C, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/26 (scale bar = 100µm).
10. Sample 82-c, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/47 (scale bar = 100µm).

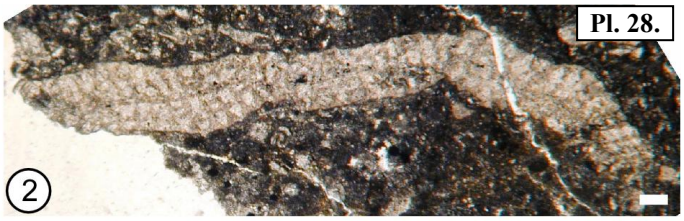
Genus *Chuvashovia* Vachard, 1980

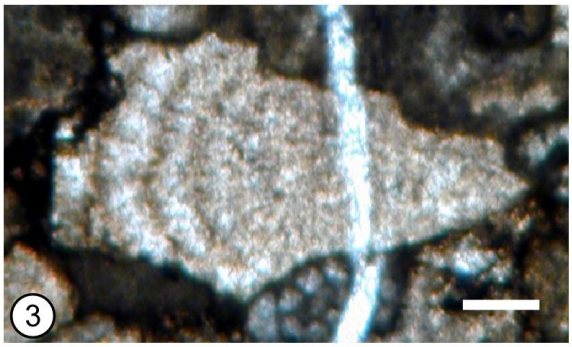
Figs. 11-12: ***Chuvashovia*? sp.**

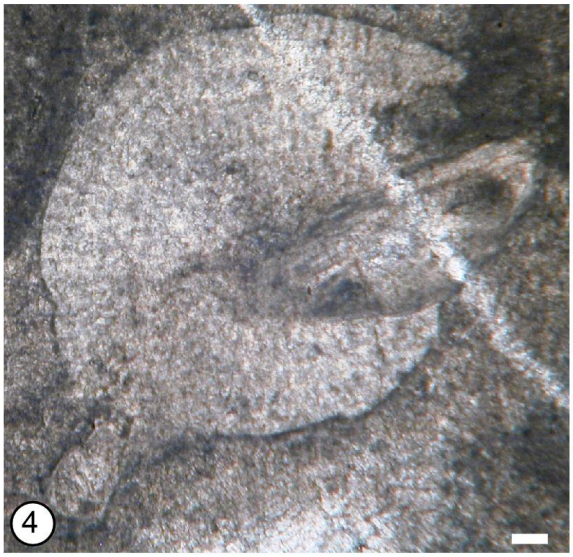
11. Sample 82-c, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/45 (scale bar = 400µm).
12. Detail of previous taxa. Sample 82-c, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/46 (scale bar = 100µm).

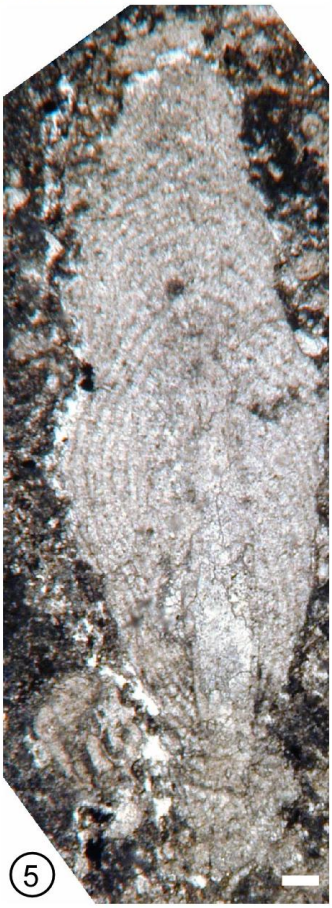
Pl. 28.

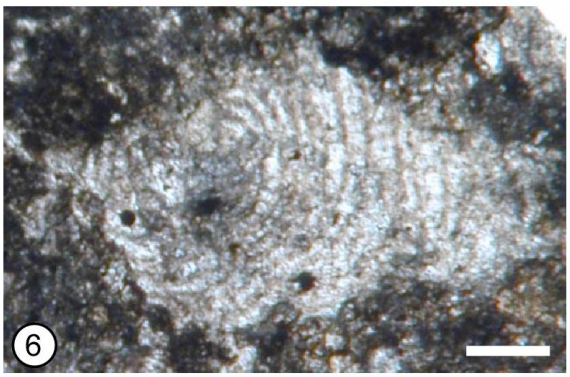


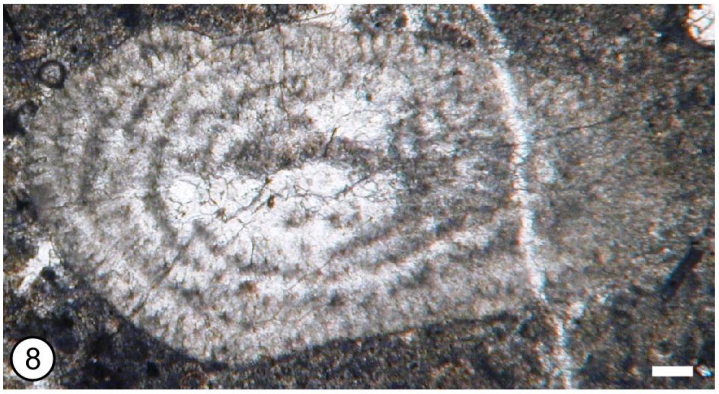


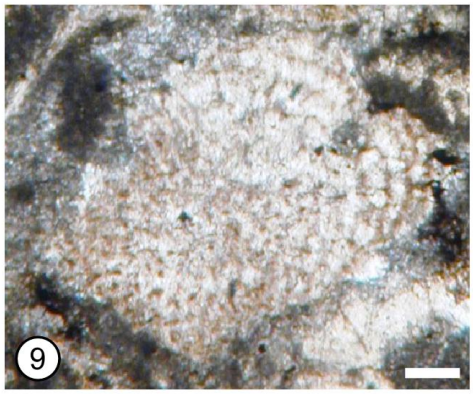


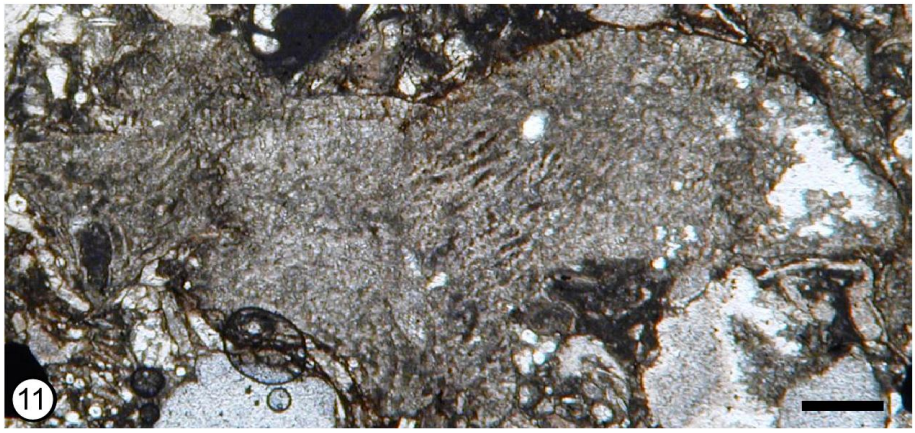












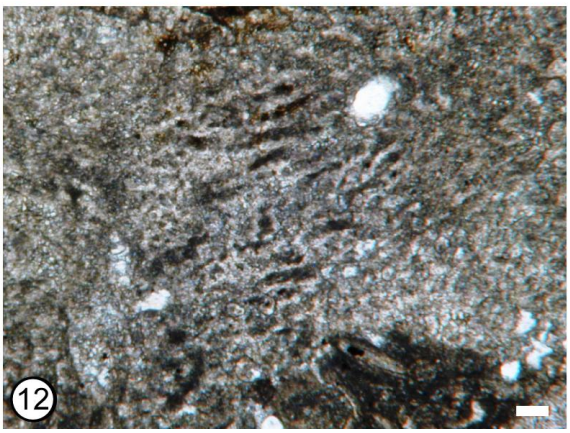


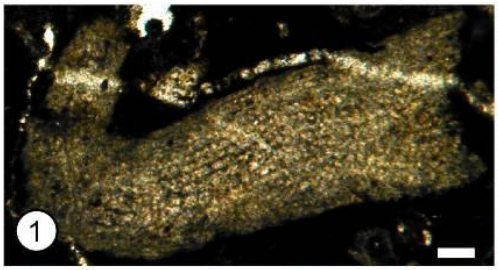
Plate 29.

Family Ungdarellaceae
Tribe Ungdarelleae
Genus *Ungdarella* Maslov, (1950) 1956a

Figs. 1-15: ***Ungdarella uralica*** Maslov (1950) 1956a

1. Sample 10-7, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/135 (scale bar = 100µm).
2. Sample 10-7, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/138 (scale bar = 100µm).
3. Sample 10-7, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/137 (scale bar = 300µm).
4. Sample 10-2.3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/24 (scale bar = 100µm).
5. With central ladder. Sample 11-III, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/8 (scale bar = 100µm).
6. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/142 (scale bar = 400µm).
7. Sample 53, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/50 (scale bar = 100µm).
8. Sample 10-II, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/34 (scale bar = 100µm).
9. *Ungdarella* with attachment disk. Sample 25-9B, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.7/2 (scale bar = 100µm).
10. Sample 10-7, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/139 (scale bar = 400µm).
11. Sample 73(2), Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/12 (scale bar = 400µm).
12. Sample RC1, Montagne Noire (France), Roc de Castel, Brigantian. Collection MA, 9.6/4 (scale bar = 400µm).
13. Sample RM1, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 2.10/117 (scale bar = 100µm).
14. Sample RM1, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 2.10/121 (scale bar = 100µm).
15. Sample 10-17, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/12 (scale bar = 100µm).

Pl. 29.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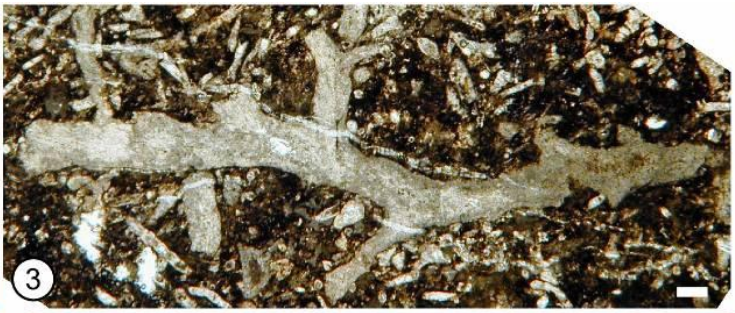
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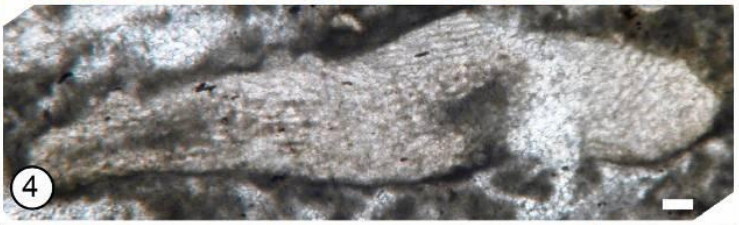
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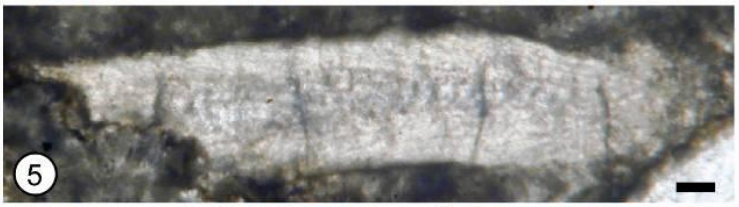
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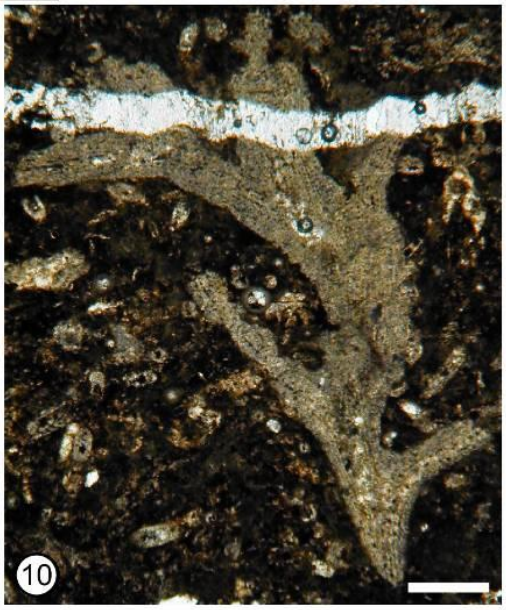
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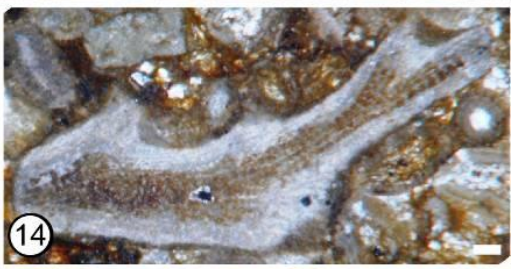
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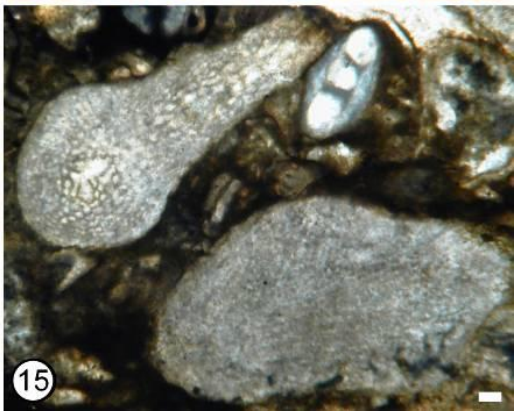
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Plate 30.

Calcifoliaceae
Family Calcifoliaceae
Tribe Fascielleae
Genus *Fasciella* Ivanova, 1973

Figs. 1-9: ***Fasciella kizilia*** Ivanova, 1973

1. Sample 11.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.2/51 (scale bar = 100µm).
2. Sample 10-I.2. Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA. 9.3/59 (scale bar = 400µm).
3. Sample 12-1, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/2 (scale bar = 200µm).
4. Sample PA-7, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/42 (scale bar = 300µm).
5. Sample 601D, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/63 (scale bar = 100µm).
6. Sample Bou25-1a, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/71 (scale bar = 100µm).
7. Sample RR76, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/215 (scale bar = 100µm).
8. Sample RR55, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/98 (scale bar = 100µm).
9. Sample Bou25-16, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.7/11 (scale bar = 400µm).

Figs. 10-18: ***Fasciella crustosa*** Vachard, Somerville and Cózar, 2004

10. Sample RR60, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/185 (scale bar = 200µm).
11. Sample RR55, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/118 (scale bar = 100µm).
12. Sample RR54, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/98 (scale bar = 400µm).
13. Sample RR1, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/198 (scale bar = 400µm).
14. Sample Bou25-16B, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.7/16 (scale bar = 500µm).
15. Sample RR55, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/123 (scale bar = 200µm).
16. Sample RR66, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/57 (scale bar = 300µm).
17. Sample RR73, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/154 (scale bar = 200µm).
18. Sample 601D, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/62 (scale bar = 400µm).

Figs. 19-20: ***Fasciella scalaeformis*** Vachard, Somerville and Cózar, 2004

19. Sample 431A, Montagne Noire (France), Mounio, Brigantian. Collection MA, 9.9.9.1/8 (scale bar = 100µm).
20. Sample 431D, Montagne Noire (France), Mounio, Brigantian. Collection MA, 9.9.9.1/25 (scale bar = 100µm).

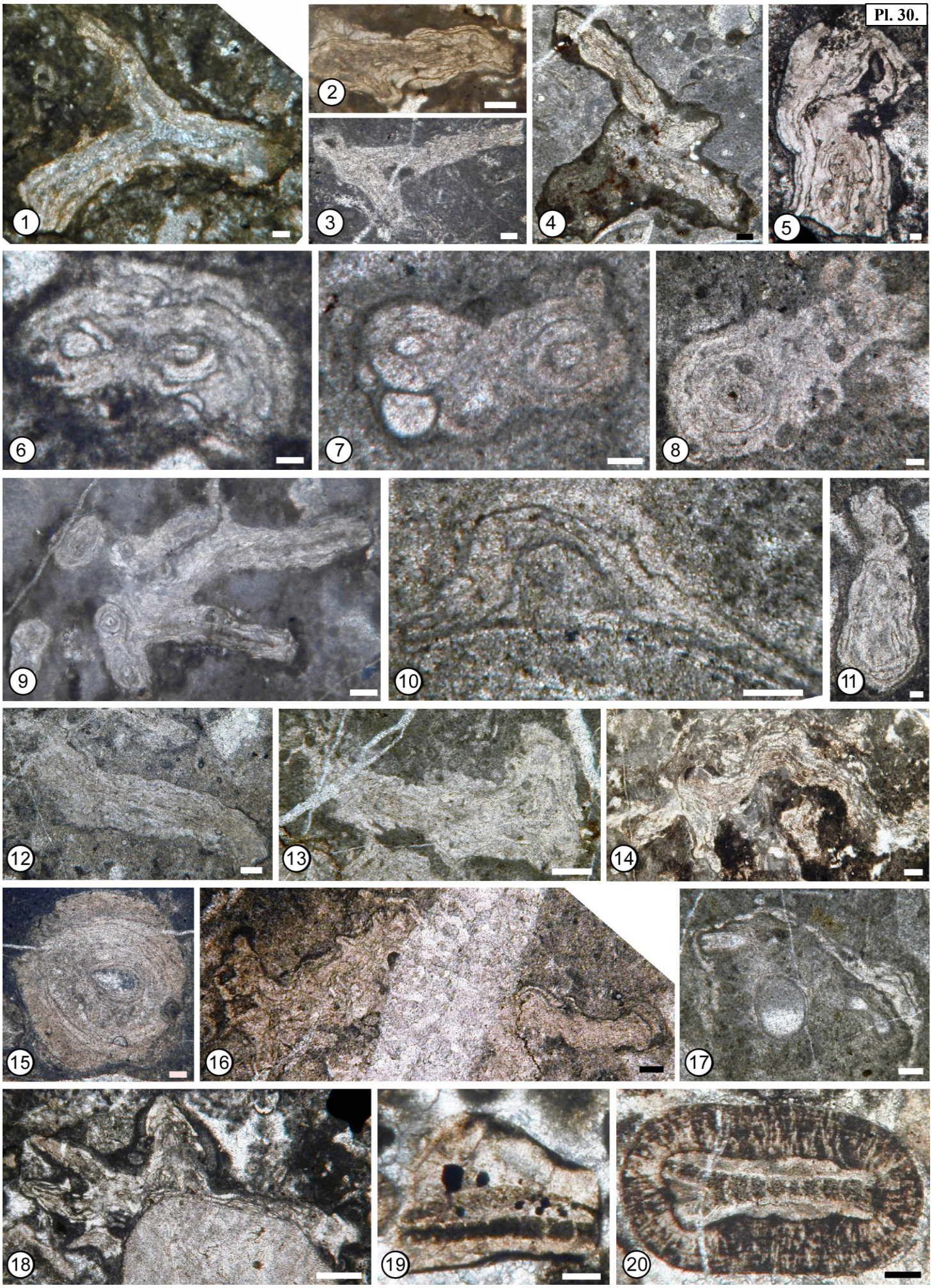


Plate 31.

Genus *Praedonezella* Kulik, 1973

Figs. 1-6: ***Praedonezella primitiva*** Vachard, Somervillle and Cózar, 2004

1. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/33 (scale bar = 400µm).
2. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/68 (scale bar = 400µm).
3. Sample LSltop-2048, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/26 (scale bar = 400µm).
4. Sample RR3, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/217 (scale bar = 400µm).
5. Sample 31, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/21 (scale bar = 400µm).
6. Sample 21?, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/88 (scale bar = 400µm).

Figs. 7-8: ***Praedonezella cespeformis*** Kulik, 1973 emend. Perret and Vachard, 1977

7. Sample AH18i, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/38 (scale bar = 200µm).
8. Sample AH20b, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/91 (scale bar = 100µm).

Pl. 31.

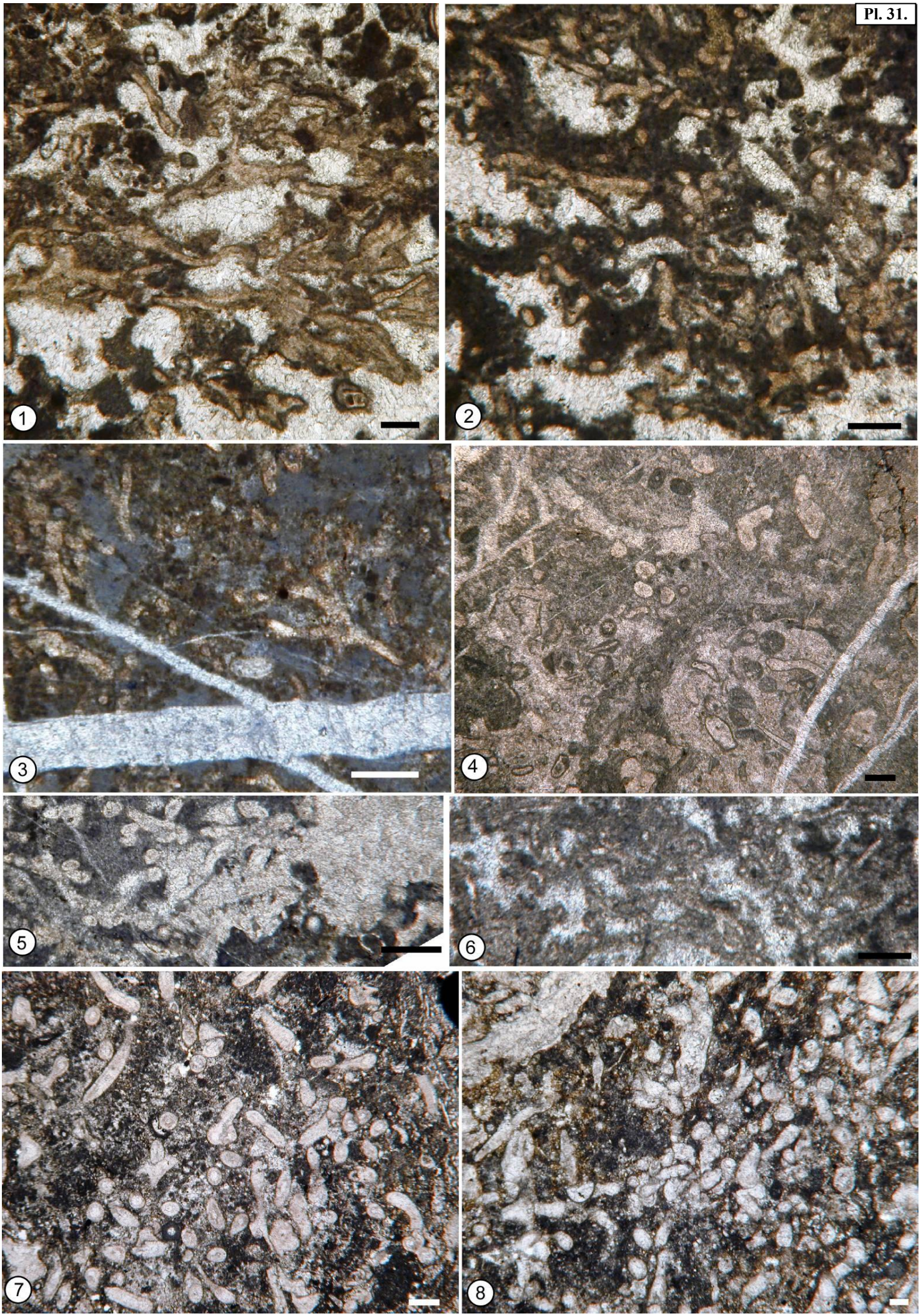


Plate 32.

Tribe Calcifolieae

Genus *Frustulata* Saltovskaya, 1984 sensu Vachard and Cózar, 2005

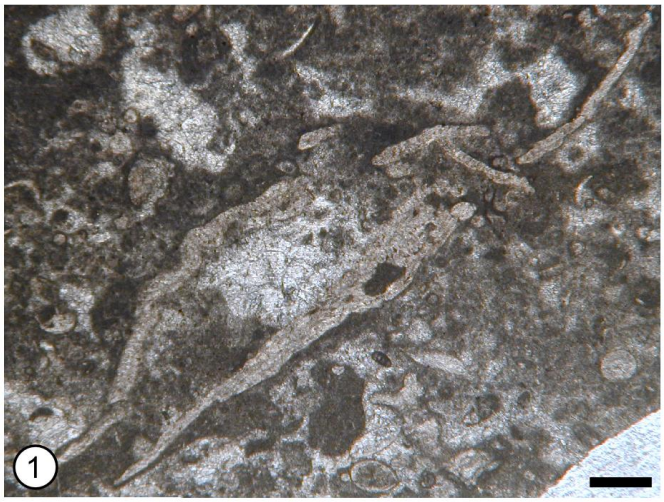
Figs. 1-4: ***Frustulata meridionalis*** n. sp.

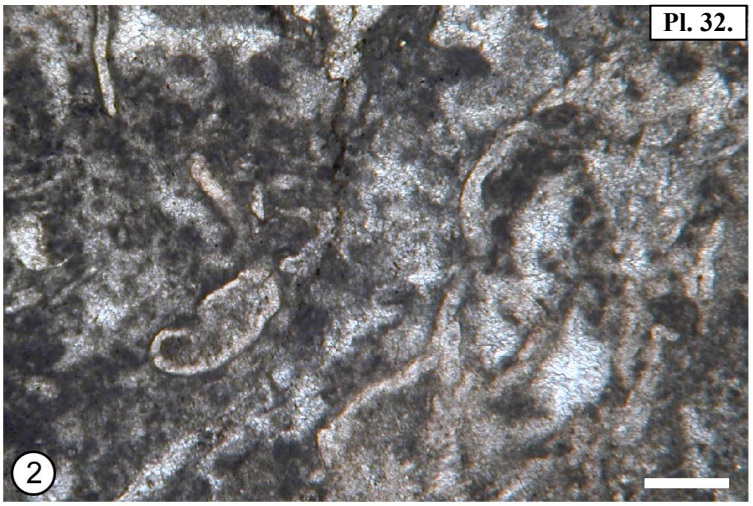
1. Holotype. Sample 10-2.3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/26 (scale bar = 400µm).
2. Paratype. Sample 10-2.3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/25 (scale bar = 400µm).
3. Paratype. Sample 10-7, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/131 (scale bar = 400µm).
4. Paratype. Sample 12-2, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/5 (scale bar = 400µm).

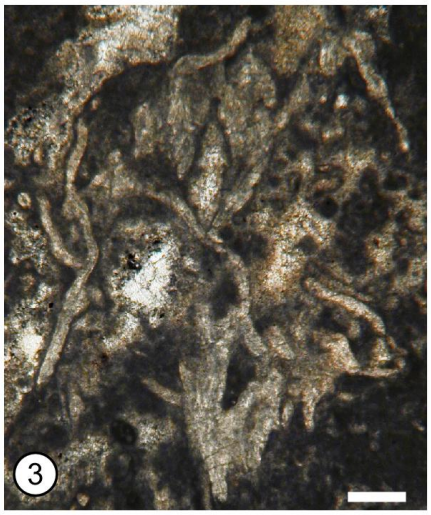
Figs. 5-8: ***Frustulata* sp. 5**

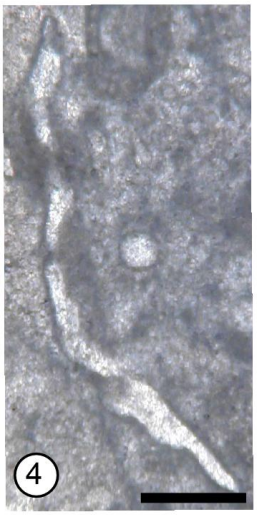
5. Sample SP24, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/26 (scale bar = 400µm).
6. Sample UM-ROQ, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection Univ. Montpellier, 9.7/139 (scale bar = 200µm).
7. *Frustulata* transition to *Falsocalcifolium*. Sample RR72, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/136 (scale bar = 400µm).
8. *Frustulata* transition to *Falsocalcifolium*. Sample RR76, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/221 (scale bar = 400µm).

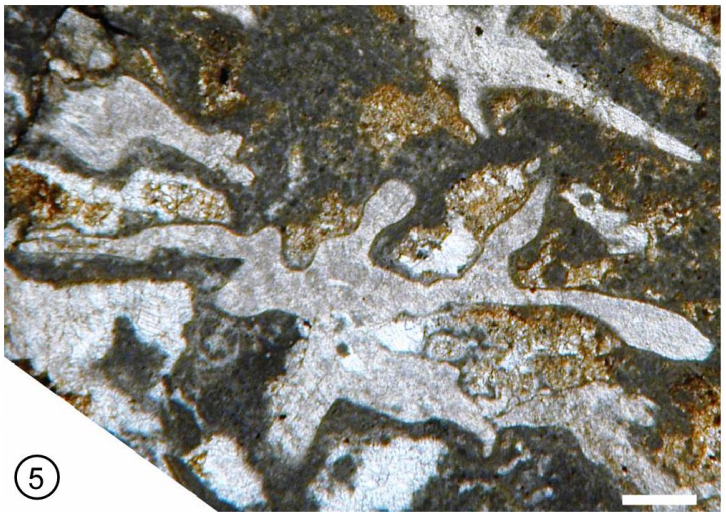
Pl. 32.

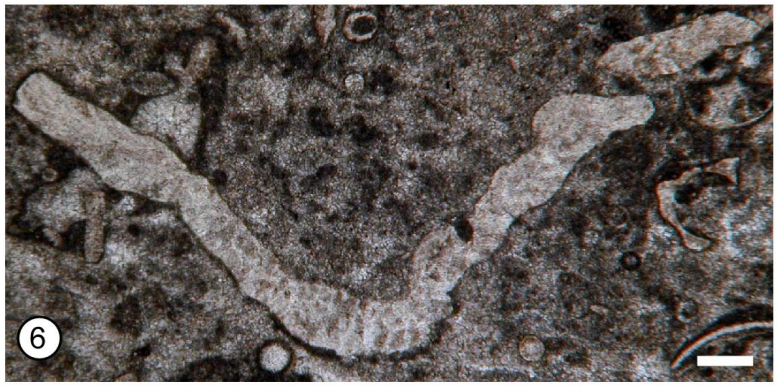


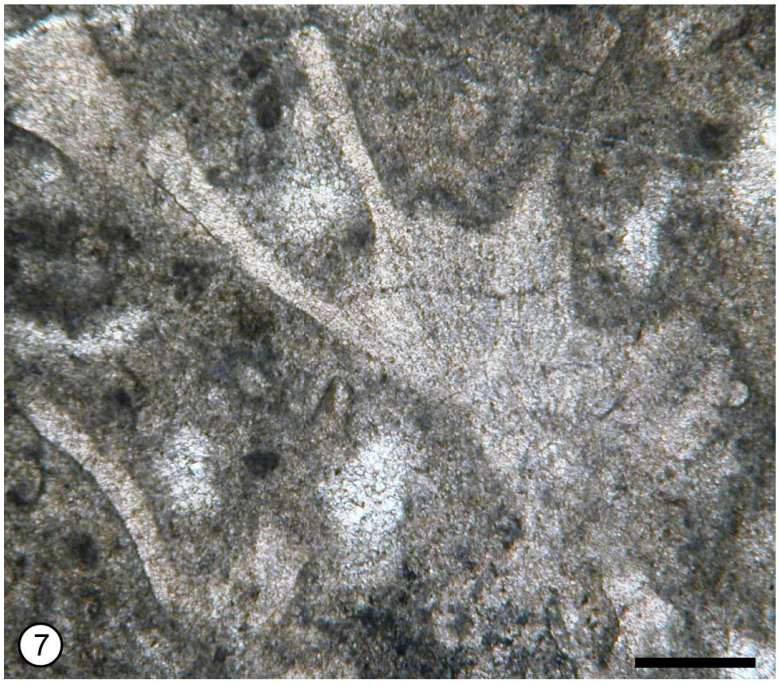












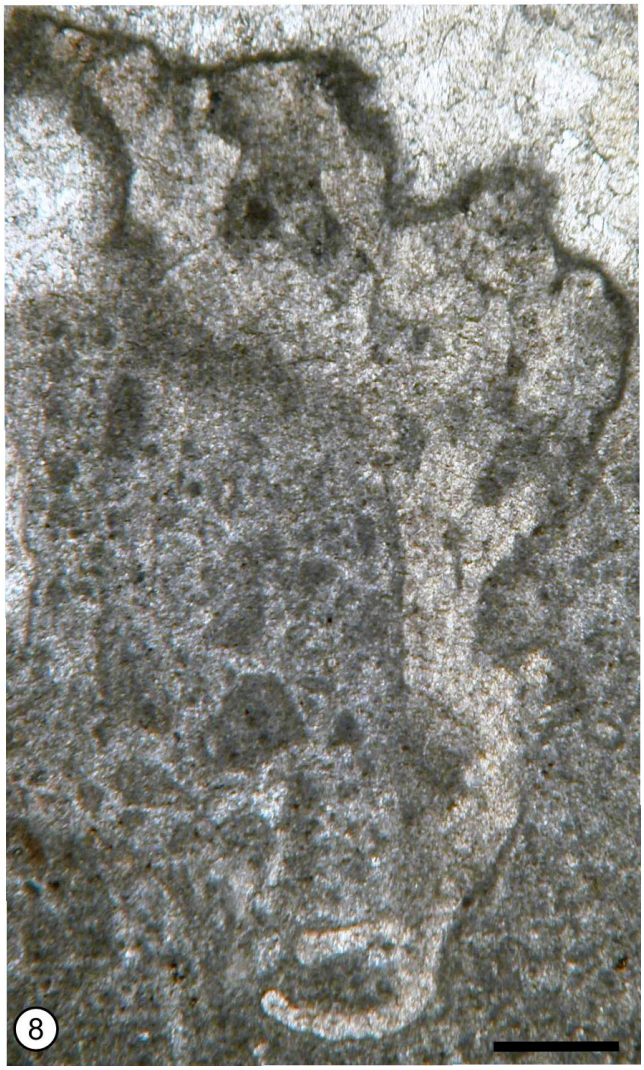


Plate 33.

Figs. 1-3: ***Frustulata* sp. 5**

1. Sample 10-II, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/40 (scale bar = 400µm).
2. Sample 601D, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/57 (scale bar = 400µm).
3. Sample ML764, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MLB, 9.7/80 (scale bar = 100µm).

Genus *Falsocalcifolium* Vachard and Cózar, 2005

Figs. 4-5: ***Falsocalcifolium punctatum*** (Maslov, 1956)

4. Sample 601C, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/47 (scale bar = 100µm).
5. Sample 328'B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/14 (scale bar = 400µm).

Figs. 6-13: ***Falsocalcifolium*? *castelsequensis* n. sp.**

6. Sample 10-8.1, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/78 (scale bar = 100µm).
7. Holotype. Sample 10-9, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/55 (scale bar = 400µm).
8. Sample 10-9, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/58 (scale bar = 100µm).
9. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/108 (scale bar = 400µm).
10. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/114 (scale bar = 100µm).
11. Sample RR53, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/81 (scale bar = 100µm).
12. Sample RR53, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/77 (scale bar = 100µm).
13. Sample 10-10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/96 (scale bar = 100µm).

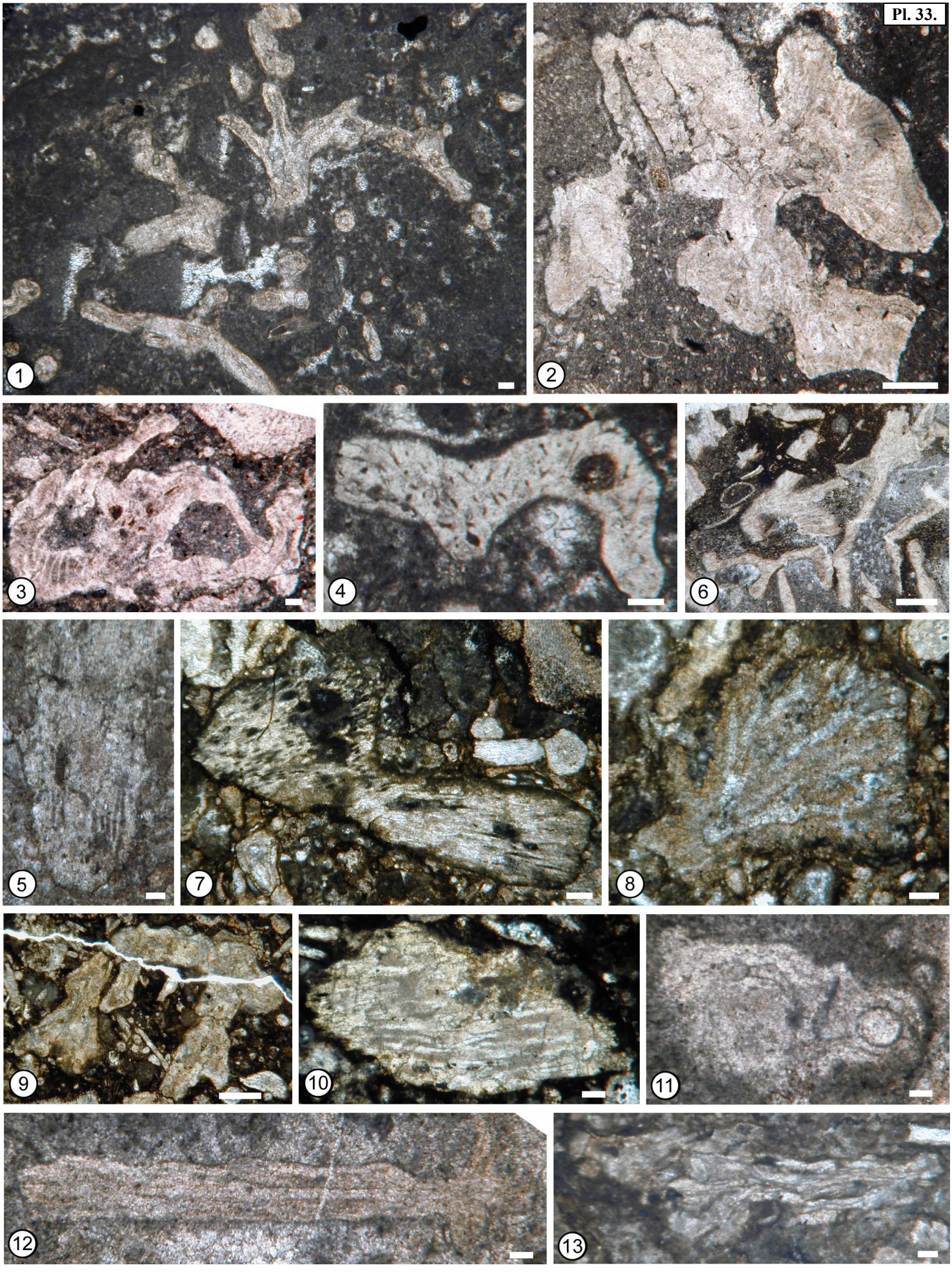


Plate 34.

Genus *Calcifolium* Shvetsov and Birina, 1935

Figs. 1-10: ***Calcifolium okense*** Shvetsov and Birina, 1935

1. Sample CAS23.2, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.8/18 (scale bar = 400µm).
2. Detail of previous one. Sample CAS23.2, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.8/19 (scale bar = 100µm).
3. Sample AH20a, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/82 (scale bar = 100µm).
4. Sample AH18f, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/8 (scale bar = 100µm).
5. *Calcifolium* with ferrigenous filaments. Sample AH20e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/135 (scale bar = 100µm).
6. *Calcifolium okense* with filaments. Sample AH18e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/29 (scale bar = 100µm).
7. *Calcifolium okense* with ferrigenous filaments. Sample AH20e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/4 (scale bar = 100µm)
8. Sample AH18f, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/20 (scale bar = 200µm).
9. With *Endothyra bowmani*. Sample AH18h, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/67 (scale bar = 200µm).
10. Sample AH18e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/31 (scale bar = 100µm)

Calcisphaerales

Family Calcisphaeraceae

Genus *Pachysphaerina* Conil and Lys in Conil et al., 1969

Figs. 11-13: ***Pachyspherina pachysphaerica*** (Pronina, 1963)

11. Sample 11-8, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection DV, 9.3/20 (scale bar = 100µm).
12. Sample 600E, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/129 (scale bar = 100µm).
13. Sample 600A, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/108 (scale bar = 100µm).

Figs. 14-15: ***Pachysphaerina polydermoides*** (Conil and Lys, 1964)

14. Sample 134D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/12 (scale bar = 100µm).
15. Sample 332'A.2, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 7/152 (scale bar = 100µm)

Genus *Pachythurammina* Vachard, 1977b

Figs. 16-17: ***Pachythurammina sarcosphaera*** Vachard, 1977b

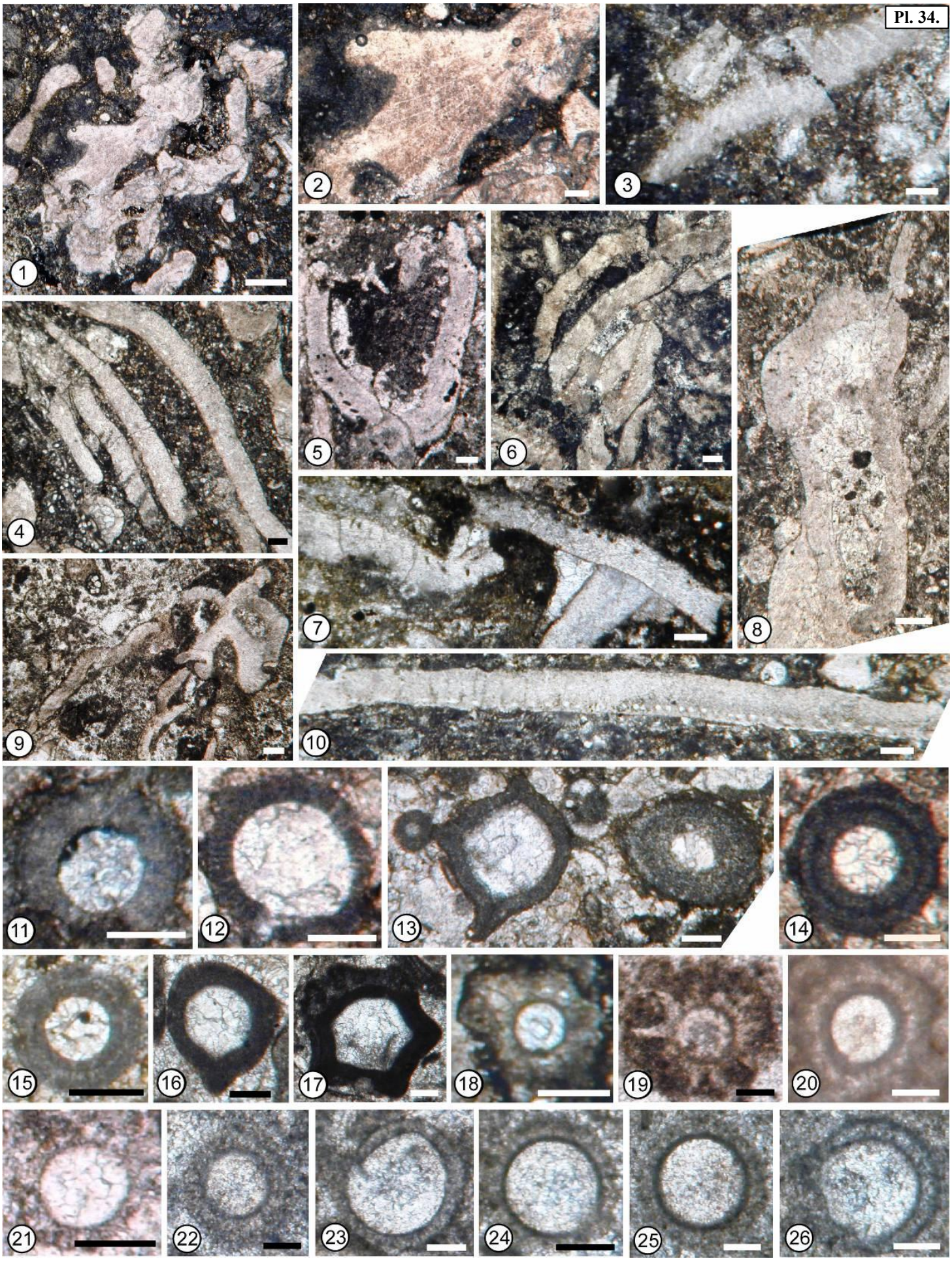
16. Sample 293G, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/63 (scale bar = 100µm).
17. Sample 332F, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/135 (scale bar = 100µm)

Family Asterosphaeraceae

Genus *Radiosphaera* Reitlinger, 1957

Figs. 18-26: ***Radiosphaera ponderosa*** Reitlinger, 1960

18. Sample 246D, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/20 (scale bar = 100µm).
19. Sample 248A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/70 (scale bar = 100µm).
20. Sample 73, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/4 (scale bar = 100µm).
21. Sample AH18c, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/50 (scale bar = 100µm).
22. Sample RR54, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/106 (scale bar = 100µm).
23. Sample RR62, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.4/11 (scale bar = 100µm).
24. Sample RR62, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.4/12 (scale bar = 100µm).
25. Sample RR74, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/180 (scale bar = 100µm).
26. Sample RR86, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.8/7 (scale bar = 100µm)



24. *Eotuberitina* attached on *Howchinia*. Sample RR47, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/12 (scale bar = 100µm).
25. Sample UM-ROQ, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection Univ. Montpellier, 9.7/131 (scale bar = 100µm).
26. SampleRR66, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/53 (scale bar = 400µm).
27. Sample 328'B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/22 (scale bar = 100µm).
28. Sample RR54, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/102 (scale bar = 100µm).

Genus *Diplosphaerina* Derville, 1952

Figs. 29-35: ***Diplosphaerina inaequalis*** (Derville, 1931)

29. Sample 13, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/1 (scale bar = 100µm).
30. Sample 245A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/3 (scale bar = 100µm).
31. Sample 246B, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/14 (scale bar = 100µm).
32. Sample 134'A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/20 (scale bar = 100µm).
33. Sample MAR3B, Ardengost (France), late Serpukhovian. Collection MFP, 9.9.9.9.2/3 (scale bar = 100µm).
34. Sample RR53, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/76 (scale bar = 100µm).
35. Sample RR57, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/154 (scale bar = 100µm).

Plate 35.

Foraminifers
Order Fusulinida
Parathuramminoids
Superfamily Parathuramminoidea
Family Parathuramminidae
Genus *Hemithurammina* Mamet, 1973

Figs. 1-13: ***Hemithurammina fimbriata*** (Howchin, 1888) emend. Mamet, 1973

1. Sample 293I, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/79 (scale bar = 100µm).
2. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, /21 (scale bar = 100µm).
3. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/22 (scale bar = 100µm).
4. Sample 293H, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/74 (scale bar = 100µm).
5. Sample 314A, Montagne Noire (France), Vailhan (Roque de Loup), Brigantian. Collection DV,.9.8/99 (scale bar = 100µm).
6. Sample 601A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/17 (scale bar = 100µm).
7. Sample 132C, Montagne Noire (France), St Rome. Brigantian. Collection DV, 9.9.7/10 (scale bar = 100µm).
8. Sample RR49, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/31 (scale bar = 100µm).
9. Sample RR53, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/80 (scale bar = 100µm).
10. Sample RR79, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/259 (scale bar = 100µm).
11. Sample RR81, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/297 (scale bar = 100µm).
12. Sample RR85, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/335 (scale bar = 100µm).
13. Sample RR75, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/194 (scale bar = 100µm).

Genus *Sogdianina* Saltovskaya, 1973

Figs. 14-18: ***Sogdianina angulata*** Saltovskaya, 1973

14. SampleRR75, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/197 (scale bar = 100µm).
15. SampleRR75, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/198 (scale bar = 100µm).
16. SampleRR75, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/199 (scale bar = 100µm).
17. SampleRR75, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/201 (scale bar = 100µm).
18. SampleRR75, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/204 (scale bar = 100µm).

Tuberitinoids
Superfamily Tuberitinoidea
Family Tuberitinidae
Genus *Eotuberitina* Miklukho-Maklay, 1958

Figs. 19-28: ***Eotuberitina reitlingerae*** Miklukho-Maklay, 1958

19. Sample 25-5, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/ 84 (scale bar = 100µm).
20. Sample ML764, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MLB, 9.7/70 (scale bar = 100µm).
21. Sample34, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/68 (scale bar = 200µm).
22. Sample 134'A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/129 (scale bar = 100µm).
23. SampleRR80, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/266 (scale bar = 200µm).

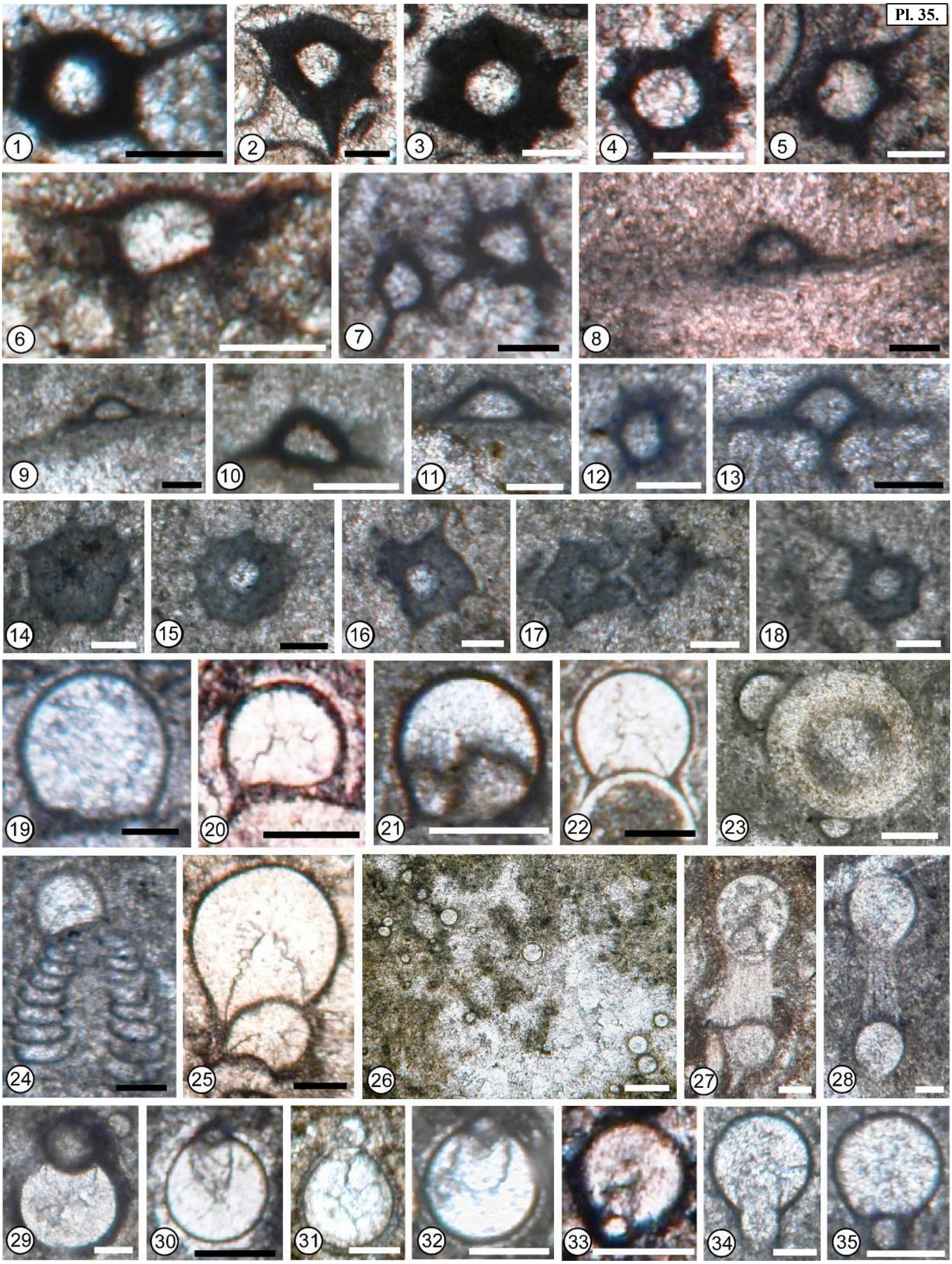


Plate 36.

Genus *Tuberitina* Galloway and Harlton, 1928

Figs. 1-13: ***Tuberitina bulbacea*** Galloway and Harlton, 1928

1. Sample 131, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/20 (scale bar = 300µm).
2. Sample 466B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/44 (scale bar = 100µm).
3. Sample 33-102, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/102 (scale bar = 100µm).
4. Sample 330-753, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/109 (scale bar = 100µm).
5. Sample 253A, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection DV, 9.9.3/58 (scale bar = 100µm).
6. Sample 135A, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.9.4/124 (scale bar = 100µm).
7. Sample RR52, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/67 (scale bar = 100µm).
8. Sample RR56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/152 (scale bar = 100µm).
9. Sample RR58, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/166 (scale bar = 100µm).
10. Sample RR59, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/178 (scale bar = 100µm).
11. Sample RR71, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/125 (scale bar = 400µm).
12. Sample RR72, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/142 (scale bar = 100µm).
13. Sample RR72, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/143 (scale bar = 100µm).

Family (ies) indeterminate

Genus *Tubesphaera* Vachard, 1994

Figs. 14-19: ***Tubesphaera cognata*** Vachard, 1994

14. Sample 11-7, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/19 (scale bar = 100µm).
15. Sample 245B, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/1 (scale bar = 100µm).
16. Sample 250C, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection DV, 9.9.3/50 (scale bar = 100µm).
17. Sample 328B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/74 (scale bar = 100µm).
18. Sample 341B, Montagne Noire (France), Tourière, Brigantian. Collection DV, 9.9.7/30 (scale bar = 100µm).
19. Sample 341B, Montagne Noire (France), Tourière, Brigantian. Collection DV, 9.9.7/31 (scale bar = 100µm).

Genus *Polysphaerinella* Mamet, 1973

Figs. 20-27: ***Polysphaerinella bulla*** (Conil and Lys, 1968) emend. Mamet, 1973

20. Sample 293A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/2 (scale bar = 100µm).
21. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/27 (scale bar = 100µm).
22. Sample 350A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/36 (scale bar = 100µm).
23. Sample 137C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/57 (scale bar = 100µm).
24. Sample 134B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/156 (scale bar = 100µm).
25. Sample AH20f. Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/148 (scale bar = 100µm).
26. ?*Tuberitina* with a special structure evocating *Polysphaerina*. Sample RR54, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/112 (scale bar = 100µm).
27. Sample RR79, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/260 (scale bar = 100µm).

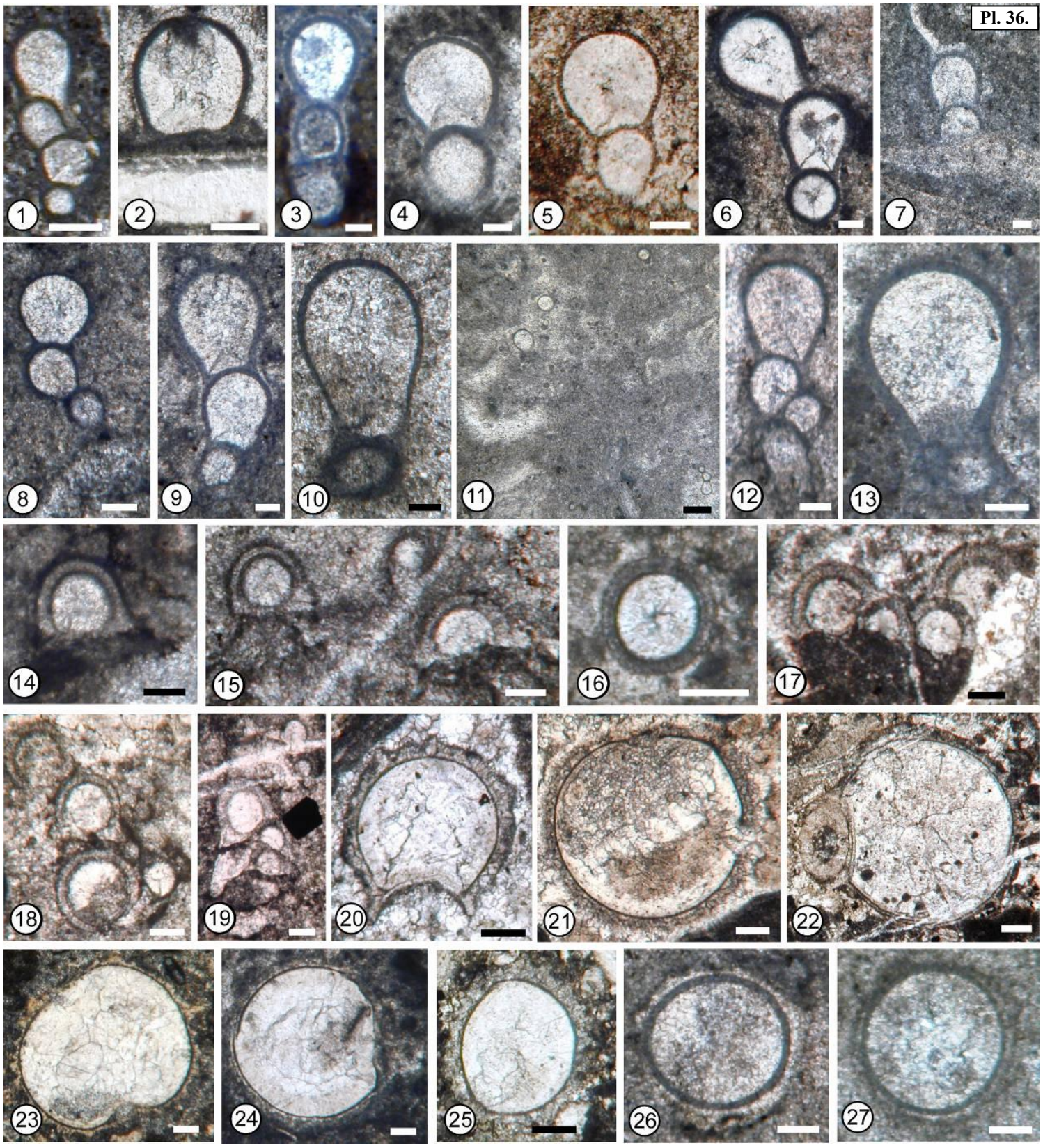


Plate 37.

Caligelloids
Superfamily Caligelloidea
Family Caligellidae
Genus *Caligella* Antropov, 1950

Figs. 1-3: ***Caligella* sp.**

1. Sample 293E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/51 (scale bar = 100µm).
2. Sample 82, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/48 (scale bar = 200µm).
3. Sample 293I, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/77 (scale bar = 100µm).

Genus *Baituganella* Lipina, 1955

Figs. 4-12: ***Baituganella anomalis*** (Vdovenko, 1962)

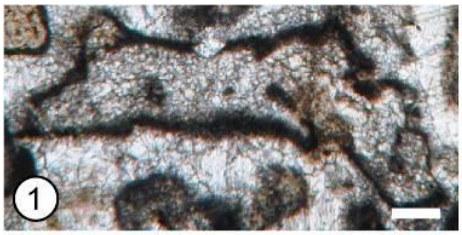
4. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/107 (scale bar = 400µm).
5. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1'/7 (scale bar = 100µm).
6. Sample 84B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/27 (scale bar = 200µm).
7. Sample 76, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/2 (scale bar = 200µm).
8. Sample 330-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/115 (scale bar = 100µm).
9. Sample 50, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.3/11 (scale bar = 400µm).
10. Sample 293E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/41 (scale bar = 100µm).
11. Sample RR59, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/173 (scale bar = 400µm).
12. Sample RR56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/144 (scale bar = 100µm).

Genus *Ademassa* Vachard in Vachard, Massa and Strank, 1993b

Figs. 13-17: ***Ademassa inuncta*** Vachard in Vachard, Massa and Strank, 1993b

13. Sample 137F, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/84 (scale bar = 100µm).
14. Sample 137B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/38 (scale bar = 100µm).
15. Sample 137D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/67 (scale bar = 100µm).
16. Sample 134A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/151 (scale bar = 100µm).
17. Sample 134A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/149 (scale bar = 100µm).

Pl. 37.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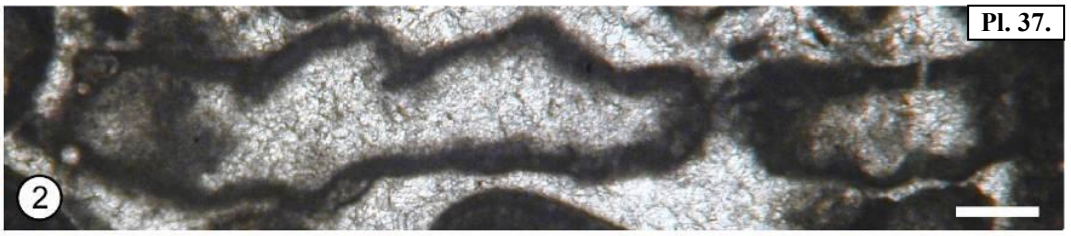
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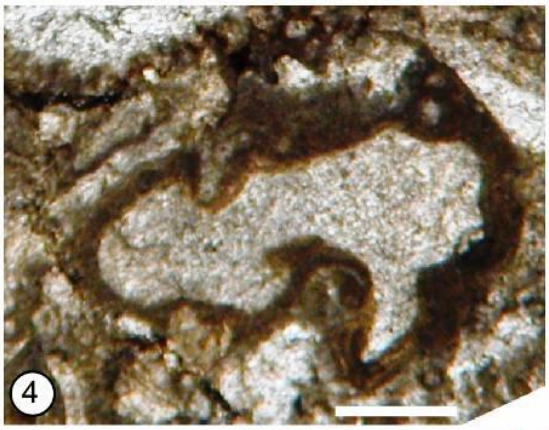
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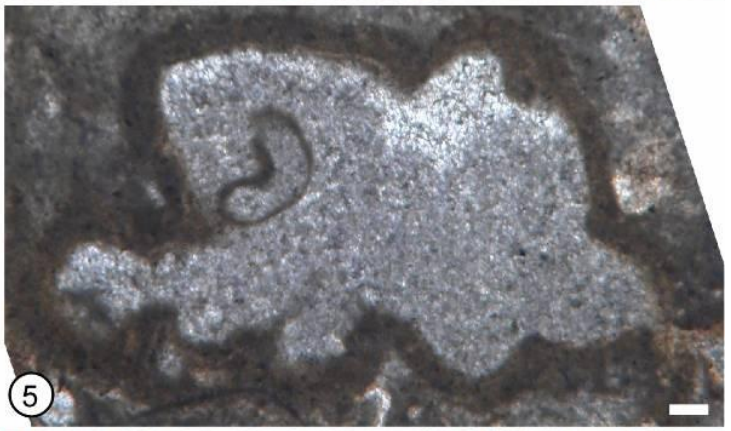
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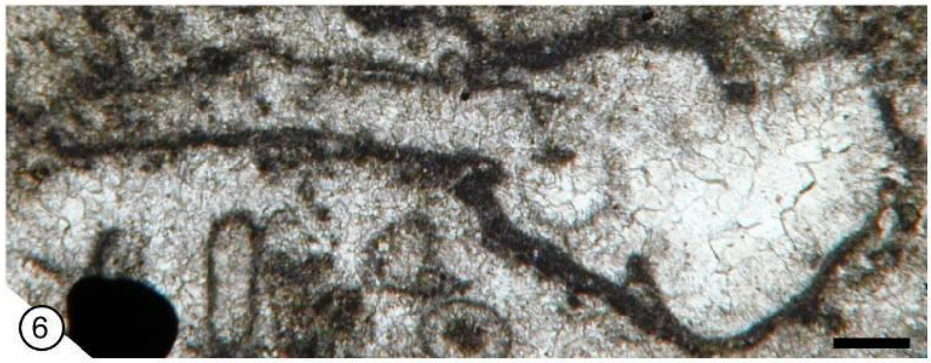
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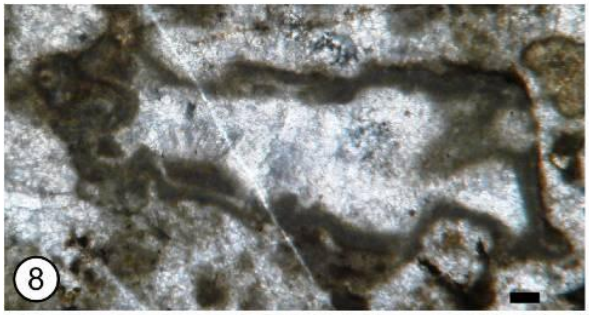
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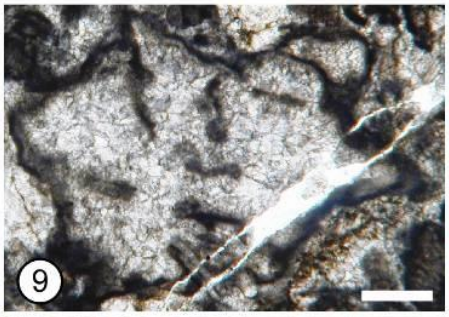
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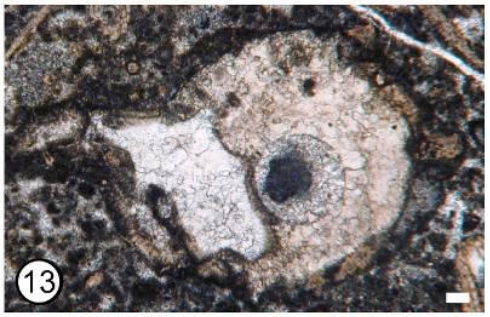
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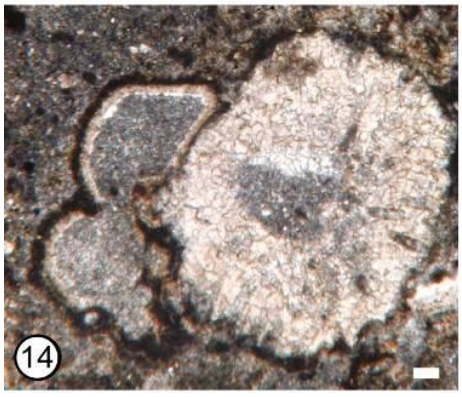
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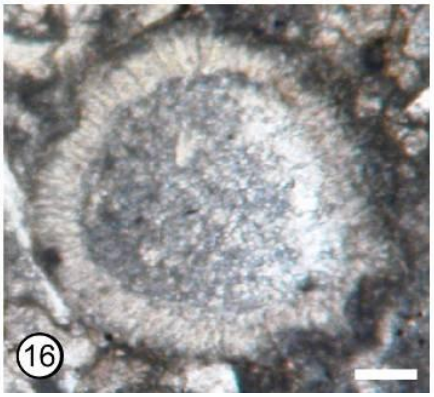
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17

Plate 38.

Family Insolentithecidae

Genus *Protoinsolentitheca* Vachard and Cózar, 2004b

Figs. 1-11: ***Protoinsolentitheca fundamenta*** Vachard and Cózar, 2004b

1. Sample 10-8.1, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/74 (scale bar = 100µm).
2. Sample ML788, Montagne Noire (France), Vailhan, Brigantian. Collection MLB, 9.7/96 (scale bar = 100µm).
3. Sample 82, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/44 (scale bar = 100µm).
4. Sample 82, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/52 (scale bar = 100µm).
5. Sample 330-11, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/87 (scale bar = 200µm).
6. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/148 (scale bar = 400µm).
7. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/150 (scale bar = 400µm).
8. Sample 330-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/123 (scale bar = 100µm).
9. *Protoinsolentitheca* at the first stage on *Eostaffella*. Sample HS9B, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/82 (scale bar = 100µm).
10. Sample 330-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/120 (scale bar = 100µm).
11. Sample 54, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/108 (scale bar = 100µm).

Genus *Insolentitheca* Vachard in Bensaid et al., 1979

Figs. 12-13: ***Insolentitheca* ex gr. *horrida*** (Brazhnikova in Brazhnikova et al., 1967)

12. Sample MAR1-16, Ardengost (France), late Serpukhovian. Collection MFP, 9.9.9.9.2/2 (scale bar = 100µm).
13. Sample FSL-TIB, Montagne Noire (France), Tiberet, Brigantian. Collection Fac. Sc. Lyon, 9.7/117 (scale bar = 100µm).

Pl. 38.

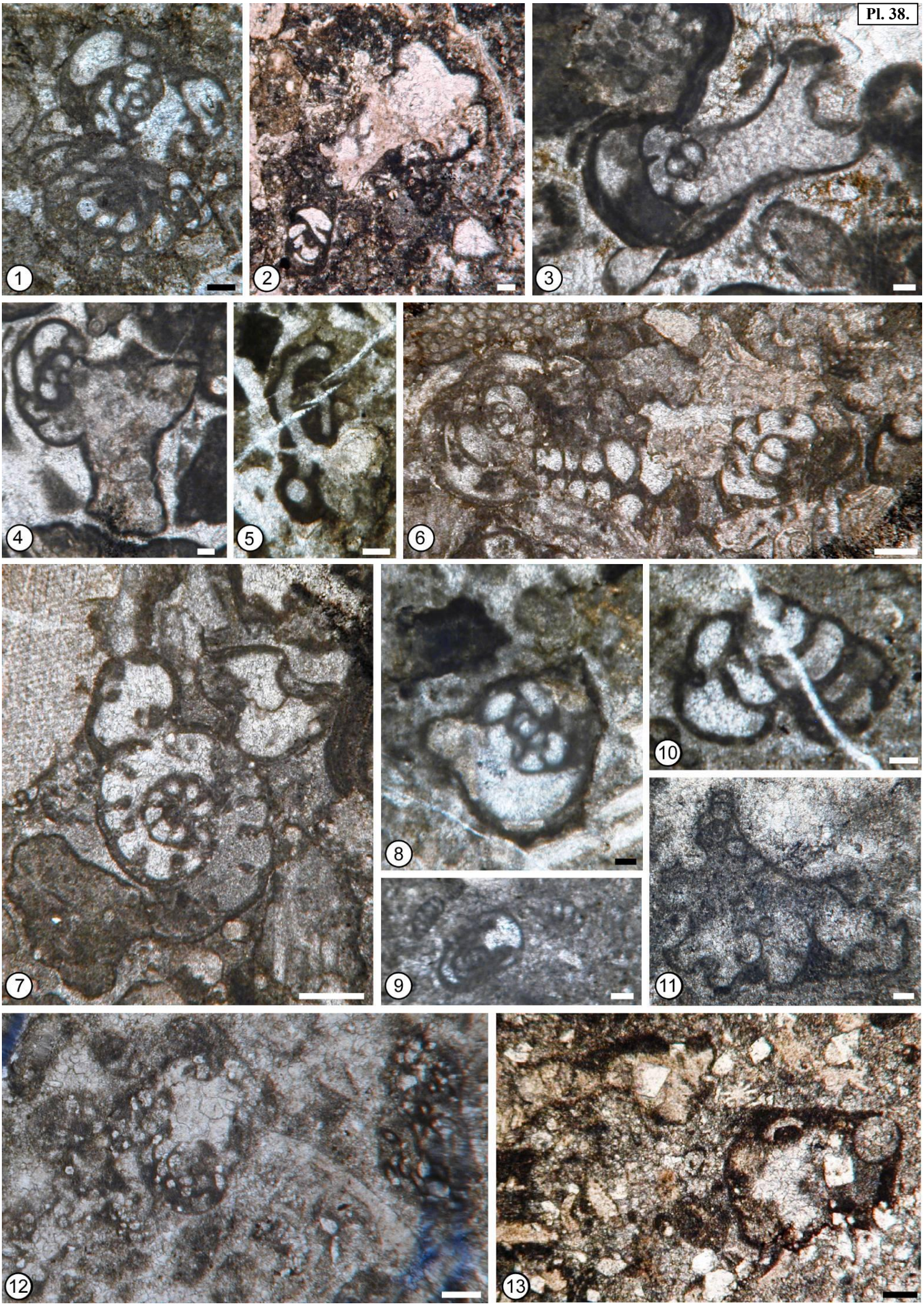


Plate 39.

Earlandioids
Superfamily ?Earlandioidea
Family Earlandiidae
Genus *Earlandia* Plummer, 1930

Figs. 1-9: ***Earlandia* ex gr. *elegans*** (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova and Fursenko, 1937)

1. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1'/15 (scale bar = 100µm).
2. Sample 251C, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection DV, 9.9.3/54 (scale bar = 100µm).
3. Sample 133B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/45 (scale bar = 100µm).
4. Sample 690, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/44 (scale bar = 100µm).
5. Sample RR66, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/59 (scale bar = 100µm).
6. Sample RR78, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/244 (scale bar = 100µm).
7. Sample RR86, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.8/4 (scale bar = 100µm).
8. Sample FSL-LAU2, Montagne Noire (France), Laurens, late Brigantian/early Serpukhovian. Collection Fac. Sc. Lyon, 9.7/111 (scale bar = 100µm).
9. Sample 61, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/203 (scale bar = 100µm).

Figs. 10-12: ***Earlandia* ex gr. *minor*** (Rauzer-Chernousova, 1948g)

10. Sample ML789, Montagne Noire (France), Gare de Laurens, late Brigantian/early Serpukhovian. Collection MLB, 9.7/104 (scale bar = 100µm).
11. Sample AH18f, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/15 (scale bar = 100µm).
12. Sample 25-14, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.7/11 (scale bar = 100µm).

Figs. 13-15: ***Earlandia* ex gr. *vulgaris*** (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova and Fursenko, 1937)

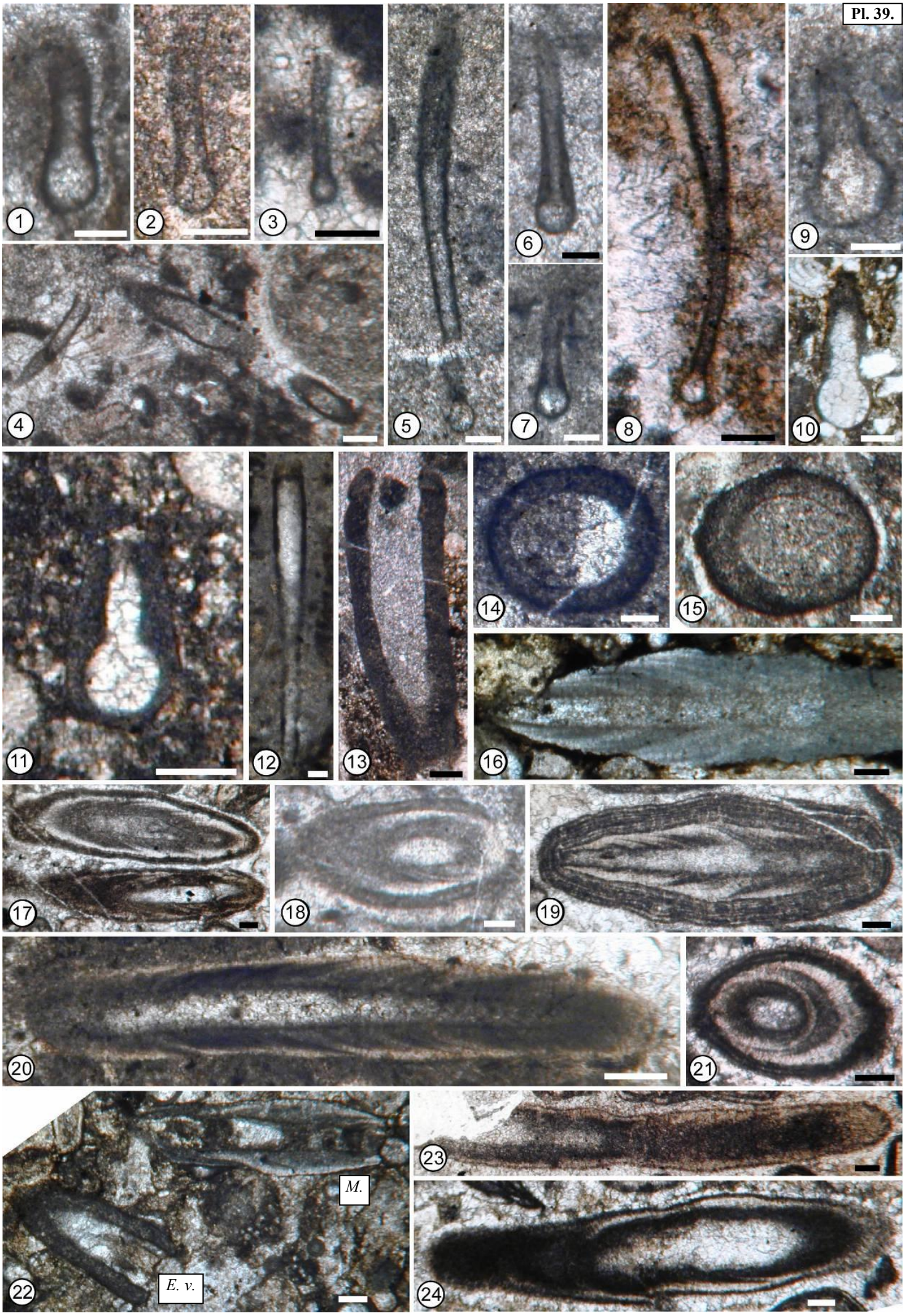
13. Sample 328'B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/18 (scale bar = 100µm).
14. Sample RR59, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/172 (scale bar = 100µm).
15. Sample ML764, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MLB, 9.7/65 (scale bar = 100µm).

Family ?Earlandiidae
Genus *Magnitella* Malakhova, 1975a

Figs. 16-24: ***Magnitella praecursor*** (Vachard, 1977b) emend. herein.

16. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection DV, 3/107 (scale bar = 100µm).
17. Sample 293A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/9 (scale bar = 100µm).
18. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/143 (scale bar = 100µm).
19. Sample 293F, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/58 (scale bar = 100µm).
20. Sample 140A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.3/65 (scale bar = 200µm).
21. Sample 293A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/10 (scale bar = 100µm).
22. *Magnitella* (*M.*) and *Earlandia* ex gr. *vulgaris* (*E. v.*). Sample 600C, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/126 (scale bar = 100µm).
23. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/17 (scale bar = 100µm).
24. Sample 293I, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/84 (scale bar = 100µm).

Pl. 39.



Genus *Brunsia* Mikhailov, 1935

Figs. 25-29: ***Brunsia spirillinoides*** (Grozdilova and Glebovskaya, 1948)

25. Sample 293A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/1 (scale bar = 100µm).
26. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/27 (scale bar = 100µm).
27. Sample 2, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.11/4 (scale bar = 100µm).
28. Sample 8, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.11/24 (scale bar = 100µm).
29. Sample 15, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.11/30 (scale bar = 100µm).

Plate 40.

Pseudoammodiscoids
Superfamily Pseudoammodiscoidea
Family Pseudoammodiscidae
Genus *Pseudoammodiscus* Conil and Lys in Conil and Pirlet, 1970

Figs. 1-11, 13-14: ***Pseudoammodiscus* ex gr. *priscus*** (Rauzer-Chernousova, 1948f)

1. Sample 49, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/1 (scale bar = 100µm).
2. Sample 332A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/109 (scale bar = 100µm).
3. Sample 465A, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/38 (scale bar = 100µm).
4. Sample 25-14, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.7/10 (scale bar = 100µm).
5. Sample 24, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/67 (scale bar = 100µm).
6. Sample 72, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/14 (scale bar = 100µm).
7. Sample 137D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/68 (scale bar = 100µm).
8. Sample 328'C, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/31 (scale bar = 100µm).
9. Sample 53, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/94 (scale bar = 100µm).
10. Sample RR87, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.8/44 (scale bar = 100µm).
11. Sample HS8, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/51 (scale bar = 100µm).
13. Sample 329D, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/64 (scale bar = 100µm).
14. Sample 690, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/47 (scale bar = 100µm).

Fig. 12: ***Pseudoammodiscus volgensis*** (Rauzer-Chernousova, 1948g)

12. Sample HS26, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/92 (scale bar = 100µm).

Genus *Pseudoglomospira* Bykova in Bykova and Polenova, 1955

Fig. 15: ***Pseudoglomospira gordialiformis*** Rich, 1980

15. Re-illustrated after Vachard, 1974b. Sample 142A, Montagne Noire (France), Colline 199, latest Brigantian. Collection DV (scale bar = 100µm).

Figs. 16-23: ***Pseudoglomospira* ex gr. *subquadrata*** (Potievskaya and Vakarchuk in Brazhnikova et al., 1967)

16. Sample CAS15bis, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.8/1 (scale bar = 100µm).
17. Sample CAS15, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.7/28 (scale bar = 100µm).
18. Sample AH20e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/6 (scale bar = 100µm).
19. Sample AH2, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/48 (scale bar = 100µm).
20. "*Glomospira* of the authors". Sample AH20, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/143 (scale bar = 100µm).
21. Sample AH20, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/144 (scale bar = 100µm).
22. Sample CAS13, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.7/12 (scale bar = 100µm).
23. Sample CAS14.3, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.7/22 (scale bar = 100µm).
24. Sample AH81.1, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/35 (scale bar = 100µm).

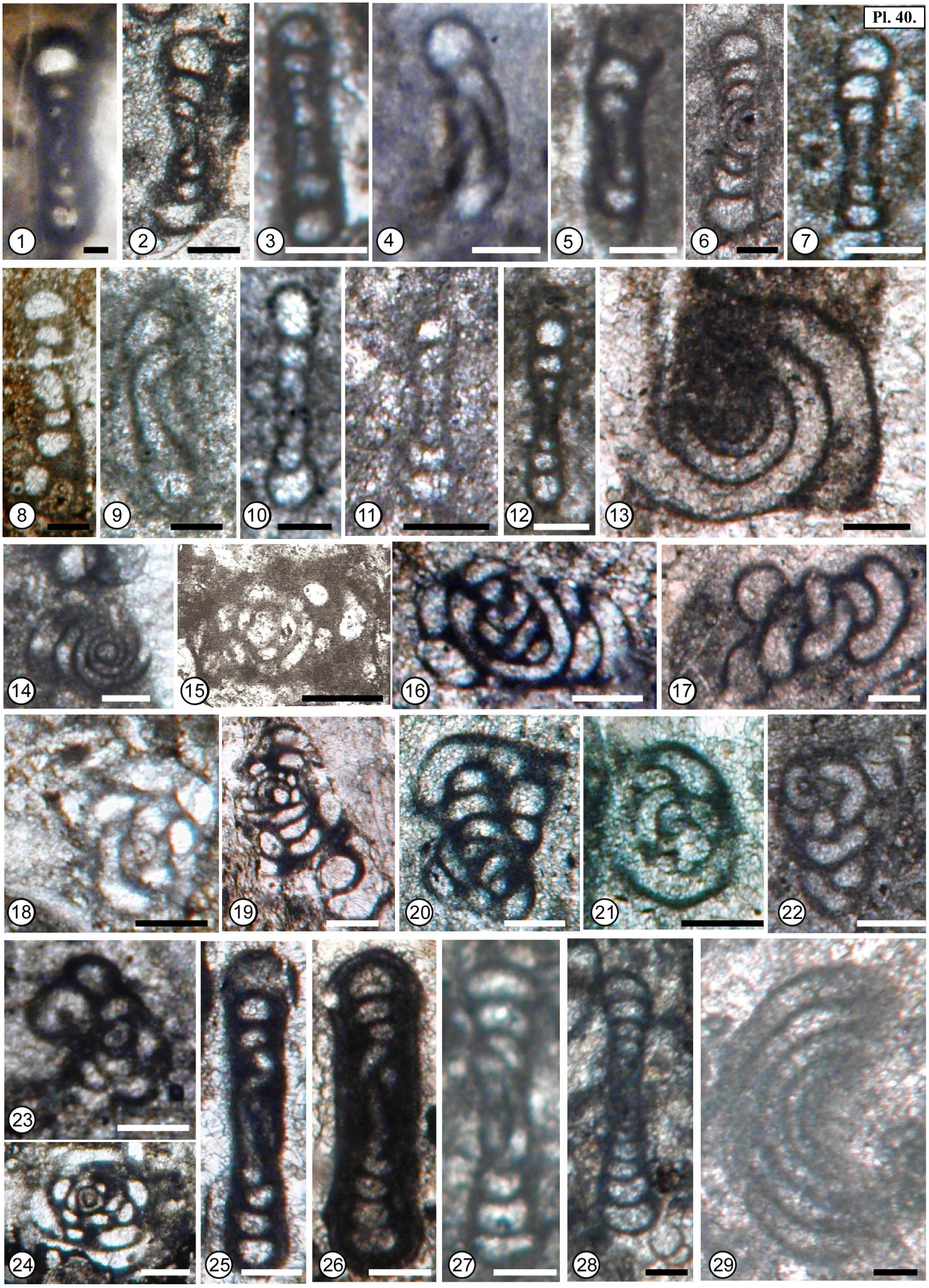


Plate 41.
Archaediscoids

Superfamily Archaediscoidea
Family Ammarchaediscidae
Genus *Planoarchaediscus* Miklukho-Maklay, 1956

Figs. 1-5: ***Planoarchaediscus spirillinoides*** (Rauzer-Chernoussova, 1948h)

1. Sample 133D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/50 (scale bar = 100µm).
2. Sample 328'E, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/47 (scale bar = 100µm).
3. Sample 54, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/97 (scale bar = 100µm).
4. Sample RR66, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/51 (scale bar = 100µm).
5. Sample 33, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/73 (scale bar = 100µm).

Genus *Ammarchaediscus* Conil and Pirlet in Pirlet and Conil, 1974

Figs. 6: ***Ammarchaediscus primaevus*** (Pronina, 1963)

6. Sample 82C, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/39 (scale bar = 100µm).

Family Archaediscidae
Subfamily Archaediscinae
Genus *Archaediscus* Brady, 1873

Figs. 7-9: ***Archaediscus stilus*** Grozdilova and Lebedeva in Grozdilova, 1953

7. Sample 248E, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.7/83 (scale bar = 100µm).
8. Sample 465B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/27 (scale bar = 100µm).
9. Sample 82-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/56 (scale bar = 100µm).

Figs. 10-12: ***Archaediscus complanatus*** Conil and Lys, 1964

10. Sample 611C, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/92 (scale bar = 100µm).
11. Sample 611A, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/88 (scale bar = 100µm).
12. Sample 611A, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/86 (scale bar = 100µm).

Figs. 13-15: ***Archaediscus enormis*** Schlykova, 1951

13. Sample 164C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/32 (scale bar = 100µm).
14. Sample 137G, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/107 (scale bar = 100µm).
15. Sample 126G, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/20 (scale bar = 100µm).

Figs. 16-17: ***Archaediscus chernoussovensis*** Mamet in Mamet, Choubert and Hottinger, 1966

16. Sample 137G, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/102 (scale bar = 100µm).
17. Presence of truncational facets. Sample 82-F, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/6 (scale bar = 100µm).

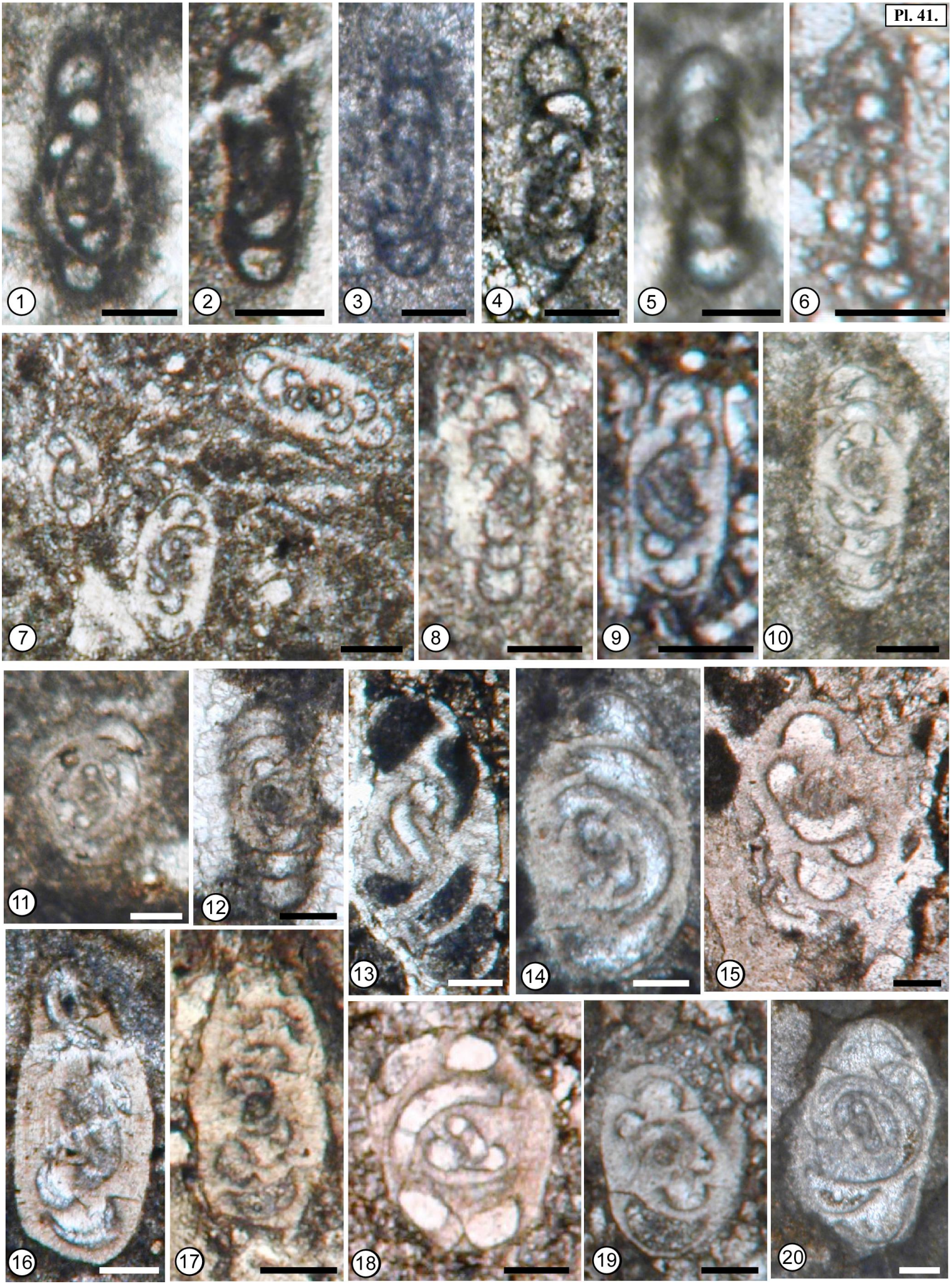
Figs. 18-19: ***Archaediscus moelleri*** Rauzer-Chernousova, 1948f

18. Sample ML784, Montagne Noire (France), Péret, Brigantian. Collection MLB, 9.7/88 (scale bar = 100µm).
19. Sample 82-C, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/43 (scale bar = 100µm).

Fig. 20: ***Archaediscus convexus*** Grozdilova and Lebedeva in Grozdilova, 1953

20. Sample 10-II, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/35 (scale bar = 100µm).

Pl. 41.



Subfamily Asteroarchaediscinae

Genus *Nodasperodiscus* Conil and Pirlet in Pirlet and Conil, 1974

Figs. 21-22: ***Nodasperodiscus ovoides*** (Rauzer-Chernousova, 1948f)

21. Re-illustrated after Perret, 1973b. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP (scale bar = 100µm).
22. Re-illustrated after Perret, 1973b. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP (scale bar = 100µm).

Fig. 23: ***Nodasperodiscus* sp.**

23. Re-illustrated after Perret, 1993. Sample Mail24, Ardengost (France), Mail d'Hachan, late Serpukhovian. Collection MFP (scale bar = 100µm).

Figs. 24-27: ***Nodasperodiscus parvus*** (Rauzer-Chernoussova, 1948f)

24. Sample PA-16, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.6/66 (scale bar = 100µm).
25. Sample 431C, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/69 (scale bar = 100µm).
26. Sample 431D, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/18 (scale bar = 100µm).
27. Sample 134'C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/138 (scale bar = 100µm).

Plate 42.

Figs. 1-6: ***Archaediscus karreri*** Brady, 1873

1. Sample HS31, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/117 (scale bar = 400µm).
2. Sample HS26, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/97 (scale bar = 100µm).
3. Sample HS33A, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/134 (scale bar = 100µm).
4. Sample HS26, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/90 (scale bar = 100µm).
5. Sample HS32, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/123 (scale bar = 100µm).
6. Sample HS29, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/111 (scale bar = 100µm).

Fig. 7: ***Archaediscus suppressus*** Schlykova, 1951

7. Sample 139A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.3/74 (scale bar = 100µm).

Figs. 8-11: ***Archaediscus*** spp.

8. Sample RR84, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/326 (scale bar = 100µm).
9. Sample RR77, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/229 (scale bar = 100µm).
10. Sample 137B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/43 (scale bar = 100µm).
11. Sample 137C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/49 (scale bar = 100µm).

Genus *Betpakodiscus* Marfenkova, 1983 emend.

Fig. 12: ***Betpakodiscus*? sp.**

12. Re-illustrated after Perret, 1993. Sample Mail17', Ardengost (France), Mail d'Hachan, late Serpukhovian. Collection MFP (scale bar = 50µm).

Genus *Hemiarchaediscus*, Miklukho-Maklay, 1957 emend

Figs. 13-19: ***Hemiarchaediscus viae*** (Vachard, 1977b)

13. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/15 (scale bar = 100µm).
14. Sample 293E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/42 (scale bar = 100µm).
15. Sample 293E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/40 (scale bar = 100µm).
16. Sample 293E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/44 (scale bar = 100µm).
17. Sample 293G, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/61 (scale bar = 100µm).
18. Sample 293G, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/62 (scale bar = 100µm).
19. Sample 601E, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.7/69 (scale bar = 100µm).

Fig. 20: ***Hemiarchaediscus planus*** Miklukho-Maklay, 1957

20. Re-illustrated after Perret, 1993. Sample CAS13d, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP (scale bar = 100µm).

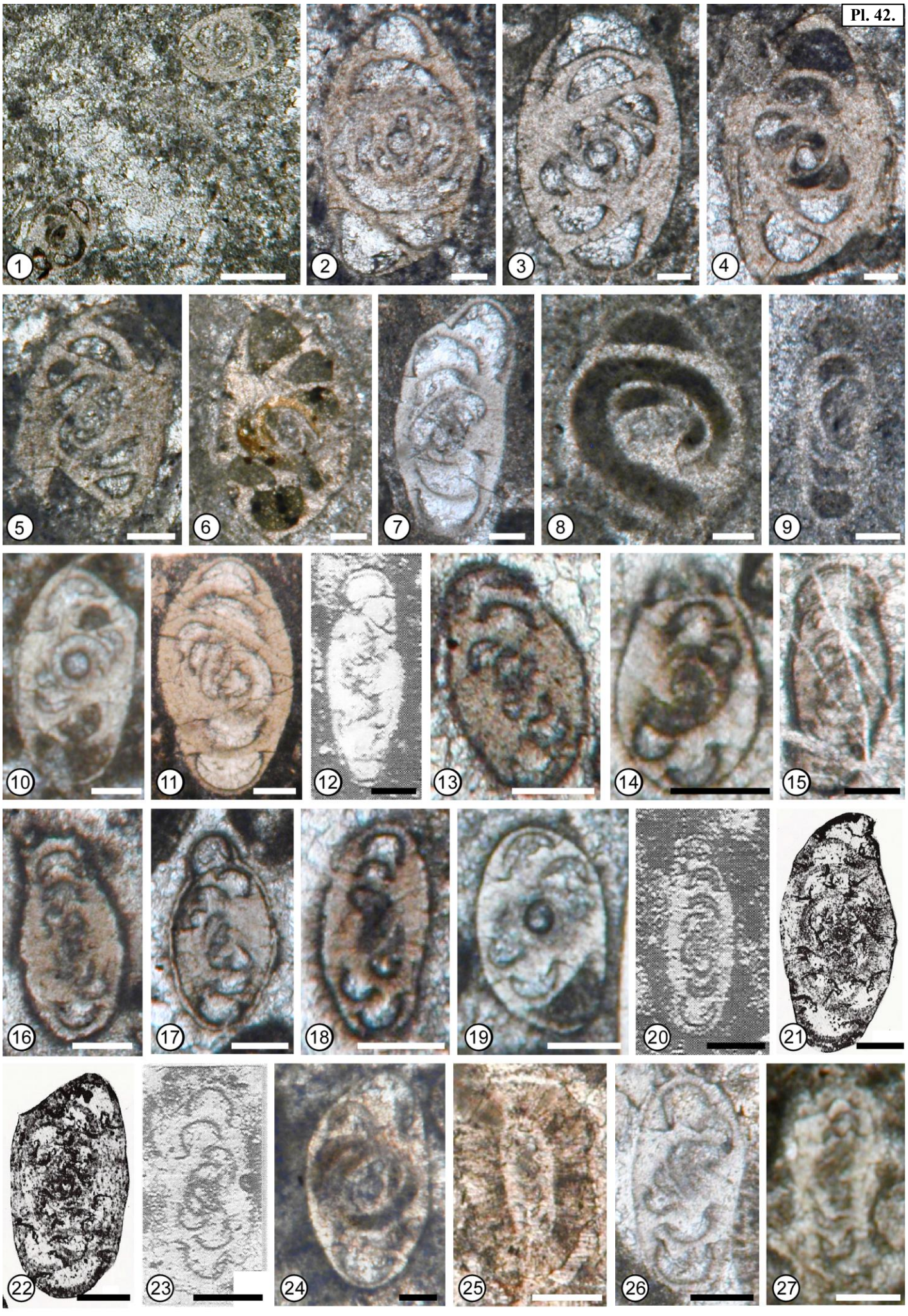


Plate 43.

Genus *Nodasperodiscus* Conil and Pirlet in Pirlet and Conil, 1974

Figs. 1-2: ***Nodasperodiscus parvus*** (Rauzer-Chernoussova, 1948f)

1. Sample 605A, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.7/20 (scale bar = 100µm).
2. Sample 431D, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/17 (scale bar = 100µm).

Genus *Neoarchaediscus* A. Miklukho-Maklay, 1956

Figs. 3-4: ***Neoarchaediscus incertus*** (Grozdilova and Lebedeva, 1954)

3. Re-illustrated after Perret, 1973b. Sample Ger14-15, Ardengost (France), Bois de Gertous, late Serpukhovian. Collection MFP (scale bar = 50µm).
4. Re-illustrated after Perret, 1993. Sample CAS14, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, (scale bar = 50µm).

Figs. 5-15: ***Neoarchaediscus akchimensis*** (Grozdilova and Lebedeva, 1954)

5. Sample AH18a, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/46 (scale bar = 100µm).
6. Sample AH18h, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/71 (scale bar = 100µm).
7. Sample AH18f, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/11 (scale bar = 100µm).
8. Sample CAS23, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 13.06.05/17 (scale bar = 100µm).
9. Sample 82-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/50 (scale bar = 100µm).
10. Sample 82-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/51 (scale bar = 100µm).
11. Sample 82-D, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/58 (scale bar = 100µm).
12. Sample 137G, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/99 (scale bar = 100µm).
13. Sample 134'B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/130 (scale bar = 100µm).
14. Sample 134'B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/132 (scale bar = 100µm).
15. Sample 137C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/134 (scale bar = 100µm).

Genus *Asteroarchaediscus* Miklukho-Maklay, 1956

Figs. 16-18: ***Asteroarchaediscus baschkiricus*** (Krestovnikov and Teodorovich, 1936)

16. Re-illusted after Perret, 1973b. Sample AH14, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP (scale bar = 100µm).
17. Re-illusted after Perret, 1973b. Sample Bar1, Ardengost (France), col de Fréchet, late Serpukhovian. Collection MFP (scale bar = 100µm).
18. Small transverse sections of *Fasciella* often confused with *Asteroarchaediscus* in the literature; Sample 134'C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/138 (scale bar = 100µm).

Family Eosigmoilinidae
Subfamily Eosigmoilininae
Genus *Eosigmoilina* Ganelina in Kiparisova et al., 1956

Figs. 19-20: Transition? between ***Archaediscus*** and ***Eosigmoilina***

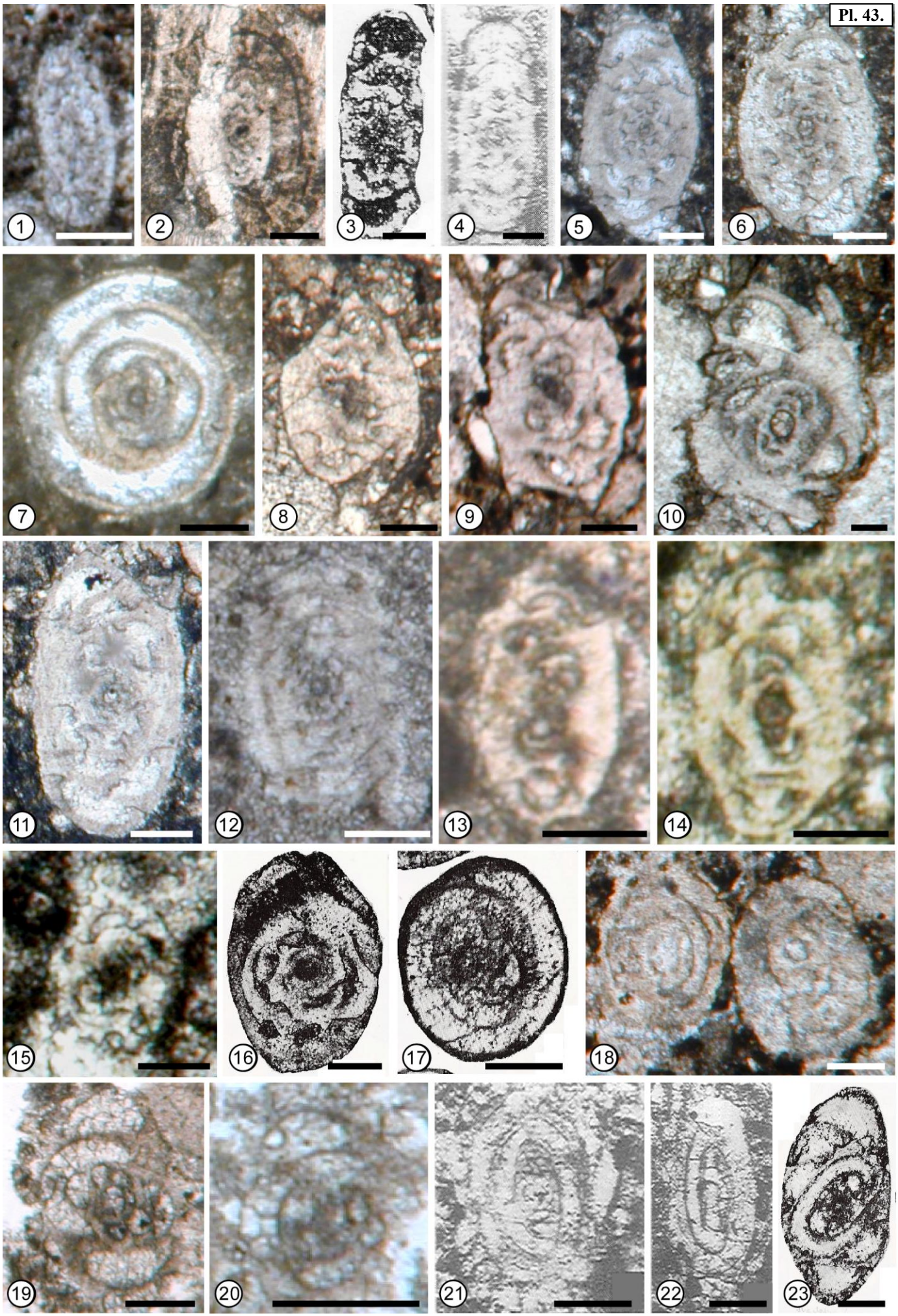
19. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/55 (scale bar = 100µm).
20. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/58 (scale bar = 100µm).

Figs. 21-22: ***Eosigmoilina explicata*** Ganelina in Kiparisova et al., 1956

21. Re-illusted after Perret, 1993. Sample CAS14, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP (scale bar = 100µm).
22. Re-illusted after Perret, 1993. Sample CAS14, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP (scale bar = 50µm).

Fig. 23: ***Eosigmoilina* sp. 2**

23. Re-illustrated after Perret, 1973b. Sample Ger5, Ardengost (France), Bois de Gertous, late Serpukhovian. Collection MFP (scale bar = 100µm).



29. Sample 132E, Montagne Noire (France), St Rome. Brigantian. Collection DV, 9.9.7/13 (scale bar = 100µm).
30. Sample 134D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/8 (scale bar = 100µm).
31. Sample AH20, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/142 (scale bar = 100µm).

Figs. 32-34: ***Howchinia* sp.**

32. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/52 (scale bar = 100µm).
33. Sample AH20, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/141 (scale bar = 100µm).
34. Sample 226C, Montagne Noire (France), La Serre (Mas de la Roque), late Brigantian/early Serpukhovian. Collection DV, 9.9.9.9.2/95 (scale bar = 100µm).

Figs. 35-36: ***Howchinia subconica*** (Brazhnikova and Yartseva, 1956)

35. Sample 602A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/79 (scale bar = 100µm).
36. Sample 602A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/80 (scale bar = 100µm).

Fig. 37: ***Howchinia beleutensis*** Vdovenko, 1962

37. Re-illustrated after Perret, 1993. Sample AH14, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP (scale bar = 100µm).
38. Re-illustrated after Perret, 1993. Sample CAS15bis, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP (scale bar = 100µm).

Fig. 39: ***Howchinia subplana*** (Brazhnikova and Yartseva, 1956)

39. Re-illustrated after Perret, 1973b. Sample Asp. L, Ardengost (France), Col d'Aspin, late Serpukhovian. Collection MFP (scale bar = 100µm).

Figs. 40-42: ***Howchinia*** ? sp.

40. Sample LR.1, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 7/160 (scale bar = 100µm).
41. Sample 690, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/42 (scale bar = 100µm).
42. Sample 690, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/48 (scale bar = 100µm).

Genus *Planohowchinia* Cózar and Mamet, 2001

Fig. 43: ***Planohowchinia* ? *rara* n. sp.**

43. Holotype. Sample 314D, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 7/147 (scale bar = 100µm).

Plate 44.

Lasiodiscoids
Superfamily Lasiodiscoidea
Family Howchiniidae
Genus *Howchinia* Cushman, 1927a

Figs. 1-17: ***Howchinia bradyana*** (Howchin, 1888) emend. Davis, 1951

1. Sample 82F, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/7 (scale bar = 100µm).
2. Sample 82-C, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/41 (scale bar = 100µm).
3. Sample 12-4, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/9 (scale bar = 100µm).
4. Sample RR56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/127 (scale bar = 100µm).
5. Sample 126F, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/11 (scale bar = 100µm).
6. Sample RR47. , Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/10 (scale bar = 100µm).
7. Sample 327B, Montagne Noire (France), Vailhan (Roque de Loup), Brigantian. Collection DV, 9.8/117 (scale bar = 100µm).
8. Sample 313, Montagne Noire (France), Vailhan (Roque de Loup), Brigantian. Collection DV, 9.8/88 (scale bar = 100µm).
9. Sample PA-9.2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/55 (scale bar = 100µm).
10. Sample RR47, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/11 (scale bar = 100µm).
11. Sample RR48, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/16 (scale bar = 100µm).
12. Sample 134A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/150 (scale bar = 100µm).
13. Sample 84-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/30 (scale bar = 100µm)
14. Sample 34, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/67 (scale bar = 100µm).
15. Sample 34, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/70 (scale bar = 100µm).
16. Sample 328´B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/20 (scale bar = 100µm).
17. Sample RR45, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/5 (scale bar = 100µm).

Figs. 18-31: ***Howchinia gibba*** (von Moeller, 1879)

18. Sample 32, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/60 (scale bar = 100µm).
19. Sample 607D, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/57 (scale bar = 100µm).
20. Sample RR54, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/100 (scale bar = 100µm).
21. Sample RR49, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/28 (scale bar = 100µm).
22. Sample RR55, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/116 (scale bar = 100µm).
23. Sample RR45, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/6 (scale bar = 100µm).
24. Sample RR56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/148 (scale bar = 100µm).
25. Sample 687A, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/82 (scale bar = 100µm).
26. Sample RR77, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/220 (scale bar = 100µm).
27. Sample RR76, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/233 (scale bar = 100µm).
28. Sample 132D, Montagne Noire (France), St Rome. Brigantian. Collection DV, 9.9.7/14 (scale bar = 100µm).

Plate 45.

Family Lasiodiscidae

Genus *Hemidiscopsis* n. gen.

Figs. 1-24: ***Hemidiscopsis caprariensis*** (Vachard, 1977b) n. gen.

1. Sample PA9, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/45 (scale bar = 100µm).
2. Sample PA11, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/51 (scale bar = 100µm).
3. Sample PA11, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/53 (scale bar = 100µm).
4. Sample PA9.2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/56 (scale bar = 100µm).
5. Sample PA9.2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/58 (scale bar = 100µm).
6. Sample PA9.2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/57 (scale bar = 100µm).
7. Sample PA9.2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/59 (scale bar = 100µm).
8. Sample PA9, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/48 (scale bar = 100µm).
9. Sample RR61, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/196 (scale bar = 100µm).
10. Sample RR67, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/80 (scale bar = 100µm).
11. Sample RR80, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/272 (scale bar = 100µm).
12. With *Howchinia* (*Ho.*). Sample 83, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/322 (scale bar = 100µm).
13. Sample PA9.2, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/60 (scale bar = 100µm).
14. Sample RR67, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/66 (scale bar = 100µm).
15. Sample RR80, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/289 (scale bar = 100µm).
16. Sample RR68, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/92 (scale bar = 100µm).
17. Sample RR80, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/271 (scale bar = 100µm).
18. Sample RR80, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/278 (scale bar = 100µm).
19. Sample RR86, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.8/2 (scale bar = 100µm).
20. Sample RR65, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/43 (scale bar = 100µm).
21. Sample RR67, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/78 (scale bar = 100µm).
22. Important proloculus. Sample RR87, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.8/28 (scale bar = 100µm).
23. Sample RR84, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/329 (scale bar = 100µm).
24. Sample RR67, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/62 (scale bar = 100µm).

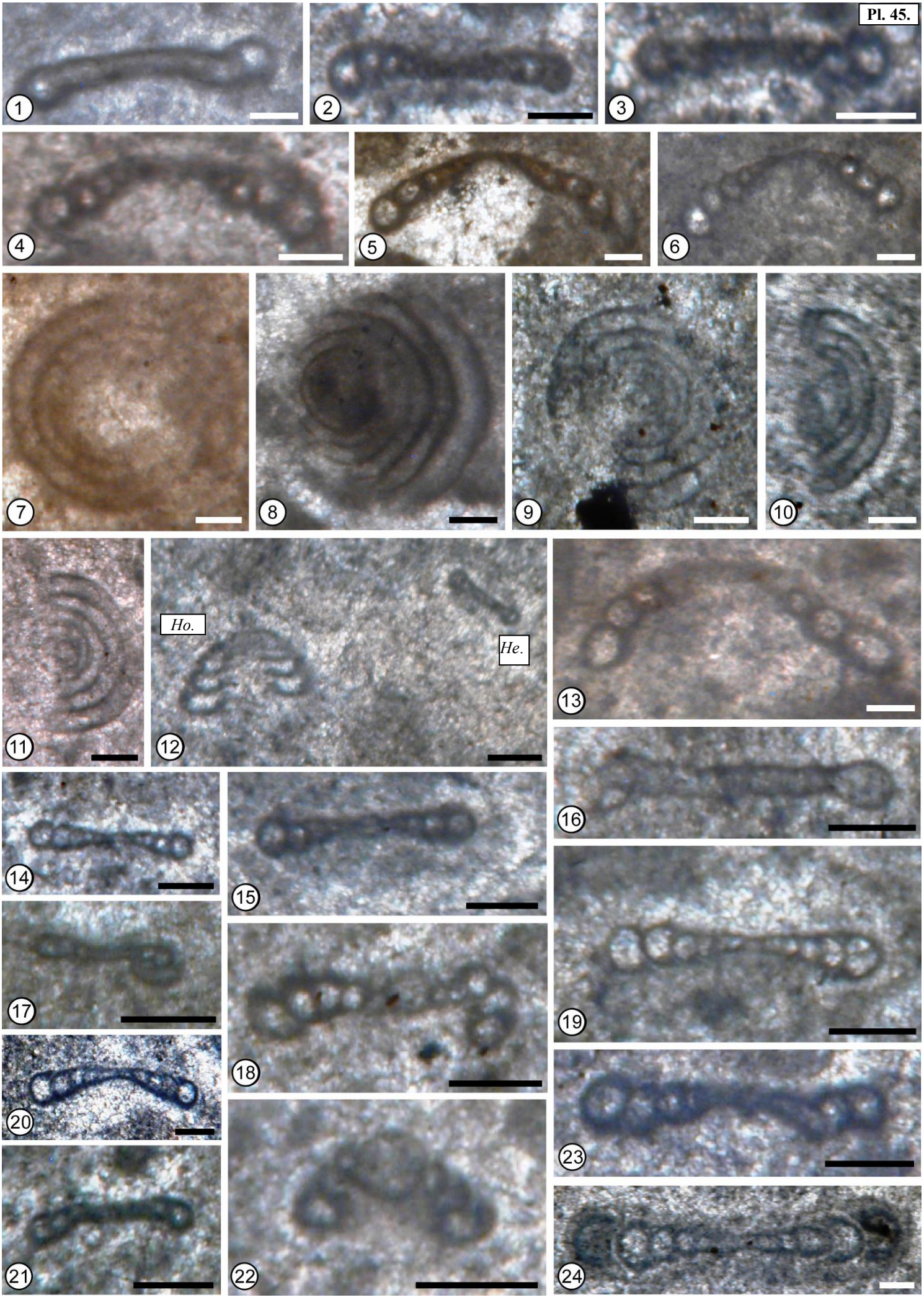


Plate 46.

Tournayelloids
Superfamily Tournayelloidea
Family Forschiidae
Genus *Forschia* Mikhailov, 1935

Figs. 1-7: ***Forschia mikhailovi*** Dain, 1953

1. Sample 10-I, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/83 (scale bar = 100µm).
2. Sample 164A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/28 (scale bar = 100µm).
3. Sample 462C, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/36 (scale bar = 100µm).
4. Sample 462C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MLB, 9.7/72 (scale bar = 100µm).
5. Sample 137B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/33 (scale bar = 100µm).
6. Sample 137G, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/97 (scale bar = 100µm).
7. Sample 137G, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/101 (scale bar = 100µm).

Genus *Forschiella* Mikhailov, 1939

Figs. 8-9: ***Forschiella prisca*** Mikhailov, 1939

8. Sample 328c, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/76 (scale bar = 100µm).
9. Sample Castelsec11-9.1 Längs, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/7 (scale bar = 200µm).

Family Lituotubellidae
Genus *Lituotubella* Rauzer-Chernousova, 1948a

Figs. 10-16: ***Lituotubella magna*** Rauzer-Chernousova, 1948a

10. Sample 10-II, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/39 (scale bar = 100µm).
11. Sample 10-9, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/62 (scale bar = 100µm).
12. Sample FB23. Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB. 9.9.7/67 (scale bar = 200µm).
13. Sample 332F, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/136 (scale bar = 100µm).
14. Sample ML788, Montagne Noire (France), Vailhan, Brigantian. Collection MLB, 9.7/94 (scale bar = 100µm).
15. Sample 246A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/9 (scale bar = 400µm).
16. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/117 (scale bar = 100µm).

Pl. 46.

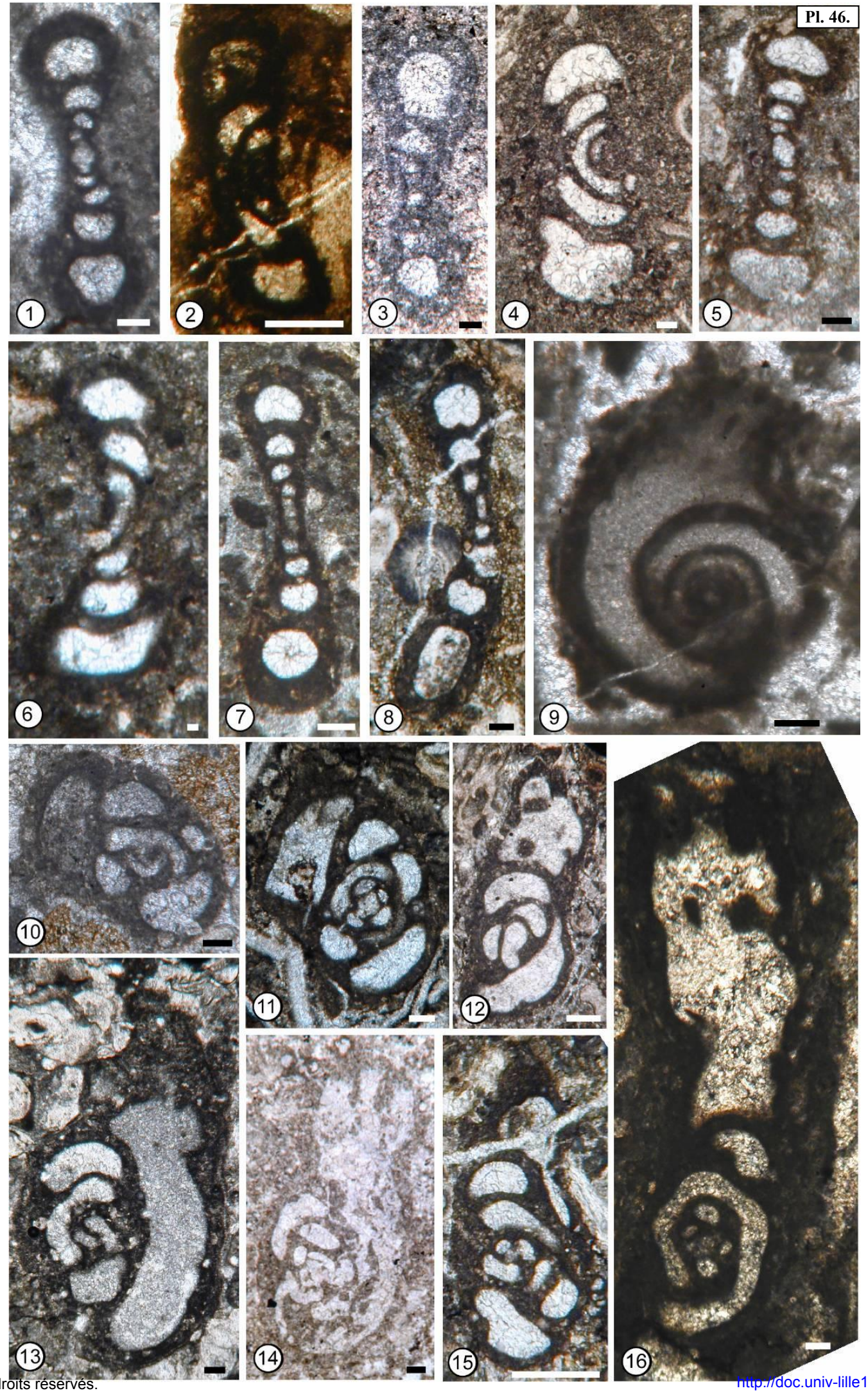


Plate 47.

Family Pseudolituotubidae

Genus *Pseudolituotuba* Vdovenko, 1971

Figs. 1-10: ***Pseudolituotuba gravata*** (Conil and Lys, 1965)

1. Sample 12-25, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.4/22 (scale bar = 400µm).
2. Sample 82-C, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/40 (scale bar = 300µm).
3. Sample 82-C, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/48 (scale bar = 400µm).
4. *Pseudolituotuba* encrusting *Fasciella* (*F.*). Sample 82-D, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/57 (scale bar = 100µm).
5. Sample 87, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/150 (scale bar = 200µm).
6. Sample 25-1, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.7/23 (scale bar = 200µm).
7. Sample 87, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/148 (scale bar = 200µm).
8. Sample RR72. , Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/138 (scale bar = 100µm).
9. Sample 87, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/154 (scale bar = 500µm).
10. Attached on *Fasciella* (*F.*). Sample RR81, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/308 (scale bar = 400µm).

Genus *Scalebrina* Conil and Longerstaey in Conil et al., 1980

Figs. 11-17: ***Scalebrina* sp.**

11. Sample 601A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/5 (scale bar = 100µm).
12. *Scalebrina* on a spine of brachiopod. Sample 33-0, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/143 (scale bar = 100µm).
13. Sample 330-5, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/29 (scale bar = 100µm).
14. Sample 330-11, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/82 (scale bar = 100µm).
15. Sample 140D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.3/70 (scale bar = 100µm).
16. Sample 134'E, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/141 (scale bar = 400µm).
17. Sample RR65, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/41 (scale bar = 100µm).

Family Septabrunsiininidae

Genus *Spinobrunsiina* Conil and Longerstaey in Conil et al., 1980

Figs. 18-20: ***Spinobrunsiina* sp.**

18. Sample 332E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/129 (scale bar = 100µm).
19. Sample 33, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/85 (scale bar = 100µm).
20. Sample 7, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/7 (scale bar = 100µm).

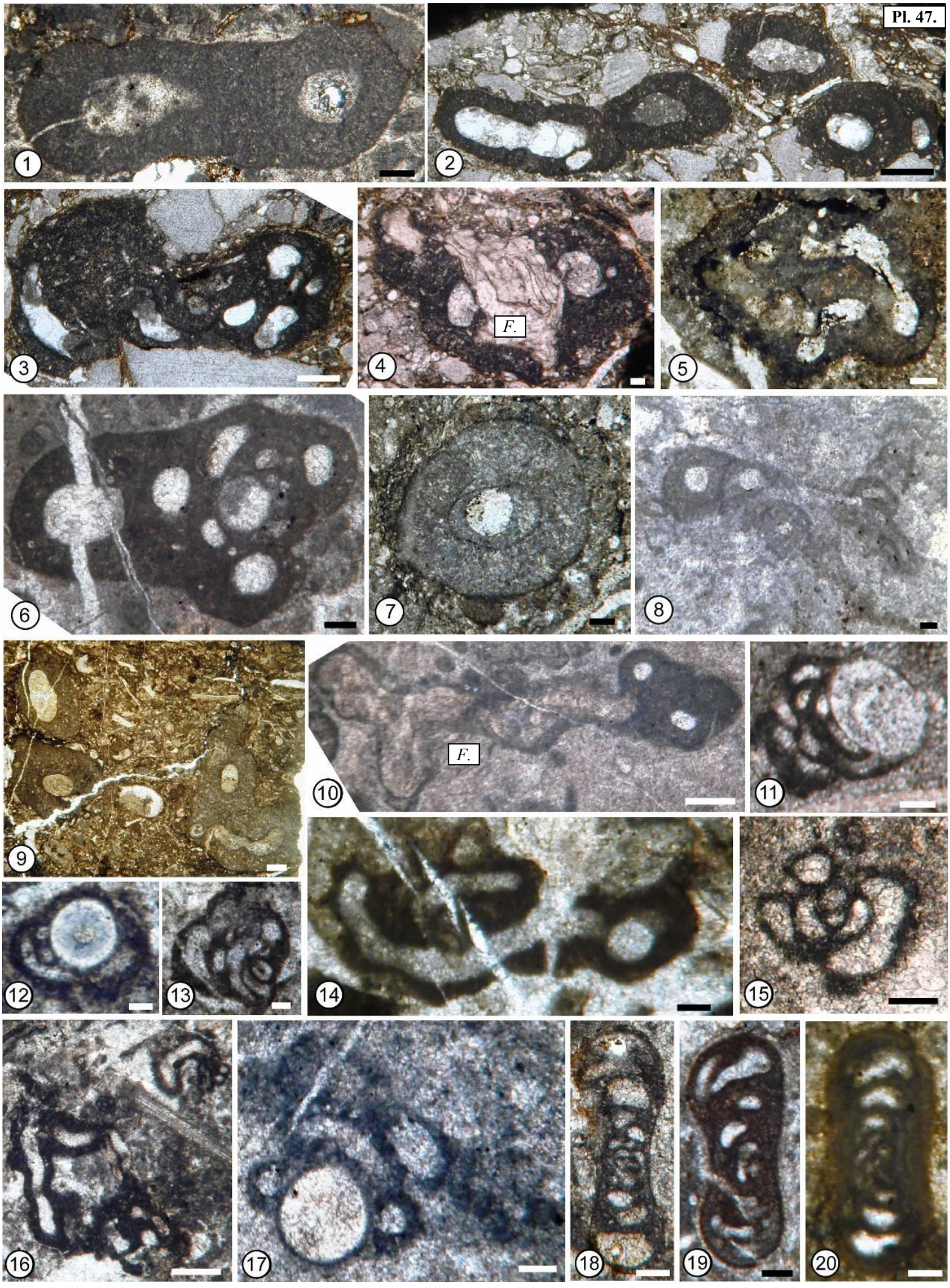


Plate 48.

Haplophragmelloids
Superfamily Haplophragmelloidea
Family Haplophragmellidae
Genus *Globispiroplectammina* Vachard, 1977b

Figs. 1-9: ***Globispiroplectammina mameti*** Vachard, 1977b

1. Sample 248E, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/79 (scale bar = 100µm).
2. Sample 248E, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/85 (scale bar = 100µm).
3. Sample 137A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/25 (scale bar = 100µm).
4. Sample 137F, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/93 (scale bar = 100µm).
5. Sample 328'A, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/3 (scale bar = 100µm).
6. Sample 328'C, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/24 (scale bar = 100µm).
7. Sample 328'D, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/37 (scale bar = 100µm).
8. Sample 690, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/41 (scale bar = 100µm).
9. Sample 227A, Montagne Noire (France), La Serre (Mas de la Roque), late Brigantian/early Serpukhovian. Collection DV, 9.9.9.9.2/97 (scale bar = 100µm).

Genus *Spireitlina* Vachard in Vachard and Beckary, 1991

Figs. 10-13: ***Spireitlina minima*** **n. sp.**

10. Paratype. Sample RR67, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/76 (scale bar = 100µm).
11. Paratype. Sample RR67, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/81 (scale bar = 100µm).
12. Holotype. Sample Bou25-6, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/86 (scale bar = 100µm).
13. Paratype. Sample 50, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/33 (scale bar = 100µm).

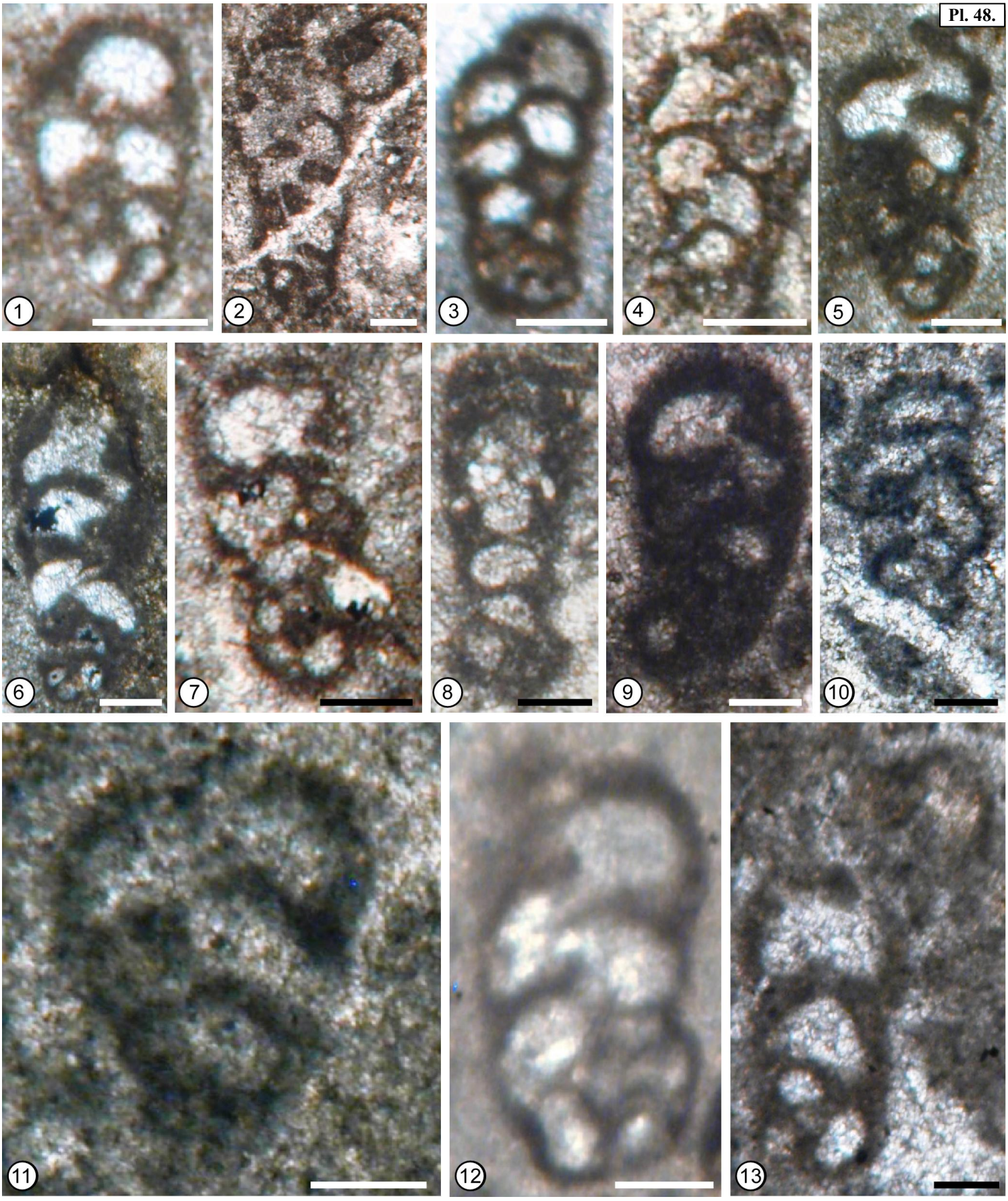


Plate 49.

Family Mstiniidae

Genus *Mstinia* Dain, 1953 emend. herein.

Figs. 1-7: ***Mstinia tetraloculi*** (Rauzer-Chernousova, 1948a) emend. herein.

1. Sample Heidi, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/44 (scale bar = 100µm).
2. Sample 293F, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/52 (scale bar = 100µm).
3. Sample 293A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/5 (scale bar = 100µm).
4. Sample 246A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/9 (scale bar = 400µm).
5. Sample 330-11, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/75 (scale bar = 100µm).
6. Sample 10-14.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/151 (scale bar = 200µm).
7. Sample 330-5, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/26 (scale bar = 400µm).

Figs. 8-10: ***Mstinia minima*** (Brazhnikova, 1956)

8. Sample 332A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/106 (scale bar = 100µm).
9. Sample FB22, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB, 9.9.7/66 (scale bar = 100µm).
10. Sample 330-5, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/20 (scale bar = 100µm).

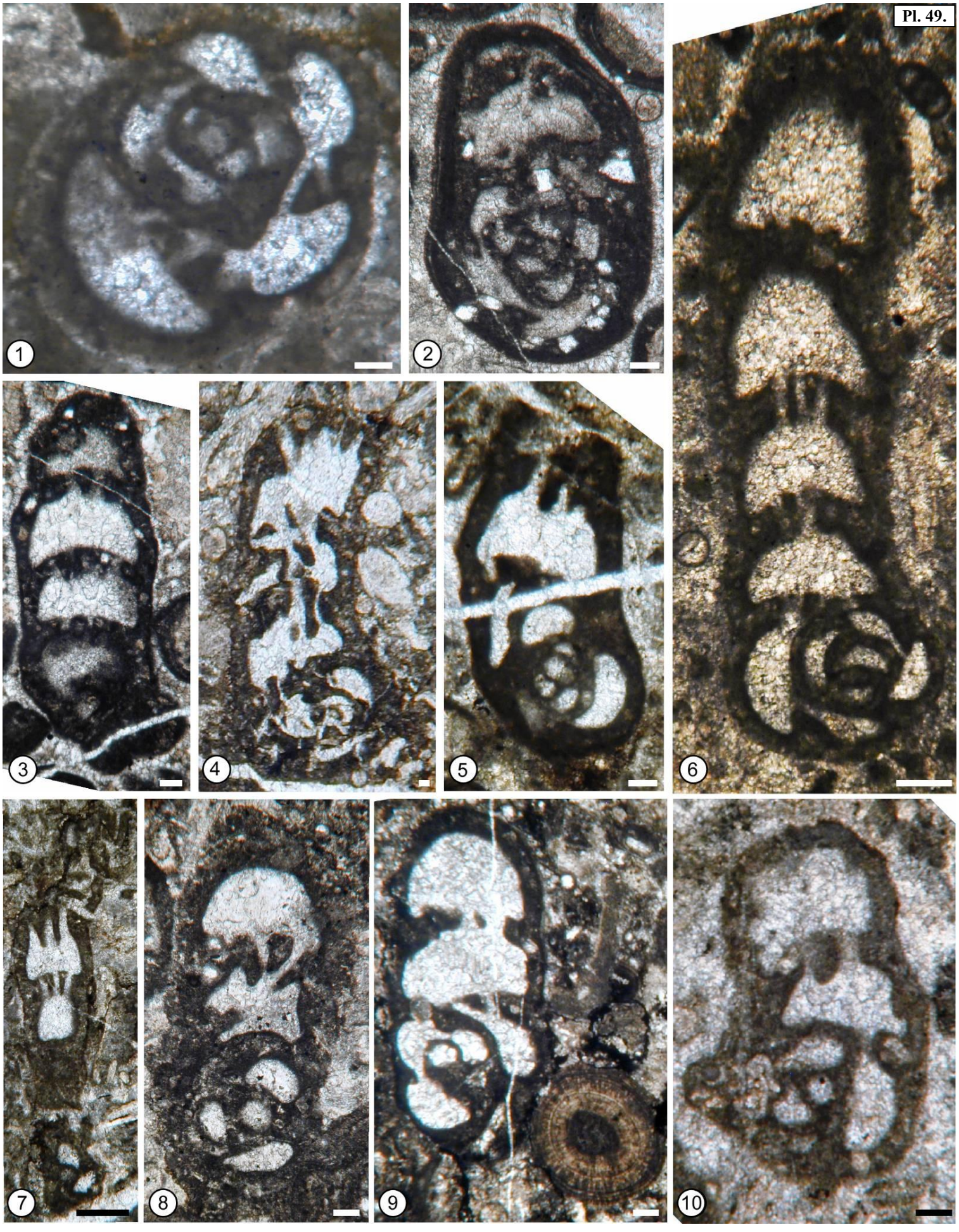


Plate 50.

Genus Haplophragmina Reitlinger, 1950

Figs. 1-14: ***Haplophragmina beschevensis*** Brazhnikova in Brazhnikova et al., 1967

1. Sample Feldrand 54, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/68 (scale bar = 100µm).
2. Sample 10-9, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/52 (scale bar = 100µm).
3. Sample 350A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/37 (scale bar = 100µm).
4. Sample 601F, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/74 (scale bar = 100µm).
5. Sample 226A, Montagne Noire (France), La Serre (Mas de la Roque). Brigantian. Collection DV, 9.9.9.9.2/93 (scale bar = 400µm).
6. Sample 59, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/31 (scale bar = 100µm).
7. Sample FSL-LAU2, Montagne Noire (France), Laurens, late Brigantian/early Serpukhovian. Collection Fac. Sc. Lyon, 9.7/110 (scale bar = 100µm).
8. Sample 135C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/128 (scale bar = 100µm).
9. Sample RR51, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/61 (scale bar = 100µm).
10. Sample Bou25-1a, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/72 (scale bar = 100µm).
11. Sample 48, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/112 (scale bar = 200µm).
12. Sample 132E, Montagne Noire (France), St Rome. Brigantian. Collection DV, 9.9.7/12 (scale bar = 100µm).
13. Sample FB18, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB, 9.9.7/59 (scale bar = 100µm).
14. Sample RR63, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/27 (scale bar = 100µm).

Plate 51.

Endothyroids
Superfamily Endothyroidea
Family Endothyridae
Subfamily Endothyrinae
Genus *Endothyra* Phillips, 1846 sensu Brady, 1876 emend. China, 1965

Figs. 1-4: ***Endothyra* ex gr. *bowmani*** Phillips, 1846 sensu Brady, 1876 emend. China, 1965

1. Sample 126D, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/46 (scale bar = 100µm).
2. Sample 248C, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/74 (scale bar = 100µm).
3. Sample 24, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/65 (scale bar = 100µm).
4. Sample 10?, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/73 (scale bar = 100µm)

Figs. 5-11: ***Endothyra* ex gr. *similis*** Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova, Belyaev and Reitlinger, 1936

5. Sample 126C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/60 (scale bar = 100µm).
6. Sample PA13, Montagne Noire (France), Les Pascales, Brigantian. Collection MA, 9.6/63 (scale bar=100µm).
7. Sample 330-5, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/25 (scale bar = 100µm).
8. Sample HS26, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, Horsesquarry/87 (scale bar = 100µm).
9. Sample RR76, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/206 (scale bar = 100µm).
10. Sample RR54, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/107 (scale bar = 100µm).
11. Sample RR63, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/21 (scale bar = 100µm).

Figs. 12-16: ***Endothyra* ex gr. *prisca*** Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova, Belyaev and Reitlinger, 1936

12. Sample 82-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/56 (scale bar = 100µm).
13. With *E. bowmani*. Sample 33-1, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9./97 (scale bar = 100µm).
14. Sample RR51, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/49 (scale bar = 100µm).
15. Sample RR51, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/57 (scale bar = 100µm).
16. Sample 857.2, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/67 (scale bar = 100µm).

Figs. 17-21: ***Endothyra obsoleta*** Rauzer-Chernousova, 1948c

17. Sample 327A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/112 (scale bar = 100µm).
18. Sample 21, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9./89 (scale bar = 100µm).
19. Sample 67, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/23 (scale bar = 100µm).
20. Sample 64, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/25 (scale bar = 100µm).
21. Sample RR73, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/167 (scale bar = 100µm).

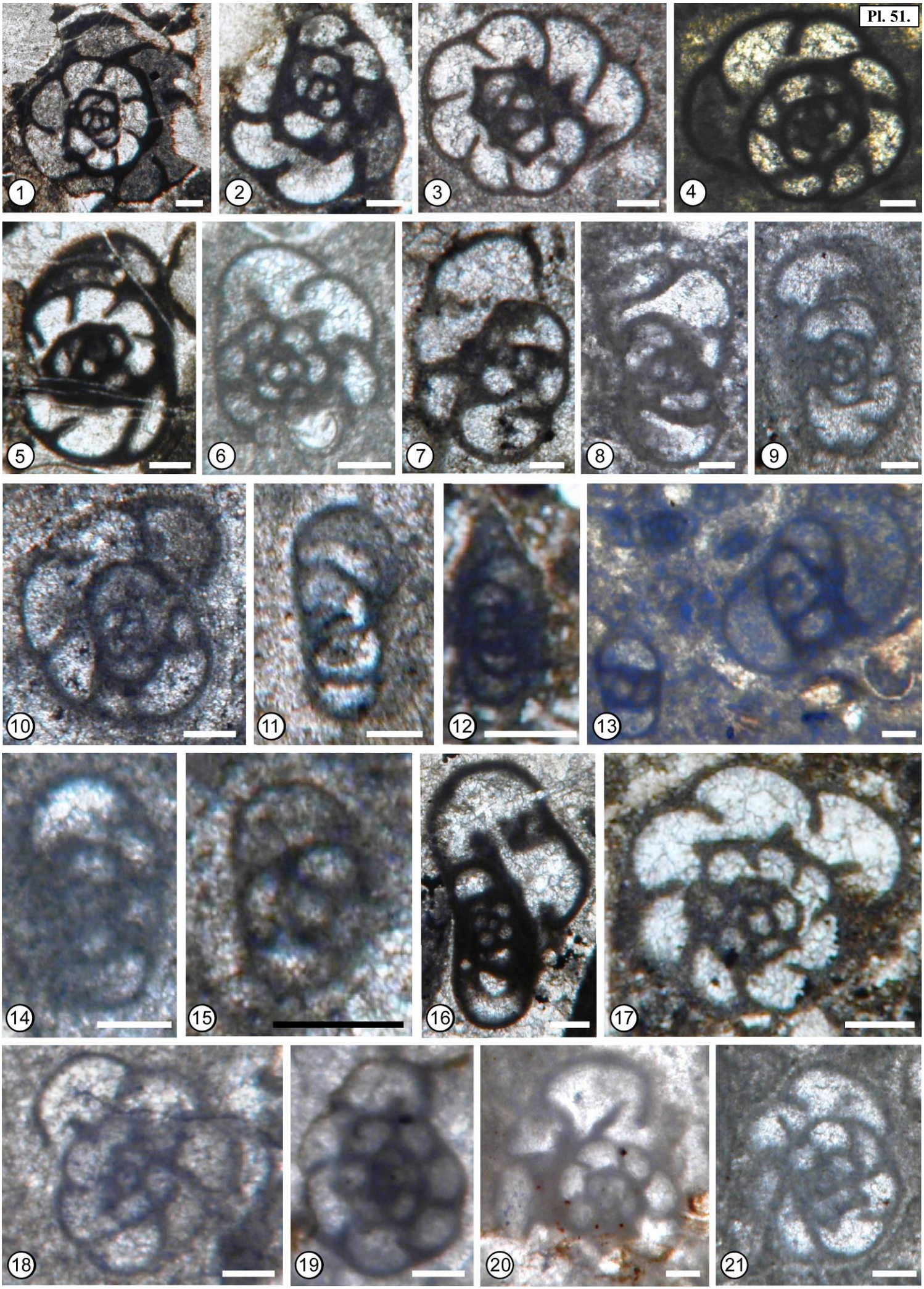


Plate 52.

Genus ? *Semiendothyra* Reitlinger, 1980

Figs. 1-2: ***Semiendothyra* (?) *excellens*** (Zeller, 1953)

1. Sample 139A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.3/72 (scale bar = 100µm).
2. Sample RR84, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/332 (scale bar = 100µm).

Genus *Rectoendothyra* Brazhnikova in Aizenverg et al., 1983

Figs. 3-5: ***Rectoendothyra japhetensis* n. sp.**

3. Paratype. Sample 126F, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/8 (scale bar = 100µm).
4. Paratype. Sample 126G, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/18 (scale bar = 100µm).
5. Holotype. Sample 856, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/7 (scale bar = 100µm).

Genus *Mikhailovella* Ganelina, 1956

Figs. 6-9: ***Mikhailovella gracilis*** (Rauzer-Chernousova, 1948a)

6. Sample 21?, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/90 (scale bar = 100µm).
7. Sample LSV-2015, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/96 (scale bar = 100µm).
8. Sample 24, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/64 (scale bar = 100µm).
9. Sample 42, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/64 (scale bar = 100µm).

Figs. 10-14: ***Mikhailovella* sp. 2**

10. Sample La Serre Feldweg 17, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/56 (scale bar = 100µm).
11. Sample 21, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9./96 (scale bar = 100µm).
12. Sample Feldrand 62, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/72 (scale bar = 100µm).
13. Sample La Serre Feldweg 10, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/47 (scale bar = 100µm).
14. Sample LSV-2001, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/85 (scale bar = 100µm).

Genus *Mikhailovellopsis* n. gen.

Figs. 15-18: ***Mikhailovellopsis irregulariformis* n. sp.**

15. Holotype. Sample 856C.2, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/40 (scale bar = 100µm).
16. Paratype. Sample 25-17, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.7/17 (scale bar = 100µm)
17. Paratype. Sample 25-7, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/89 (scale bar = 200µm)
18. Paratype. Sample 26, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/14 (scale bar = 100µm).

Genus *Endospiroplectammina* Lipina, 1970

Figs. 19-20: ***Endospiroplectammina syzranica*** (Lipina, 1948)

19. Sample 293.C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/22 (scale bar = 100µm).
20. Sample293.2A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/89 (scale bar = 100µm).

Pl. 52.

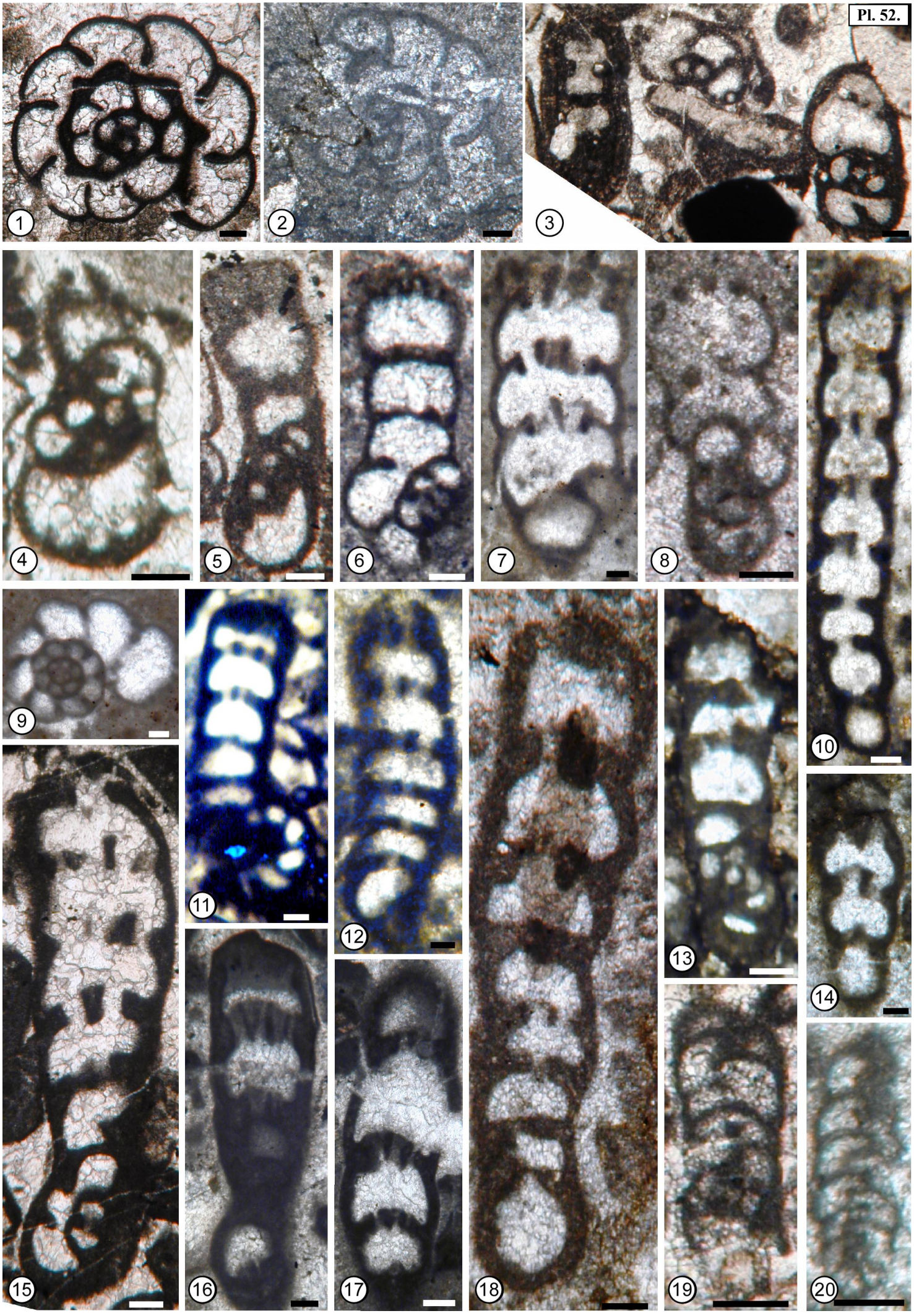


Plate 53.

Subfamily Omphalotinae

Genus *Omphalotis* Schlykova, 1969 non Mamet, 1969

Figs. 1-12: ***Omphalotis minima*** (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova, Belyaev and Reitlinger, 1936)

1. Sample 11.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.2/52 (scale bar = 100µm).
2. Sample 246A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/7 (scale bar = 100µm).
3. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/125 (scale bar = 100µm).
4. Sample 137C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/51 (scale bar = 100µm).
5. Sample RR51, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/51 (scale bar = 200µm).
6. Sample UM-ROQ, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection Univ. Montpellier, 9.7/128 (scale bar = 100µm).
7. Sample Bou25-5, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/85 (scale bar = 100µm).
8. Sample293I, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/78 (scale bar = 100µm).
9. Sample RR79, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/257 (scale bar = 100µm).
10. Sample RR56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/143 (scale bar = 100µm) cf. minima.
11. Sample RR51, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/62 (scale bar = 100µm).
12. Sample 246A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/41 (scale bar = 100µm).

Figs. 13-14: ***Omphalotis parvula*** (Bozorgnia, 1973)

13. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/19 (scale bar = 100µm).
14. Sample 226C, Montagne Noire (France), La Serre (Mas de la Roque), late Brigantian/early Serpukhovian. Collection DV, 9.9.9.9.2/94 (scale bar = 100µm).

Figs. 15-16: ***Omphalotis callosa*** (Rostovceva in Reitlinger, 1964)

15. Sample 82-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/49 (scale bar = 100µm).
16. Sample 82-E, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/5 (scale bar = 100µm).

Figs. 17-18: ***Omphalotis samarica*** (Rauser-Chernousova, 1948c)

17. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/117 (scale bar = 100µm).
18. Sample RR72, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/137 (scale bar = 100µm).

Pl. 53.

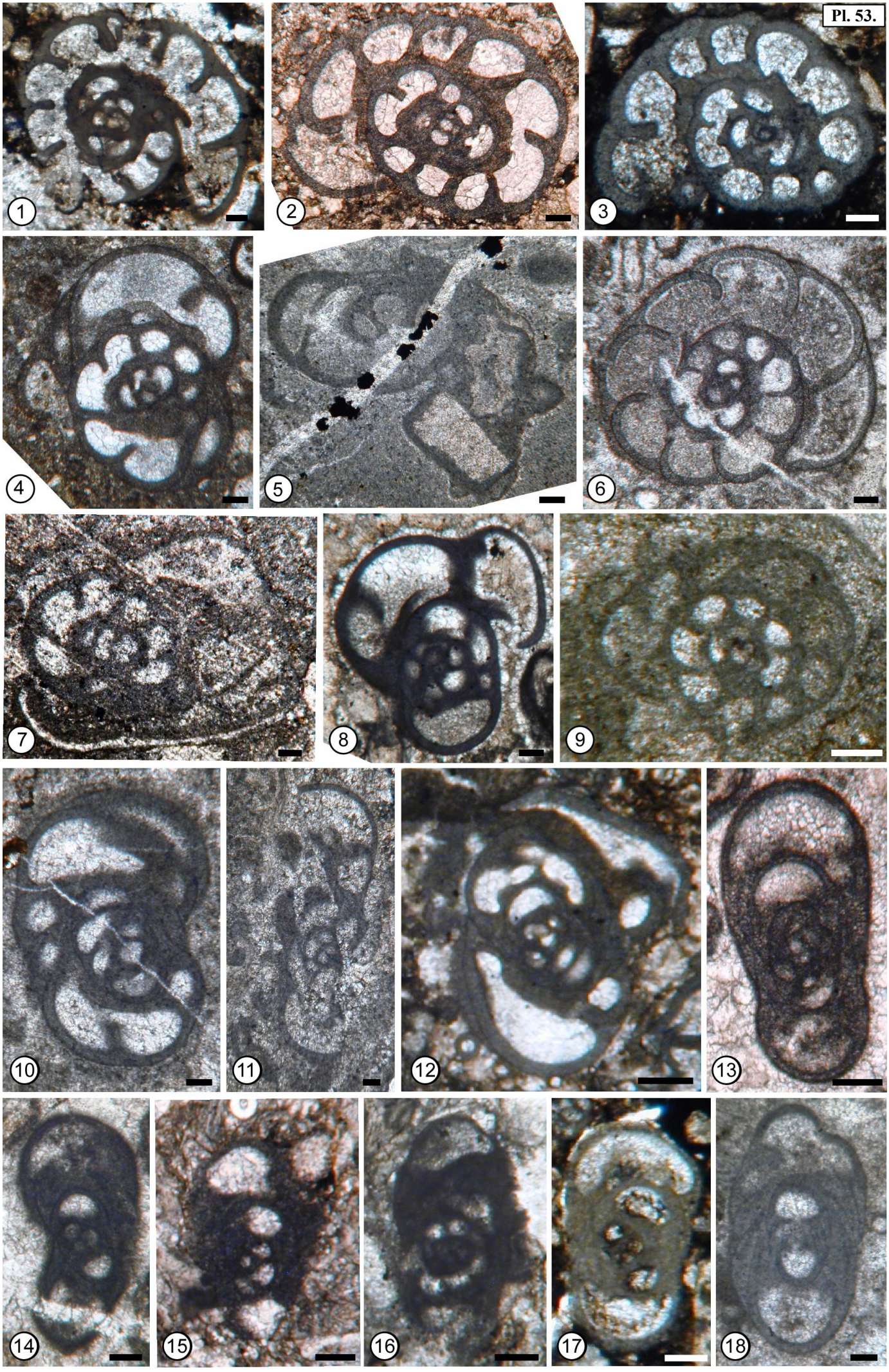


Plate 54.

Subfamily Globoendothyrinae

Genus *Eogloboendothyra* Vdovenko, 1972

Figs. 1-4: Genus ***Eogloboendothyra*** Vdovenko, 1972

1. Sample 293b, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/13 (scale bar = 100µm).
2. Sample 293c, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/16 (scale bar = 100µm).
3. Sample 600A, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/109 (scale bar = 100µm).
4. Sample 2, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.11/10 (scale bar = 100µm).

Genus *Globoendothyra* Reitlinger in Rauzer-Chernousova and Fursenko, 1959

Figs. 5-14, 16: ***Globoendothyra globula*** (Eichwald, 1860)

5. Sample 10-9, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/61 (scale bar = 100µm).
6. Sample 10-17, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/18 (scale bar = 100µm).
7. *Globoendothyra*?. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/28 (scale bar = 100µm).
8. Sample 332F, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/137 (scale bar = 100µm).
9. Sample 10-50, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/42 (scale bar = 100µm).
10. Sample 246B, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/15 (scale bar = 100µm).
11. Sample 246D, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/25 (scale bar = 100µm).
12. Sample 246F, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/36 (scale bar = 200µm).
13. Sample 601A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/16 (scale bar = 100µm).
14. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/136 (scale bar = 400µm).
16. With spine. Sample HS11, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/84 (scale bar = 100µm).
15. *Globoendothyra*? Sample 329D, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/55 (scale bar = 100µm).

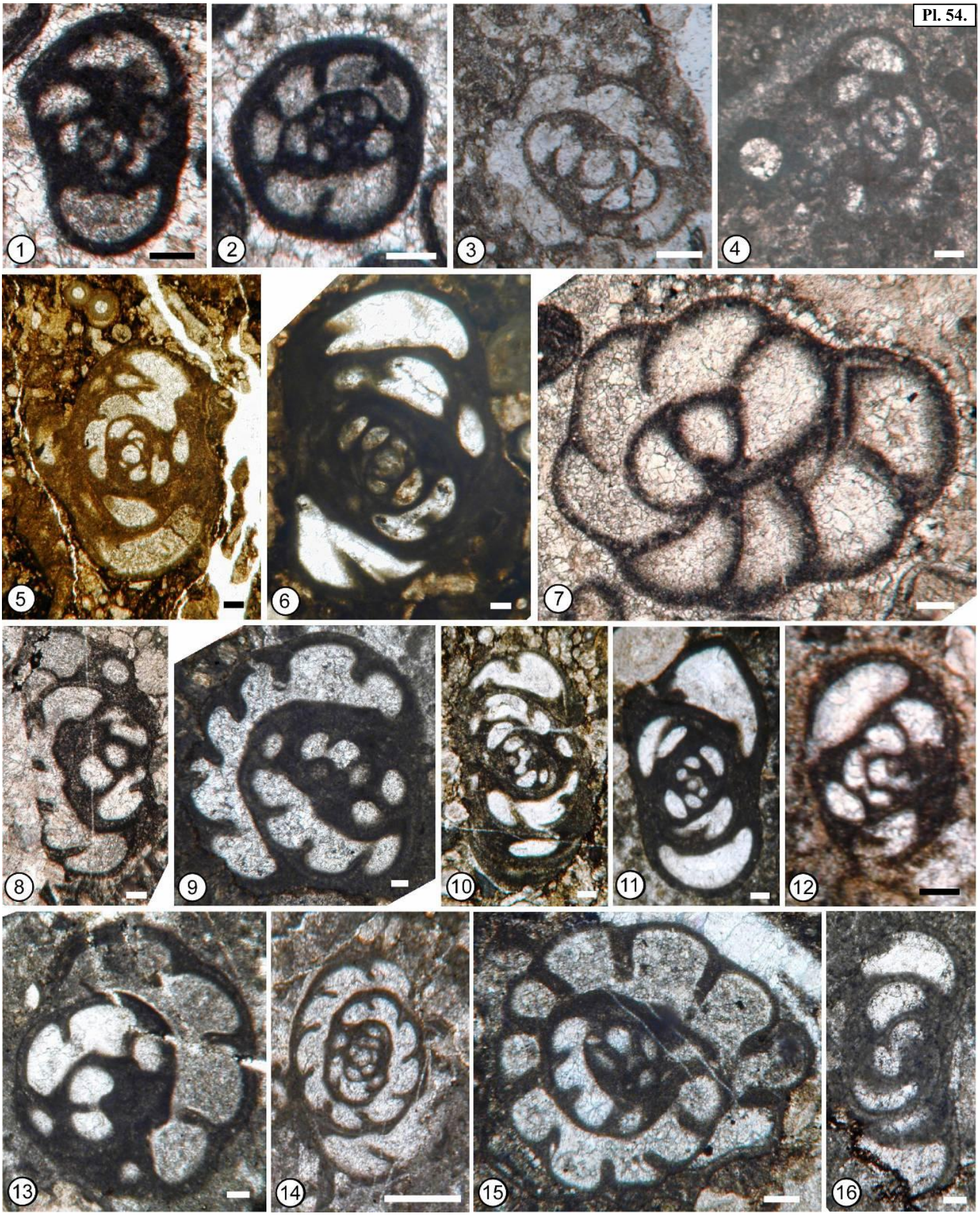


Plate 55.

Family Endothyranopsidae
Subfamily Endothyranopsinae
Genus *Plectogyranopsis* Vachard, 1977b

Figs. 1-5: ***Plectogyranopsis convexa*** (Rauzer-Chernousova, 1948b)

1. Sample 293H, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/68 (scale bar = 100µm).
2. Sample 293I, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/80 (scale bar = 100µm).
3. Sample 10-50, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/43 (scale bar = 100µm).
4. Sample 33-9, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/82 (scale bar = 100µm).
5. Sample RR56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/139 (scale bar = 100µm).

Figs. 6-12: ***Plectogyranopsis regularis*** (Rauzer-Chernousova, 1948b)

6. Sample 11-VII-4, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/50 (scale bar = 100µm).
7. Sample 332B, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/114 (scale bar = 100µm).
8. Sample 10-I.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/57 (scale bar = 200µm).
9. Sample 248E, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/84 (scale bar = 100µm).
10. Sample 137C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/56 (scale bar = 400µm).
11. Sample 134'C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/136 (scale bar = 100µm).
12. Sample 431D, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/27 (scale bar = 100µm).

Figs. 13-16: ***Plectogyranopsis ampla*** (Conil and Lys, 1964)

13. Sample 293.2B, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/96 (scale bar = 100µm).
14. Sample Bou25-7, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/88 (scale bar = 100µm).
15. Sample 600E, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/130 (scale bar = 100µm).
16. Sample 10-14, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/74 (scale bar = 100µm).

Genus *Endothyranopsis* Cummings, 1955a

Figs. 17-18: ***Endothyranopsis compressa*** (Rauzer-Chernoussova and Reitlinger, 1936)

17. Sample 11-5.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/33 (scale bar = 100µm).
18. Sample 10-14, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/66 (scale bar = 100µm).

Fig. 19: ***Endothyranopsis lenticulata*** Ueno in Ueno and Nakazawa, 1993

19. Sample 332F, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/134 (scale bar = 100µm).

Pl. 55.

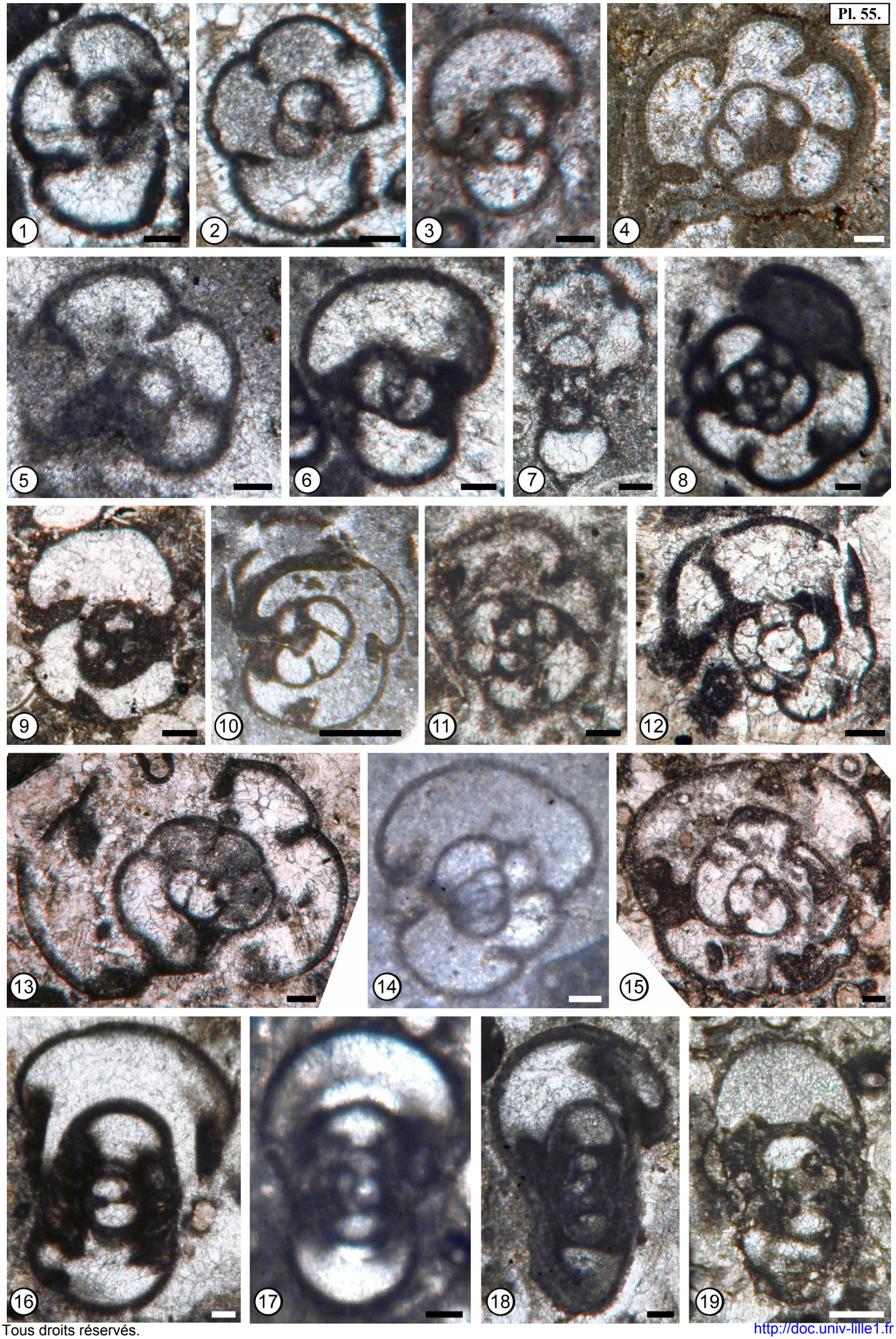


Plate 56.

Fig. 1: ***Endothyranopsis lenticulata*** Ueno in Ueno and Nakazawa, 1993

1. Sample 126F, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/12 (scale bar = 100µm).

Figs. 2-15: ***Endothyranopsis crassa*** (Brady, 1876)

2. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1'/11 (scale bar = 100µm).
3. Sample ML764, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MLB, 9.7/69 (scale bar = 100µm).
4. Sample 10-50, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/38 (scale bar = 100µm).
5. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1'/20 (scale bar = 100µm).
6. Sample 134C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/6 (scale bar = 200µm).
7. Passing to *E. sphaerica*. Sample 466A, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/43 (scale bar = 100µm).
8. Sample 328'B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/17 (scale bar = 100µm).
9. Sample 56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/146 (scale bar = 100µm).
10. Sample RR79, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/263 (scale bar = 100µm).
11. Sample 10-17, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/1 (scale bar = 100µm).
12. Sample 82, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/40 (scale bar = 100µm).
13. Sample 330-8, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/101 (scale bar = 100µm).
14. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/126 (scale bar = 100µm).
15. Sample HS30. Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/116 (scale bar = 200µm).

Figs. 16-19: ***Endothyranopsis sphaerica*** (Rauzer-Chernousova and Reitlinger in Rauzer-Chernousova et al., 1936)

16. Sample CAS14, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.7/16 (scale bar = 200µm).
17. Sample CAS22.2, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.8/12 (scale bar = 100µm).
18. Sample AH20e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/2 (scale bar = 100µm).
19. Sample AH18d, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/76 (scale bar = 100µm).

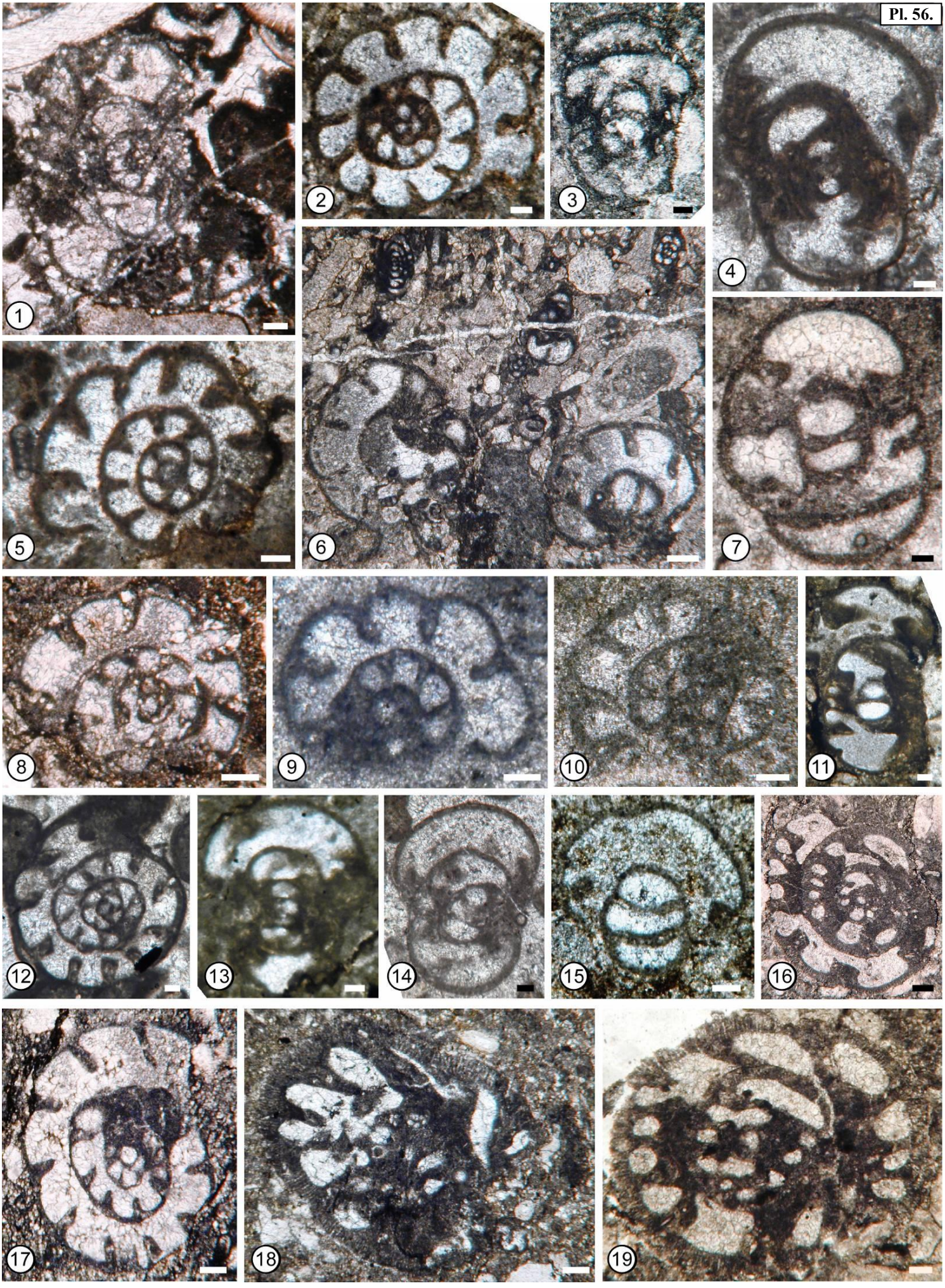


Plate 57.

Bradyinoids
Superfamily Bradyinoidea
Family Bradyinidae
Subfamily Bradyininae
Genus *Cribrospira* von Möller, 1878 emend

Figs. 1-13: ***Cribrospira mira*** Rauzer-Chernousova, 1948e emend

1. Sample 10-14.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/163 (scale bar = 100µm).
2. Sample 330-1, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.3/42 (scale bar = 100µm).
3. Sample 10-3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/11 (scale bar = 100µm).
4. Sample 293A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/4 (scale bar = 100µm).
5. Sample 134E, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/19 (scale bar = 400µm).
6. Sample 134, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/40 (scale bar = 100µm).
7. Sample 293D, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/34 (scale bar = 100µm).
8. Sample 10-14, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/74. (scale bar = 400µm).
9. Sample 79, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/3 (scale bar = 100µm).
10. Sample 293D, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/36 (scale bar = 100µm).
11. Sample 293D, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/35 (scale bar = 100µm).
12. Sample ML764, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MLB, 9.7/79 (scale bar = 200µm).
13. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/130 (scale bar = 400µm).

Fig. 14: ***Cribrospira* cf. *mikhailovi*** Rauzer-Chernousova, 1948e

14. Sample 293C, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/14 (scale bar = 400µm).

Fig. 15: ***Cribrospira*? *perretae* n. sp.**

15. Holotype. Re-illustrated Perret, 1993. Sample CAS U, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP (scale bar = 100µm).

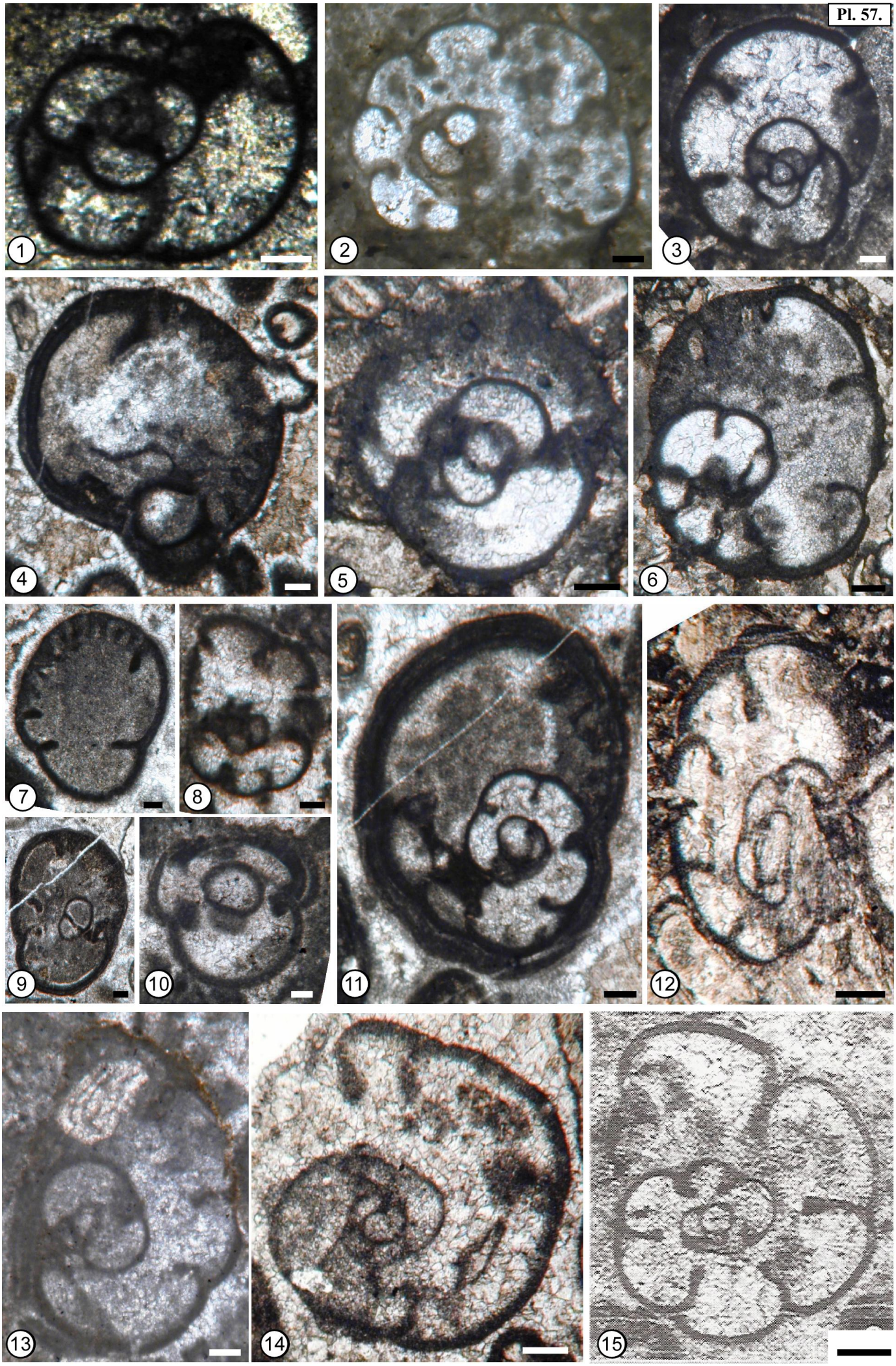


Plate 58.

Genus Janischewskina Mikhailov, 1935

Figs. 1-7: ***Janischewskina isotovae*** Lebedeva in Grozdilova et al., 1975.

1. Sample 61, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/43 (scale bar = 400µm).
2. Sample AH18h, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/ 70 (scale bar = 100µm).
3. Sample 330-5, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/23 (scale bar = 100µm).
5. Sample 330-4, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/94 (scale bar = 100µm).
6. Sample 330-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/114 (scale bar = 100µm).
7. Sample 330-4, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/95 (scale bar = 100µm).

Figs. 8-12: ***Janischewskina delicata*** (Malakhova, 1956a).

8. Sample 330-4, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/98 (scale bar = 200µm).
9. Sample 330-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/113 (scale bar = 400µm).
10. Sample AH20, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/ 19 (scale bar = 100µm).
11. Sample CAS15bisa, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.8/3 (scale bar = 100µm).
12. Sample CAS15bisa, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.8/6 (scale bar = 100µm).

Figs. 13-18: ***Janischewskina* cf. *rovnensis*** (Ganelina, 1956).

13. Sample 10II, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/36 (scale bar = 100µm).
14. Sample 165B, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/4 (scale bar = 100µm).
15. Sample La Serre-Feldweg-4, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/37 (scale bar = 100µm).
16. Sample 329B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/56 (scale bar = 100µm).
17. Sample 329D, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/62 (scale bar = 100µm).
18. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/151 (scale bar = 100µm).

Figs. 19-20: ***Janischewskina typica*** Mikhailov, 1935

19. Sample AHb/81.9, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.6/183 (scale bar = 100µm).
20. Sample AHb/81.9, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.6/182 (scale bar = 400µm).

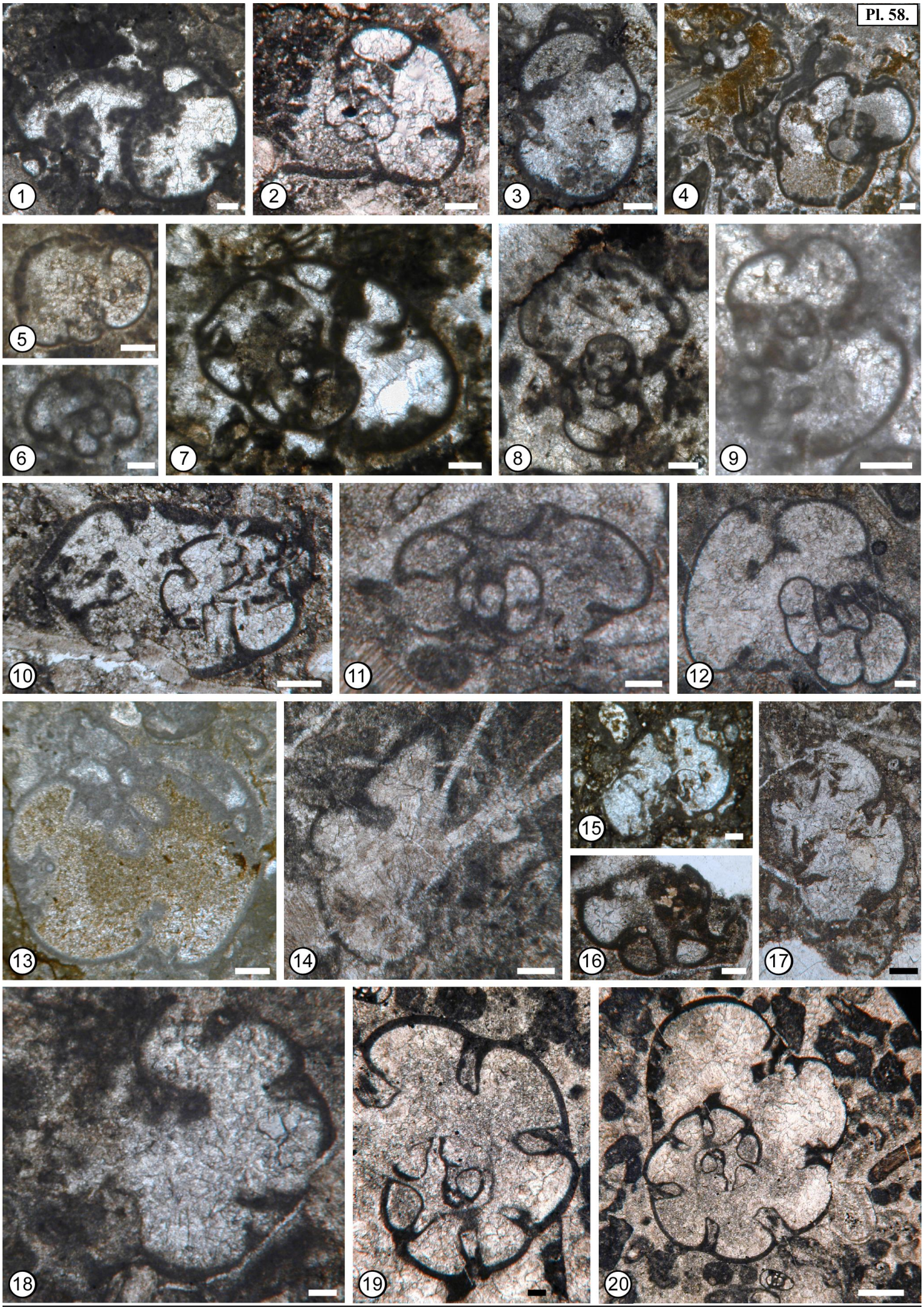


Plate 59.

Genus *Bradyina* von Möller, 1878

Figs. 1-7: ***Bradyina rotula*** (von Eichwald, 1860)

1. Sample Heidi, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/43 (scale bar = 200µm).
2. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/107 (scale bar = 400µm).
3. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/118 (scale bar = 100µm).
4. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/128 (scale bar = 200µm).
5. Sample 10-1, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/82 (scale bar = 200µm).
6. Sample 332D, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/124 (scale bar = 100µm).
7. Sample RM3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection LP, 2.10/124 (scale bar = 200µm).

Fig. 8: ***Bradyina concinna*** Reitlinger, 1950

8. Sample 330-5, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/24 (scale bar = 400µm).

Figs. 9-11: ***Bradyina cribrostomata*** Rauzer-Chernousova and Reitlinger in Rauzer Chernoussova and Fursenko, 1937

9. Sample 50, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.3/27 (scale bar = 200µm).
10. Sample CAS23, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.8/14 (scale bar = 100µm).
11. Sample AH20b, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/92 (scale bar = 100µm).

Fig. 12: ***Bradyina* sp.**

12. Young *Bradyina*. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/53 (scale bar = 100µm).

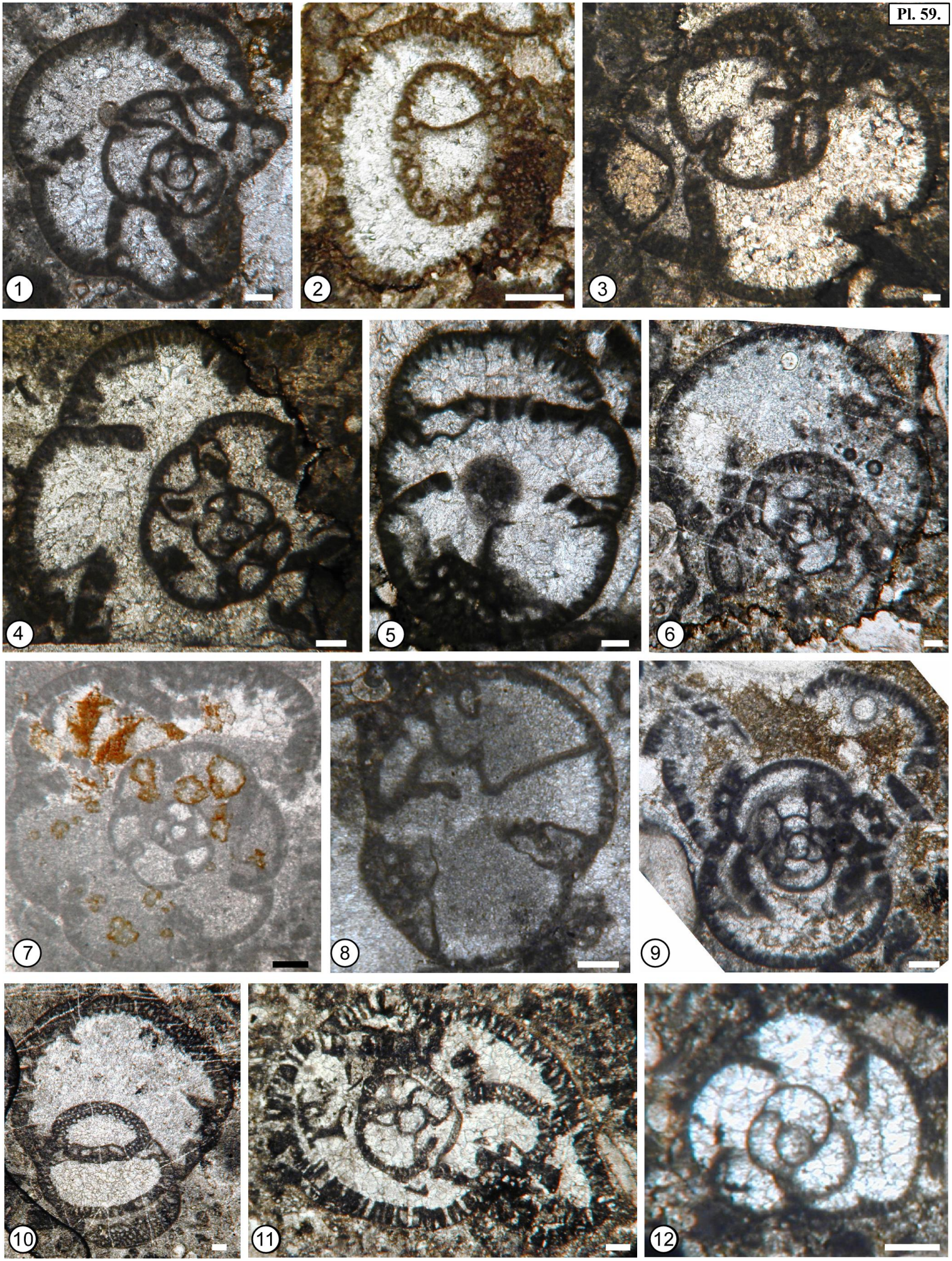


Plate 60.

Loeblichioids
Superfamily Loeblichoidea
Family Dainellidae
Genus *Vissarionovella* Cózar and Vachard, 2001

Figs. 1-3: ***Vissarionovella donzelli*** Cózar and Vachard, 2001

1. Sample 332A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/103 (scale bar = 100µm).
2. Sample 332A, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/104 (scale bar = 100µm).
3. Sample 332E, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/132 (scale bar = 100µm).

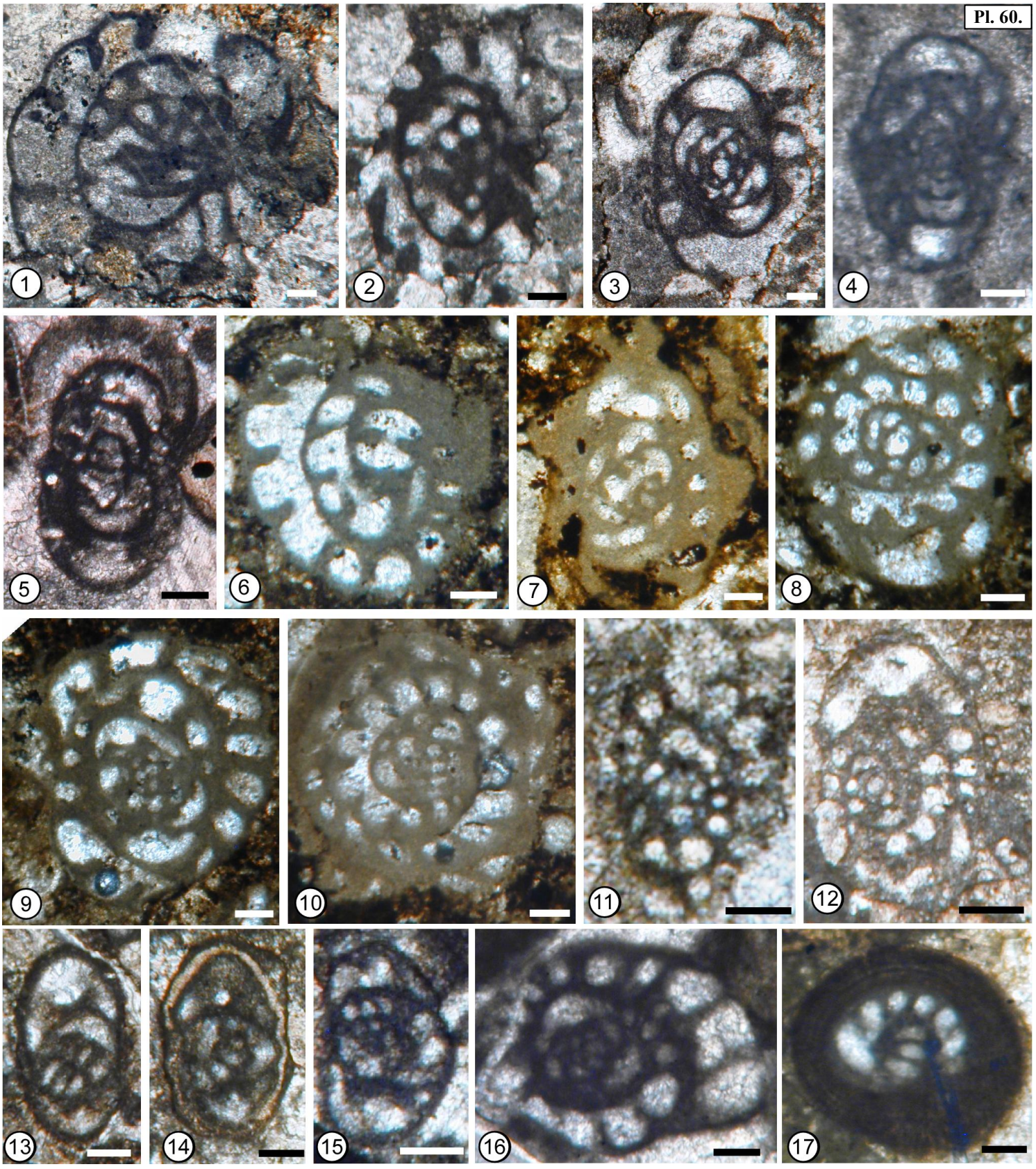
Figs. 4-10: ***Vissarionovella* aff. *llangollensis*** (Conil and Ramsbottom in Conil et al., 1981)

4. Sample RR70, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/111 (scale bar = 100µm).
5. Sample 431D, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/29 (scale bar = 100µm).
6. Sample 10-6, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/35 (scale bar = 100µm).
7. Sample 10-6, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/39 (scale bar = 100µm).
8. Sample 10-6, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/42 (scale bar = 100µm).
9. Sample 10-6, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/43 (scale bar = 100µm).
10. Sample 10-6, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/45 (scale bar = 100µm).

Genus *Pojarkovella* Simonova and Zub, 1975

Figs. 11-17: ***Pojarkovella occidentalis* n. sp.**

11. Paratype. Sample FB16, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB. 9.9.7/55 (scale bar = 100µm).
12. Holotype. Sample 600B, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/120 (scale bar = 100µm).
13. Paratype. Sample 600B, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/125 (scale bar = 100µm).
14. Paratype. Sample 600B, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/127 (scale bar = 100µm).
15. Paratype. Sample 600C, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/122 (scale bar = 100µm).
16. Paratype. Sample 82, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/36 (scale bar = 100µm).
17. Paratype. Sample 7, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/9 (scale bar = 100µm).



28. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/116 (scale bar = 100µm).
29. Sample 25-9B, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.7/5 (scale bar = 100µm).
30. Sample 856(2), Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/14 (scale bar = 100µm).
31. Sample 248D, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/76 (scale bar = 100µm).
32. Sample 248D, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/78 (scale bar = 100µm).

Fig. 33: ***Euxinita* ? sp.1**

33. Re-illustrated after Perret, 1993. Sample CAS37, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP (scale bar = 100 µm).

Plate 61.

Family Loeblichiidae
Subfamily Endostaffellinae Loeblich and Tappan, 1984
Genus *Endostaffella* Rozovskaya, 1961

Figs. 1-4: ***Endostaffella parva*** (von Möller, 1879)

1. Sample 350A, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9/40 (scale bar = 100µm).
2. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1'/16 (scale bar = 100µm).
3. Sample FB18, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB, 9.9.7/61 (scale bar = 100µm).
4. Sample RR51, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/55 (scale bar = 100µm).

Figs. 5-22: ***Endostaffella shamordini*** (Rauzer-Chernousova, 1948f)

5. Sample 466B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/46 (scale bar = 100µm).
6. Sample ML764, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MLB, 9.7/66 (scale bar = 100µm).
7. Sample 246B, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/16 (scale bar = 100µm).
8. Sample 246F, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/37 (scale bar = 100µm).
9. Sample 248B, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/65 (scale bar = 100µm).
10. Sample 33-3, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/133 (scale bar = 100µm).
11. Sample 87, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/153 (scale bar = 100µm).
12. Sample 137A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/19 (scale bar = 100µm).
13. Sample 137A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/20 (scale bar = 100µm).
14. Sample 137A, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/23 (scale bar = 100µm).
15. Sample 140C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.3/68 (scale bar = 100µm).
16. Sample 137B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/31 (scale bar = 100µm).
17. Sample 137D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/69 (scale bar = 100µm).
18. Sample 137F, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/90 (scale bar = 100µm).
19. Sample 137H, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/116 (scale bar = 100µm).
20. Sample 134B', Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/130 (scale bar = 100µm).
21. Sample 134C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/3 (scale bar = 100µm).
22. Sample 328'B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/44 (scale bar = 100µm).

Figs. 23-25: ***Endostaffella discoidea*** (Girty, 1915)

23. Sample AH18e, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/26 (scale bar = 100µm).
24. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/61 (scale bar = 100µm).
25. Sample RR70, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/122 (scale bar = 100µm).

Genus *Euxinita* Conil and Dil in Conil et al., 1980

Figs. 26-32: ***Euxinita efremovi*** Vdovenko and Rostovceva in Brazhnikova et al., 1967

26. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/103 (scale bar = 200µm).
27. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/104 (scale bar = 100µm).

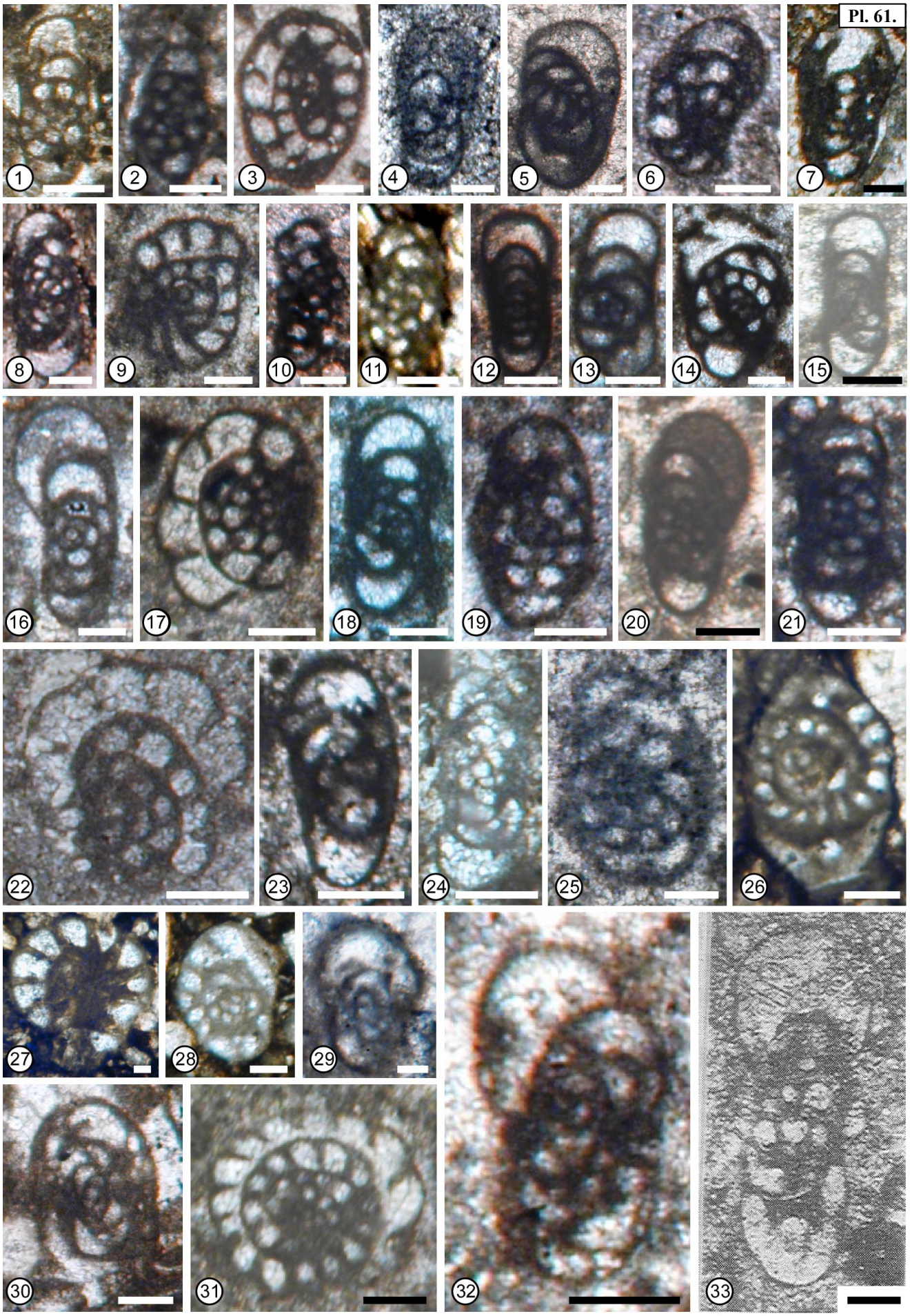


Plate 62.

Palaeotextularioids
Superfamily Palaeotextularioidea
Family Palaeotextulariidae
Subfamily Palaeotextulariinae
Genus *Palaeotextularia* Schubert, 1921

Figs. 1-6: ***Palaeotextularia* ex gr. *longiseptata*** Lipina, 1948

1. Sample 293D, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/31 (scale bar = 100µm).
2. Sample ML784, Montagne Noire (France), Serre de Péret, Brigantian. Collection MLB, 9.7/85 (scale bar = 100µm).
3. Sample 246E, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/27 (scale bar = 100µm).
4. Sample 330-5, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/31 (scale bar = 100µm).
5. Sample 140D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.3/71 (scale bar = 100µm).
6. Sample 134D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/12 (scale bar = 100µm).

Genus *Cribrostomum* von Möller, 1879 emend. Cummings, 1956

Figs. 7-11: ***Cribrostomum lecomptei*** Conil and Lys, 1964

7. Sample 10-3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/73 (scale bar = 100µm).
8. Sample 10-14, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/68 (scale bar = 100µm).
9. Sample 134'C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/137 (scale bar = 200µm).
10. Sample 431C, Montagne Noire (France), Mounio, Brigantian. Collection DV, 9.9.9.1/31 (scale bar = 100µm).
11. Sample RM1A, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection LP, 2.10/127 (scale bar = 400µm).

Genus *Climacammina* in Etheridge, 1873 emend. Cummings, 1956

Fig. 12: ***Climacammina* cf. *padunensis*** Ganelina, 1956

12. Sample 601C, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/48 (scale bar = 100µm).

Plate 63.

Subfamily Koskinobigenerininae

Genus *Consobrinella* Mamet and Pinard, 1992

Figs. 1-8: ***Consobrinella* ex gr. *consobrina*** (Lipina, 1948)

1. Sample 126C, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 8/58 (scale bar = 100µm).
2. Sample Bou25-5, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/81 (scale bar = 100µm).
3. Sample 315, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/100 (scale bar = 100µm).
4. Sample 327A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/113 (scale bar = 100µm).
5. Sample 133B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/46 (scale bar = 100µm).
6. Sample 328'C, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/30 (scale bar = 100µm).
7. Sample 328'D, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/43 (scale bar = 100µm).
8. Sample RM1, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection LP, 2.10/118 (scale bar = 100µm).

Genus *Koskinotextularia* Eickhoff, 1968b

Fig. 9: ***Koskinotextularia cuneata*** (Ivanova, 1973)

9. Sample 293B, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/12 (scale bar = 100µm).

Figs. 10-13: Koskinobigenerininae indet.

10. Sample 10-7, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/116 (scale bar = 100µm).
11. Sample FB4, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection FB, 7/168 (scale bar = 100µm).
12. Sample 11-8, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/20 (scale bar = 100µm).
13. Sample 330-11, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/85 (scale bar = 200µm).

Figs. 14-19: ***Koskinotextularia perforata*** n. sp.

14. Holotype. Sample CAS15, Ardengost (France), Serre de Castet, late Serpukhovian. Collection MFP, 9.9.9.7/24 (scale bar = 100µm).
15. Paratype. Sample AH20a, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/77 (scale bar = 100µm).
16. Paratype. Sample AH20b, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/89 (scale bar = 100µm).
17. Paratype. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/57 (scale bar = 100µm).
18. Paratype. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/62 (scale bar = 100µm).
19. Paratype. Sample AH18h, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/69 (scale bar = 100µm).

Fig. 20: ***Koskinotextularia* sp.**

20. Sample 25, Derbyshire Platform (England), Wye Valley, late Viséan. Collection LP, 2.11/33 (scale bar = 100µm).

Pl. 63.

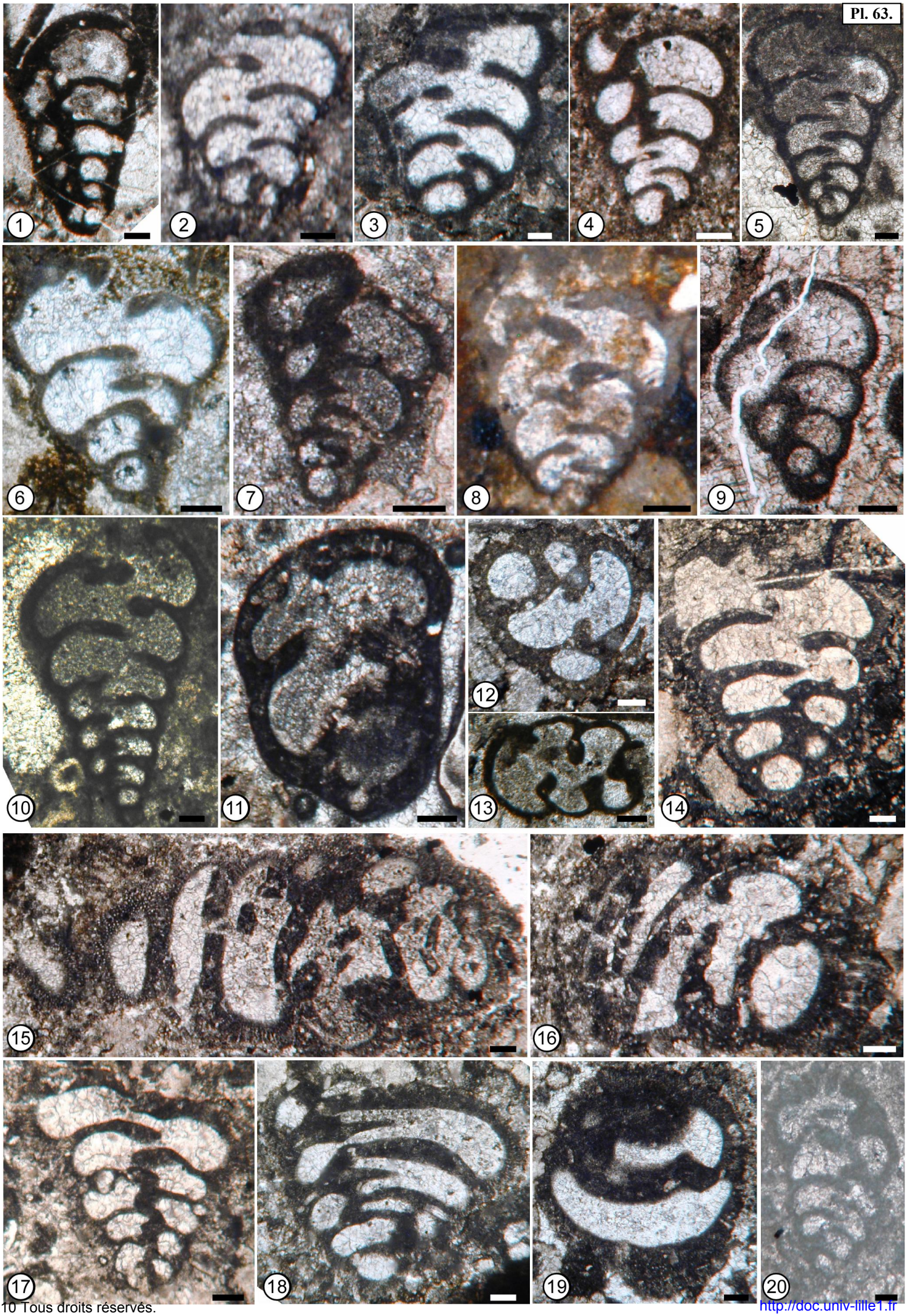


Plate 64.

Genus *Koskinobigenerina* Eickhoff, 1968b

Figs. 1-11: ***Koskinobigenerina breviseptata*** Eickhoff, 1968b

1. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/120 (scale bar = 100µm).
2. Sample 10-50, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/39 (scale bar = 100µm).
3. Sample 10-14, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/65 (scale bar = 100µm).
4. Sample 139B, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.3/76 (scale bar = 100µm).
5. Sample RR60, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/182 (scale bar = 200µm).
6. Sample SP14, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/7 (scale bar = 400µm).
7. Sample SP30, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/19 (scale bar = 400µm).
8. Sample UM-ROQ, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection Univ. Montpellier, 9.7/132 (scale bar = 100µm).
9. Sample SP15, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/9 (scale bar = 100µm).
10. Sample La Serre-Feldweg-4, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/38 (scale bar = 100µm).
11. Sample ML789, Montagne Noire (France), Gare de Laurens, late Brigantian/early Serpukhovian. Collection MLB. 9.7/105 (scale bar = 100µm).

Figs. 12-17: ***Koskinobigenerina prisca*** (Lipina, 1948).

12. Sample SP14, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/8 (scale bar = 100µm).
13. Sample LSItop-2049, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/31 (scale bar = 100µm).
14. Sample La Serre-Feldweg-4.2, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/40 (scale bar = 100µm).
15. Sample 856D, Montagne Noire (France), Japhet, earliest Brigantian. Collection DV, 9.1/34 (scale bar = 100µm).
16. Sample 10-14, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/70 (scale bar = 100µm).
17. Sample Bou3-4, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/70 (scale bar = 100µm).

Pl. 64.

Plate 65.

Superfamily Tetrataxoidea
Family Tetrataxidae
Genus *Tetrataxis* Ehrenberg, 1854

Figs. 1-14: ***Tetrataxis* spp.**

1. Sample 10-17, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/2 (scale bar = 200µm).
2. Sample 10-II.122, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.2/40 (scale bar = 100µm).
3. Sample 11-VII-4, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 2/48 (scale bar = 200µm).
4. Sample 126D, Montagne Noire (France), Japhet, earliest Brigantian, late Asbian. Collection DV, 8/53 (scale bar = 100µm).
5. Sample HS33A, Derbyshire Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/131 (scale bar = 100µm).
6. Sample 601D, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/55 (scale bar = 100µm).
7. Sample HS6, Derbyshire Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/44 (scale bar = 200µm).
8. Sample HS27, Derbyshire Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/100 (scale bar = 100µm).
9. Sample 10-3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/71 (scale bar = 100µm).
10. Sample 466A, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.5/42 (scale bar = 100µm).
11. Sample 601A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/7 (scale bar = 100µm).
12. Sample 327A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/11 (scale bar = 100µm).
13. Sample 601B, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/27 (scale bar = 100µm).
14. Sample 11-9.1Längs, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/5 (scale bar = 100µm).

Pl. 65.

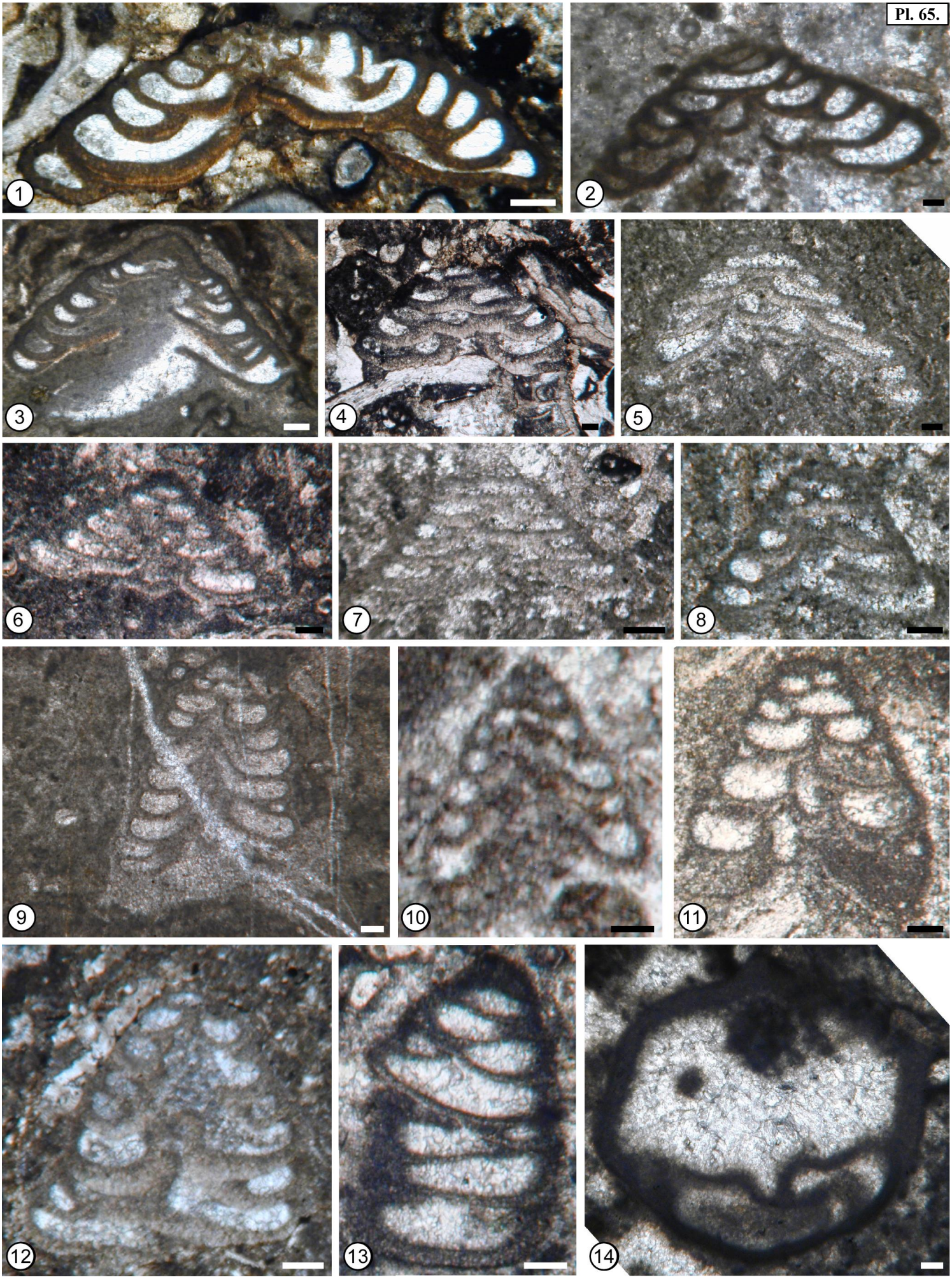


Plate 66.

Figs. 1-9: Genus ***Tetrataxis*** Ehrenberg, 1854

1. Sample 10-10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 4/68 (scale bar = 100µm).
2. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1'/18 (scale bar = 100µm).
3. Sample 10-II.122, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.2/41 (scale bar = 100µm).
4. Sample Feldweg-31, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/60 (scale bar = 100µm).
5. Sample 18, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/11 (scale bar = 400µm).
6. Sample RR69, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/103 (scale bar = 100µm).
7. Sample RR80, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/279 (scale bar = 100µm).
8. *Tetrataxis* on a coral. Sample PE-5, Montagne Noire (France), West of Péret, Brigantian. Collection MA, 9.6/8 (scale bar = 400µm).
9. *Tetrataxis* with basal globular chamber. Sample 25-4, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/79 (scale bar = 100µm).

Genus *Pseudotaxis* Mamet, 1974b

Figs. 10-11: ***Pseudotaxis eominima*** (Rauzer-Chernousova, 1948h)

10. Sample AH18h Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/64 (scale bar = 100µm).
11. SampleRR56, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/151 (scale bar = 100µm).

Figs. 12-14: ***Pseudotaxis brazhnikovae*** (Bogush and Juferev, 1966)

12. Sample AH2 Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/55 (scale bar = 100µm).
13. Sample ARE1.10, Ardengost (France), late Serpukhovian. Collection MFP, 9.9.9.9.2/6 (scale bar = 100µm).
14. Sample AH18h Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/73 (scale bar = 100µm).

Figs. 15-21: ***Pseudotaxis planiformis*** (Brazhnikova, 1983)

15. Sample Mail 10, Ardengost (France), Mail d'Hachan, late Serpukhovian. Collection MFP, (scale bar = 100µm).
16. Sample Mail 22B, Ardengost (France), Mail d'Hachan, late Serpukhovian. Collection MFP, (scale bar = 100µm).
17. Sample AH4, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, (scale bar = 100µm).
18. Sample Mail 18, Ardengost (France), Mail d'Hachan, late Serpukhovian. Collection MFP, (scale bar = 100µm).
19. Sample Mail 16, Ardengost (France), Mail d'Hachan, Serpukhovian. Collection MFP, (scale bar = 100µm).
20. Sample Mail 18, Ardengost (France), Mail d'Hachan, Serpukhovian. Collection MFP (scale bar = 100µm).
21. Sample Mail 4, Ardengost (France), Mail d'Hachan, Serpukhovian. Collection MFP (scale bar = 100µm).

Fig. 22: ***Pseudotaxis* sp.**

22. Sample 82-B, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection DV, 9.4/52 (scale bar = 100µm).

Genus *Valvulinella* Schubert, 1908

Figs. 23-24: ***Valvulinella pozhiensis*** Grozdilova and Lebedeva, 1954

23. Sample RL-4, Montagne Noire (France), Vailhan (Roque de Loup), Brigantian. Collection MA, 9.6/21 (scale bar = 100µm).
24. Sample 82-E, Montagne Noire (France), Roc du Cayla, Asbian/Brigantian boundary. Collection MA, 9.5/1 (scale bar = 100µm).

Figs. 25-27: ***Valvulinella youngi*** (Brady, 1876)

25. Sample 328'C, Montagne Noire (France), Les Mentaresses, Brigantian. Collection MA, 9.9.6/34 (scale bar = 100µm).
26. Sample 328'D, Montagne Noire (France), Les Mentaresses, Brigantian. Collection MA, 9.9.6/40 (scale bar = 100µm).
27. Sample 687A, Montagne Noire (France), Les Mentaresses, Brigantian. Collection MA, 9.9.6/79 (scale bar = 100µm).

Pl. 66.

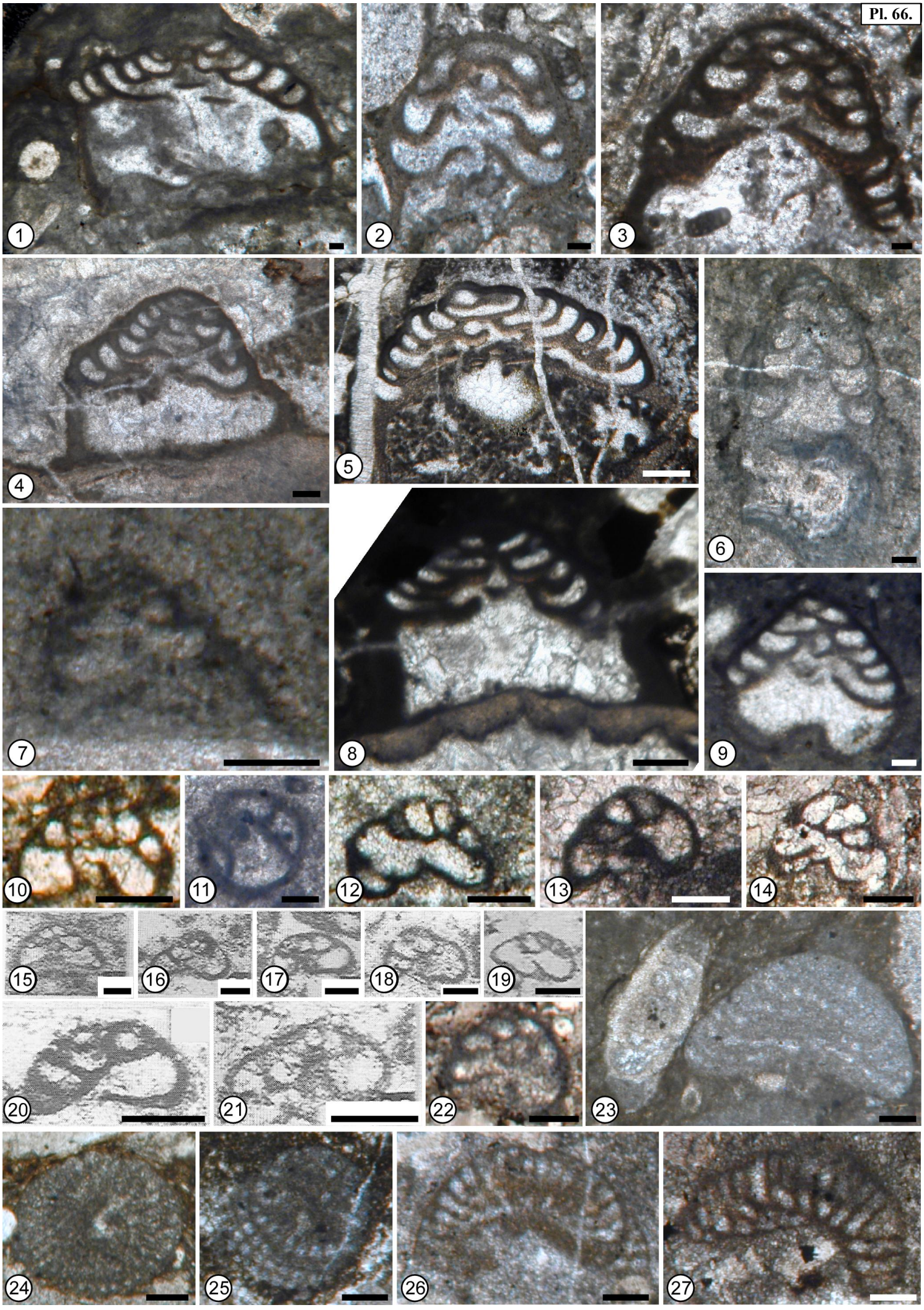


Plate 67.

Superfamily Biseriamminoidea
Family Globivalvulinidae
Genus *Biseriella* in Armstrong and Mamet, 1974 emend. herein.

Figs. 1-6: ***Biseriella parva*** (Chernysheva, 1948b)

1. Sample AH18f, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/18 (scale bar = 100µm).
2. Sample AH20'F, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/20 (scale bar = 100µm).
3. Sample AH18h, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/68 (scale bar = 100µm).
4. Sample AH18a, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/45 (scale bar = 100µm).
5. Sample 248, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/80 (scale bar = 100µm).
6. Sample AH18, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/60 (scale bar = 100µm).

Figs. 7-9: ***Biseriella* cf. *parva***

7. Sample RR61, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.3/210 (scale bar = 100µm).
8. Sample La Serre-Feldweg-17, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/54 (scale bar = 100µm).
9. Sample ML189, Montagne Noire (France), Gare de Laurens, late Brigantian/early Serpukhovian. Collection MLB, 9.7/100 (scale bar = 100µm).

Figs. 10-11: ***Biseriella lenticularis* n. sp.**

10. Holotype. Sample 293F, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/55 (scale bar = 100µm).
11. Paratype. Sample 293H, Montagne Noire (France), Lenses of the road, near Roquessels, late Asbian. Collection DV, 6/69 (scale bar = 100µm).

Figs. 12-16: ***Biseriella vailhanensis* n. sp.**

12. Paratype. Sample 328'A, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/1 (scale bar = 100µm).
13. Holotype. Sample 328'A, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/7 (scale bar = 100µm).
14. Paratype. Sample 327A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/114 (scale bar = 100µm).
15. Paratype. Sample 350A, Montagne Noire (France), Japhet, earliest Brigantian, late Asbian. Collection DV, 9/42 (scale bar = 100µm).
16. Paratype. Sample 327A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/109 (scale bar = 100µm).

Fig. 17: ***Biseriella*? *eogranulosa*** (Reitlinger, 1949)

17. Sample MAR3B, Ardengost (France), late Serpukhovian. Collection MFP, 9.9.9.9.2/3 (scale bar = 100µm).

Figs. 18-29: ***Biseriella* ? sp.**

18. Sample 227C, Montagne Noire (France), La Serre (Mas de la Roque), late Brigantian/early Serpukhovian. Collection DV, 9.9.9.9.2/106 (scale bar = 100µm).
19. Sample AH81.1, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/41 (scale bar = 100µm).
20. Sample RR66, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.5/61 (scale bar = 100µm).
21. Sample RR68, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/90 (scale bar = 100µm).
22. Sample RR75, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/191 (scale bar = 100µm).
23. Sample 248E, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/75 (scale bar = 100µm).
24. Sample AH18f, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/12 (scale bar = 100µm).
25. Sample RR75, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/193 (scale bar = 100µm).
26. Sample RR83, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/319 (scale bar = 100µm).
27. Sample 690C, Montagne Noire (France), Les Jeantels, Brigantian. Collection DV, 9.9.7/34 (scale bar = 100µm).
28. Sample 137G, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/105 (scale bar = 100µm).
29. Sample RR84, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/325 (scale bar = 100µm).

Pl. 67.

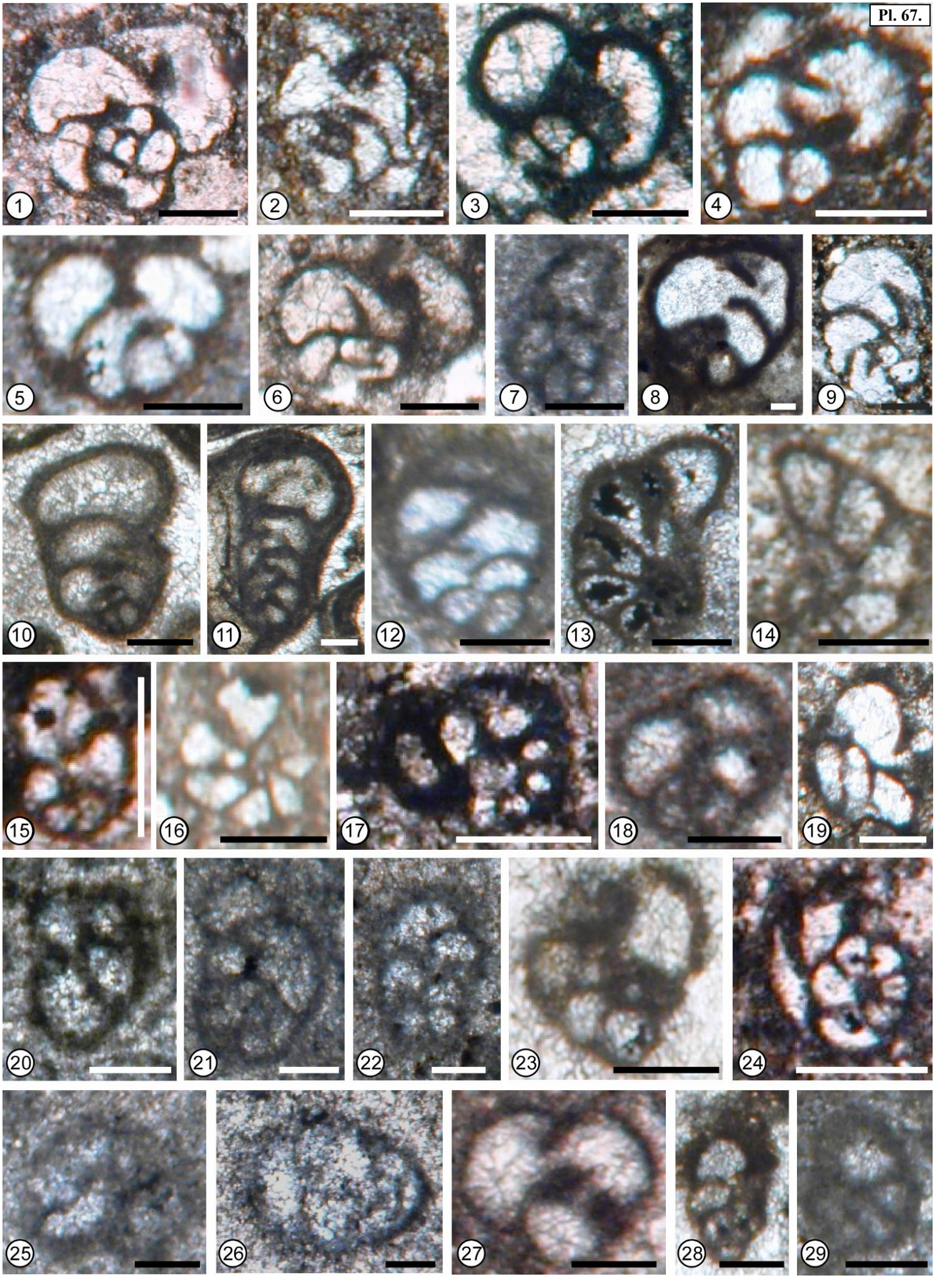


Plate 68.

Superfamily Ozawainelloidea
Family Eostaffellidae
Genus *Mediocris* Rozovskaya, 1961

Figs. 1-4: ***Mediocris breviscula*** (Ganelina, 1951)

1. Sample 76, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/1 (scale bar = 100µm).
2. *Mediocris mediocris* with *Mediocris breviscula*. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1'/13 (scale bar = 100µm).
3. Sample RR73, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/173 (scale bar = 100µm).
4. Sample RR85, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/333 (scale bar = 100µm).

Figs. 5-13: ***Mediocris mediocris*** (Vissarionova, 1948)

5. Sample 10-8.1, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/76 (scale bar = 100µm).
6. Sample LS II-2029, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/107 (scale bar = 100µm).
7. Sample 10IV100, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.2/32 (scale bar = 100µm).
8. Sample 11-8, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/20 (scale bar = 100µm).
9. Sample 4, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/119 (scale bar = 100µm).
10. Sample 5, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/70 (scale bar = 100µm).
11. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/132 (scale bar = 100µm).
12. Sample 83, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/139 (scale bar = 100µm).
13. Sample AH2, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/45 (scale bar = 100µm).

Genus *Eostaffella* Rauzer-Chernousova, 1948h

Figs. 14-19: ***Eostaffella proikensis*** Rauzer-Chernousova, 1948f

14. Sample 137C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/48 (scale bar = 100µm).
15. Sample 137G, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/96 (scale bar = 100µm).
16. Sample HS-2B, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/23 (scale bar = 100µm).
17. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/127 (scale bar = 100µm).
18. Sample RR3, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/218 (scale bar = 100µm).
19. Sample10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1'/15 (scale bar = 100µm).

Figs. 20-27: ***Eostaffella mosquensis*** Vissarionova, 1948

20. Sample 10?, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/47 (scale bar = 100µm).
21. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/142 (scale bar = 100µm).
22. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/145 (scale bar = 100µm).
23. Sample 10-3, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/10 (scale bar = 100µm).
24. Sample 246G, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/40 (scale bar = 100µm).
25. Sample 601B, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/28 (scale bar = 100µm).
26. Sample 246A, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/8 (scale bar = 100µm).
27. Sample137D, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/66 (scale bar = 100µm).

Pl. 68.

Plate 69.

Figs. 1-3: ***Eostaffella parastruvei*** Rauzer-Chernousova, 1948h

1. Sample 246B, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/13 (scale bar = 100µm).
2. Sample CAS15bis2, Ardengost (France), Serre de Castet, Serpukhovian. Collection MFP, 9.9.9.3/7 (scale bar = 100µm).
3. Sample 246H, Montagne Noire (France), Vailhan, Brigantian. Collection DV, 9.8/53 (scale bar = 100µm).

Figs. 4-9: **Eostaffellidae** in England.

4. Microfacies with two species of *Eostaffella*. Sample HS2B, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/28 (scale bar = 200µm).
5. Sample HS3, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/32 (scale bar = 400µm)
6. Sample HS-2B, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/31 (scale bar = 100µm).
7. With collapse Sample HS8, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/50 (scale bar = 100µm).
8. Sample HS-33A, Derbyshire Platform Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/136 (scale bar = 100µm).
9. *Eostaffella* comparable to an *Eostaffellina*. Sample HS-2B, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/30 (scale bar = 100µm).

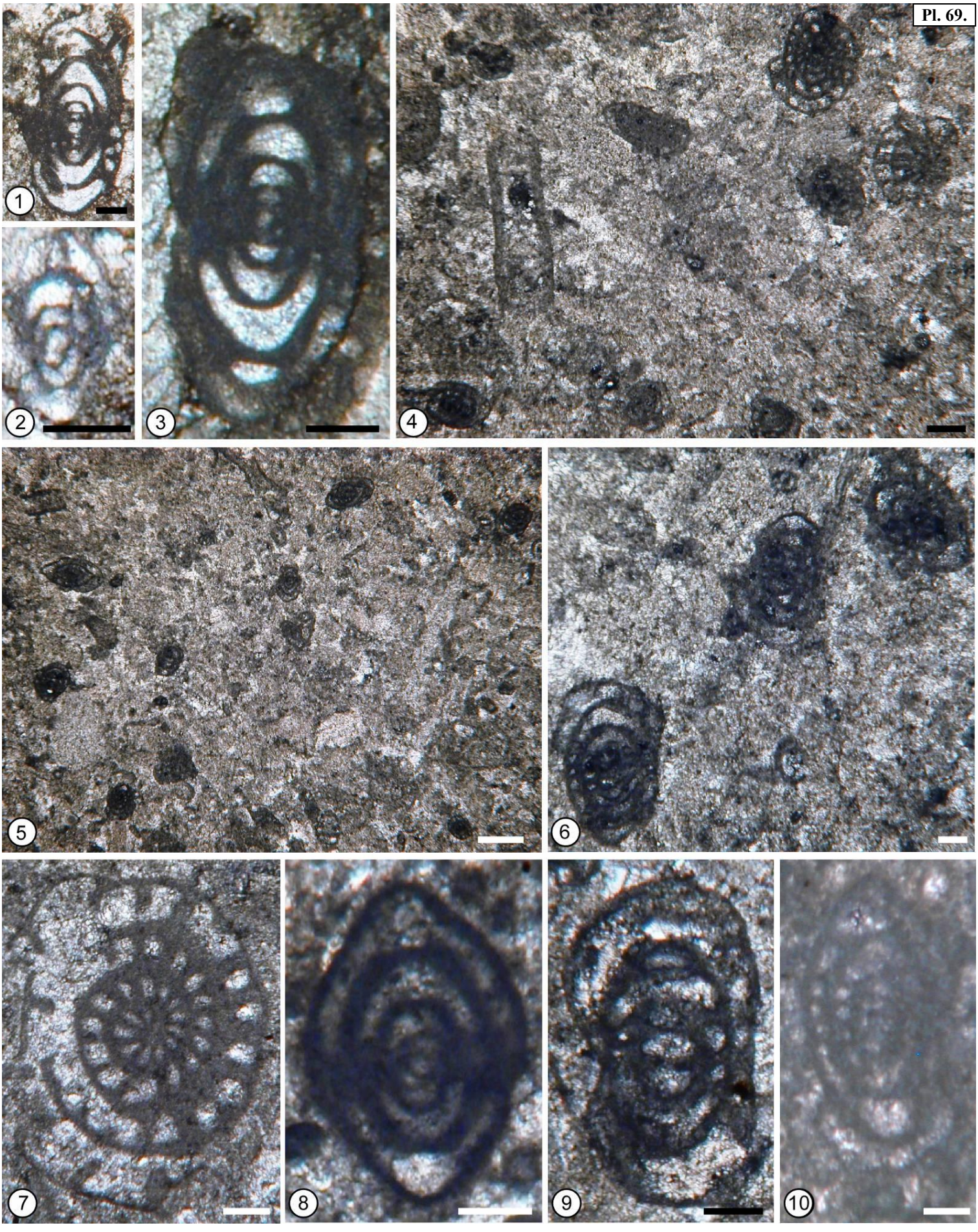


Plate 70.

Staffelloids
Superfamily Staffelloidea
Family Pseudoendothyridae
Genus *Pseudoendothyra* Mikhailov, 1939

Figs. 1-18: ***Pseudoendothyra struvei*** (von Möller, 1879)

1. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/117 (scale bar = 100µm).
2. Sample 10-12, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 3/121 (scale bar = 100µm).
3. Sample LS II-2029, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 4/106 (scale bar = 100µm).
4. Sample La Serre-Feldweg-17, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection MA, 5/57 (scale bar = 100µm).
5. Sample Serre de Peret 30, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/18 (scale bar = 100µm).
6. Sample 10-50, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 9.3/44 (scale bar = 100µm).
7. Sample 601A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/21 (scale bar = 200µm).
8. Sample 137C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/52 (scale bar = 100µm).
9. Sample 10-7.2, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/113 (scale bar = 100µm).
10. Sample 10, Montagne Noire (France), Castelsec, Asbian/Brigantian boundary. Collection MA, 1/144 (scale bar = 100µm).
11. Sample Serre de Peret 15, Montagne Noire (France), Serre de Péret, Brigantian. Collection MA, 9.2/10 (scale bar = 100µm).
12. Sample 33-25, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9/100 (scale bar = 100µm).
13. Sample 328'B, Montagne Noire (France), Les Mentaresses, Brigantian. Collection DV, 9.9.6/16 (scale bar = 100µm).
14. Sample AH20'F, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/24 (scale bar = 100µm).
15. Sample AH20'F, Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.3/26 (scale bar = 100µm).
16. Sample AH18i Ardengost (France), Montagne d'Areng, late Serpukhovian. Collection MFP, 9.9.9.9.2/44 (scale bar = 100µm).
17. Sample 24, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/63 (scale bar = 200µm).
18. Sample 24, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/63 (scale bar = 200µm).

Fig. 19: ***Pseudoendothyra luminosa*** (Ganelina, 1956)

19. Sample 24, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/69/ (scale bar = 100µm).

Fig. 20: ***Pseudoendothyra angulata*** (Rauzer-Chernousova, 1948g)

20. Sample 600B, Montagne Noire (France), Valuzières, late Asbian. Collection DV, 9.9.9.9.2/116 (scale bar = 100µm).

Pl. 70.

Plate 71.

Order Miliolida
Superfamily Nubecularioidea
Family Calcivertellidae
Genus *Calcitornella* Cushman and Waters, 1928

Figs. 1-8: ***Calcitornella* (?) sp.**

1. Sample ML789, Montagne Noire (France), Gare de Laurens, late Brigantian/early Serpukhovian. Collection MLB, 9.7/103 (scale bar = 100µm).
2. Sample 33-71, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.1/77 (scale bar = 100µm).
3. Sample 330-4, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/83 (scale bar = 100µm).
4. Sample CAS13, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection MFP, 9.9.9.7/13 (scale bar = 100µm)
5. Sample CAS13, Ardengost (France), Serre de Castet, Serpukhovian. Collection MFP, 9.9.9.7/13 (scale bar = 100µm).
6. Sample CAS13, Ardengost (France), Serre de Castet, Serpukhovian. Collection MFP, 9.9.9.7/14 (scale bar = 100µm).
7. Sample CAS14.2, Ardengost (France), Serre de Castet, Serpukhovian. Collection MFP, 9.9.9.7/18 (scale bar = 100µm).
8. Sample CAS14.2, Ardengost (France), Serre de Castet, Serpukhovian. Collection MFP, 9.9.9.7/19 (scale bar = 100µm).

Genus *Ammovertella* Cushman, 1928b

Fig. 9: ***Ammovertella*** (?) sp.

9. Sample RR2, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/209 (scale bar = 100µm)

Genus *Draffania* Cummings, 1957

Figs. 10-12: ***Draffania* aff. *biloba*** Cummings, 1957

10. Sample 134C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.5/7 (scale bar = 100µm).
11. Sample RR50, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/39 (scale bar = 100µm).
12. Sample HS27, Derbyshire Platform (England), Horseshoe quarry, Brigantian. Collection LP, 2.8/102 (scale bar = 100µm)

Other organisms

Figs. 13-17: ***Hexaphyllia* spp.**

13. Sample La Serre-Feldweg-4.2, Montagne Noire (France), La Serre, late Brigantian/early Serpukhovian. Collection LP, 5/41 (scale bar = 200µm).
14. Sample RM1B, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection LP, 2.10/137 (scale bar = 100µm).
15. Sample 330-1, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection LP, 9.9.3-41 (scale bar = 200µm).
16. Sample RR4, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/225 (scale bar = 100µm).
17. Sample RR87, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.8/43 (scale bar = 100µm).

Figs. 18-21: Other organisms

18. Microfaciès with ophiurid « vertebron ». Sample RR69, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.6/104 (scale bar = 100µm).
19. Bivalves, biofilm, bryozoans and *Fasciella*. Sample RR5, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/228 (scale bar = 400µm).
20. Microfacies of costulate spicules and bryozoans. Sample RR7, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/231 (scale bar = 400µm).
21. Sample RR7, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/232 (scale bar = 300µm).

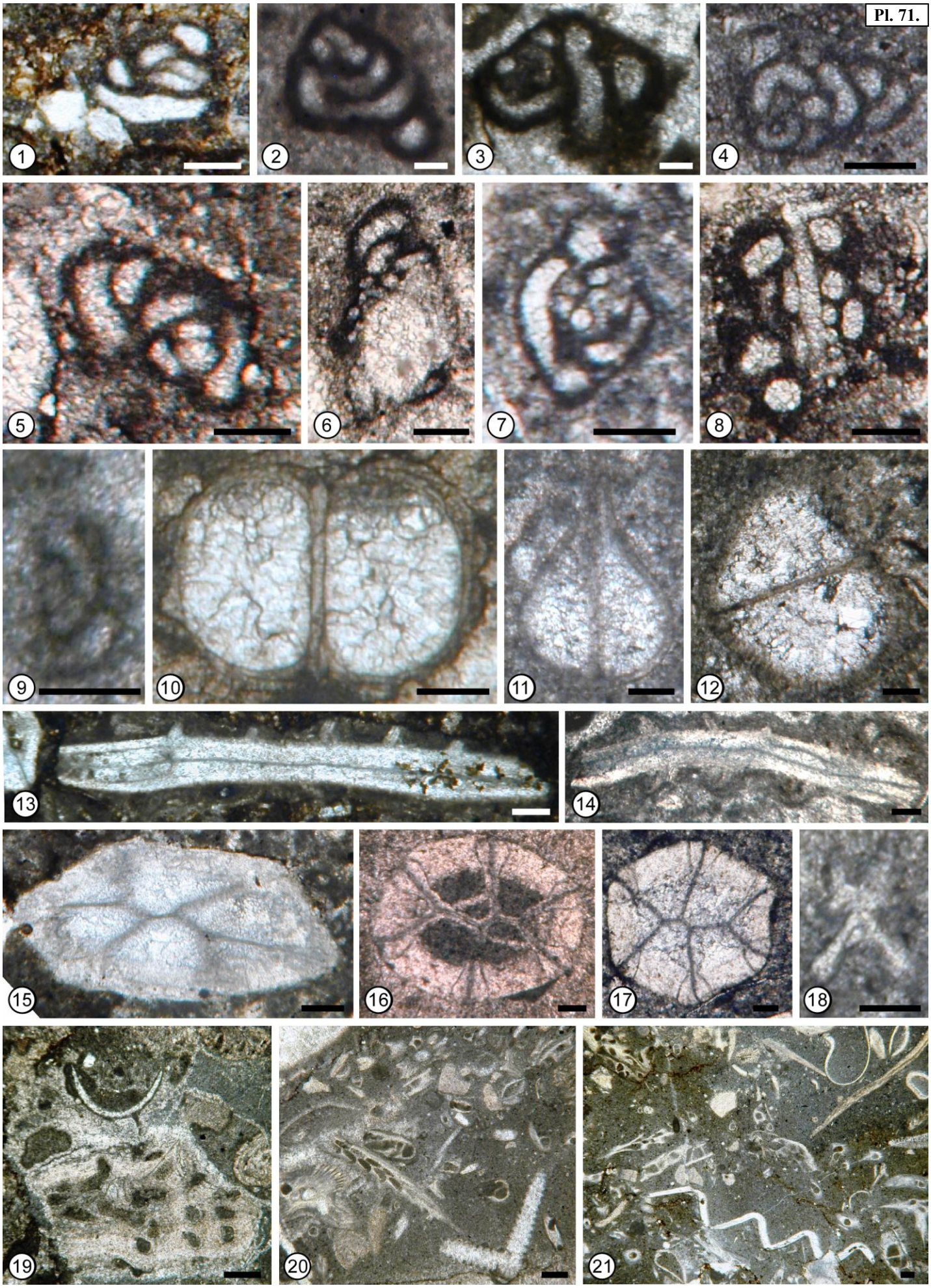


Plate 72.

Other organisms:

1. Trilobite. Sample 127A, Montagne Noire (France), Japhet, earliest Brigantian, late Asbian. Collection DV, 8/13 (scale bar = 100µm).
2. Auloporid. Sample RR7, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.1/233 (scale bar = 100µm).
3. Bivalve? Sample RR84, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/330 (scale bar = 400µm).
4. Brachiopod. Sample RR50, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.2/34 (scale bar = 100µm).
5. Ostracods, *Hemithurammina* and indeterminate organism. Sample RR62, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.4/8 (scale bar = 100µm).
6. Bivalves. Sample RR84, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.7/328 (scale bar = 400µm).
7. Brachiopod with truncational facets and fixed *Hemithurammina*. Sample RR87, Montagne Noire (France), Roque Redonde, Brigantian. Collection LP, 2.8/29 (scale bar = 100µm).
8. Costulate bivalves. Sample RM1, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection LP, 2.10/115 (scale bar = 400µm).
9. Sponge spicules. Sample Bou-25-2, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 9.6/76 (scale bar = 400µm).
10. Brachiopod? Sample601A, Montagne Noire (France), Les Pascales, Brigantian. Collection DV, 9.9/4 (scale bar = 400µm)
11. Entomozoidae (pelagic ostracods). Sample 72, Montagne Noire (France), Roc de Murviel, Late Devonian supragriottes. Collection MA, 9.9.1/16 (scale bar = 100µm).
12. *Multithecopora* sp. Sample 57, Montagne Noire (France), Roc de Murviel, late Brigantian. Collection MA, 9.9.2/74 (scale bar = 500µm).
13. Chitinozoans? Sample 72, Montagne Noire (France), Roc de Murviel, Late Devonian supragriottes. Collection MA, 9.9.1/17 (scale bar = 100µm).
14. Holothurid sclerite? Sample 609, Montagne Noire (France), Les Batailles, Brigantian. Collection DV, 9.9.5/72 (scale bar = 100µm).
15. Reelaborated goniatite. Sample Bou-25-99, Montagne Noire (France), Les Boutinelles, Brigantian. Collection MA, 6/99 (scale bar = 400µm).
16. *Spirorbis* on bryozoan. Sample 138C, Montagne Noire (France), Roquemaillère, Asbian/Brigantian boundary. Collection DV, 9.9.4/5 (scale bar = 400µm).

Pl. 72.