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Aux mes chers parents

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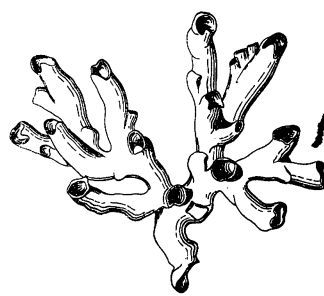
REDESCRIPTION OF TETRACORALS DESCRIBED BY E. EICHWALD IN "PALAEONTOLOGY OF RUSSIA"

REWIZJA TETRAKORALI OPISANYCH W MONORAFII E. EICHWALDA „PALEONTOLOGIJA ROSSII"

ПЕРЕОПИСАНИЕ КОРАЛЛОВ (TETRACORALLA, RUGOSA) ОПИСАННЫХ ЭДУАРДОМ ЭЙХВАЛЬДОМ В МОНОГРАФИИ „ПАЛЕОНТОЛОГИЯ РОССИИ"



A C T A P A L A E O N T O L O G I C A P O L O N I C A
Vol. XVIII 1973 No. 1

J. FEDOROWSKI & V. B. GORIANOV

REDESCRIPTION OF TETRACORALS DESCRIBED BY E. EICHWALD IN "PALAEONTOLOGY OF RUSSIA"

Abstract. — Fifty-tree species of tetracorals from Eichwald's collection have here been revised, described and illustrated. Stratigraphic range: Ordovician through Lower Permian. Most names given by Eichwald have lost their priority (nomen oblitum), but the present writers suggest to keep them for the species which were not described after Eichwald's publication.

INTRODUCTION

The present work has been done to introduce contemporary palaeontologists to at least a part of Eichwald's monograph on Russia's fossil fauna and flora. Since Eichwald's descriptions are not very clear and frequently are devoid of illustrations, his very rich collection was, and in great part continues to be, a museum curiosity only. This prevented his contemporaries and later investigators from making use of these descriptions and, consequently, in the case of the tetracorals more than 80 per cent of the names fell into oblivion. In conformity to the law of nomen oblitum, even considerably later names were generally accepted. The writers suggest to recognize Eichwald's priority at least for the specific names, which have neither been used nor changed since his times.

The present revision is based on the first Petrograd edition of the "Palaeontology of Russia" issued in Russian (E. Eichwald, 1861, Sanktpeterburg) and not on the earlier edition in French (E. Eichwald, 1860, Stuttgart), since the description of Eichwald's collection (collection No 1 housed at the Chair of Historical Geology of the University of Leningrad) was prepared on the basis of the Russian edition. All the numbers of the specimens cited throughout the paper refer to this collection.

The stratigraphic position of particular species has been given both in Eichwald's presentation and in modern terms, defined accurately by So-

viet geologists and palaeontologists. Likewise, a special list of Eichwald's species has been prepared, along with corresponding names used in the present paper. Missing specimens are marked in this list.

The taxonomy of Hill, (1956) has been adopted for the Ordovician, Silurian, Devonian and partly also Carboniferous and Permian corals. The writers described and illustrated their parts of the work quite independently of each other (V. B. Gorianov: Ordovician — Devonian, J. Fedorowski: Carboniferous — Permian) and this is the reason why higher taxons recur in both parts of the paper. The description has been limited to the systematic part only, illustrated as accurately and many-sidedly as possible in view of a rather scarce material. Figures for each part of the paper have been drawn by the writers themselves.

ACKNOWLEDGMENTS

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List of species

Named by Eichwald, 1861	Present revision
1. *Zaphrentis denticulata* Eichwald	specimen is lost
2. *Zaphrentis cylindrica* M.-Edw. & H. . . .	*Dibunophyllum pachyseptatum* n.sp.
3. *Zaphrentis dilatata Eichwald*	*Kenophyllum subcylindricum* Dybowski, 1873

4. *Zaphrentis tenuilamellata* Eichwald . . .	*Kenophyllum subcylindricum* Dybowski, 1873
5. *Zaphrentis ornata* Eichwald	*Streptelasma ornata* (Eichwald, 1829)
6. *Zaphrentis arietina* Fisch.	"*Zaphrentis*" *arietina* Fischer, 1837
7. *Amplexus coralloides* Sow.	specimen is lost
8. *Amplexus alternans* Eichwald	*Amplexocarinia alternans* (Eichwald, 1855)
9. *Lophophyllum breviceps* Eichwald	*Gshelia rouilleri* Stuckenberg, 1888
10. *Lophophyllum solare* Eichwald	
11. *Trochophyllum radiatum* Eichwald	? *Bothrophyllum inostranzewi* (Stuckenberg, 1904)
12. *Menophyllum rosula* Eichwald	*Lophophyllum rosula* (Eichwald, 1856)
13. *Anisophyllum connivens* Eichwald. . . .	*Caninia jerofeewi* (Stuckenberg, 1904)
14. *Cyathophyllum regium Phill.*	specimen is lost
15. *Cyathophyllum boloniense* Blainv	specimen is lost
16. *Cyathophyllum hexagonum* Goldf.	specimen is lost
17. *Cyathophyllum quadrigeminum* Goldf. . .	*Entelophyllum articulatum* (Wahlenberg, 1821)
18. *Cyathophyllum truncatum* L.	specimen is lost
19. *Cyathophyllum corolligerum* Eichwald . .	specimen is lost
20. *Cyathophyllum articulatum* Wahl.	*Phaulactis cyathophylloides* Ryder, 1926 *Entelophyllum articulatum* (Wahlenberg, 1821) *Entelophyllum losseni* (Dybowski, 1876) *Tryplasma loveni* (M. -Edwards & Haime, 1851)
21. *Cyathophyllum flexuosum* L.	*Entelophyllum losseni* (Dybowski, 1874)
22. *Cyathophyllum vermiculare* Goldf.	*Sclerophyllum sokolovi* Reiman, 1956 *Grypophyllum vermiculare* (Goldfuss, 1826)
23. *Cyathophyllum caespitosum* Goldf.	*Brachyelasma duncani* (Dybowski, 1873)
24. *Cyathophyllum murchisoni* M.-Edw. & H.	specimen is lost
25. *Cyathophyllum stutschburgyi* M.-Edw. & H.	*Palaeosmilia murchisoni* M. -Edwards & Haime, 1848
26. *Cyathophyllum helianthoides* Goldf. . . .	specimen is lost
27. *Cyathophyllum dianthus* Goldf.	*Spongophylloides perfecta* (Wedekind, 1927)
28. *Cyathophyllum pileolus* Eichwald	*Carinophyllum confusum* (Počta, 1902)
29. *Trypelasma aequabile* Lonsd.	*Columnaria* (?) *vagranensis* (Soshkina, 1949) *Zelophyllum* (?) sp.
30. *Campophyllum conicum* Fisch.	*Bothrophyllum conicum* Trautschold, 1879

31. *Campophyllum flexuosum* Goldf.	specimen is lost
32. *Acervularia luxurians* Eichwald	*Brachyelasma duncani* (Dybowski, 1873) *Entelophyllum articulatum* (Wahlenberg, 1821) *Diplophyllum luxurians* (Eichwald, 1829)
33. *Omphyma fastigatum* Eichwald	*Entelophyllum articulatum* (Wahlenberg, 1821) *Tryplasma loveni* (M.-Edwards & Haime, 1851)
34. *Omphyma septigerum* Eichwald	*Pycnactis* aff. *mitratus* (Schlotheim, 1820)
35. *Omphyma discus* Eichwald	*Mucophyllum* sp.
36. *Pachyphyllum gibberosum* Eichwald . . .	*Carinophyllum confusum* (Počta, 1902)
37. *Clisiophyllum buceros* Eichwald	*Grewingkia buceros* (Eichwald, 1856)
38. *Clisiophyllum eminens* Eichwald	*Streptelasma giganteum* Kaljo, 1958 *Grewingkia europeum hosholmensins* Kaljo, 1961
39. *Clisiophyllum cristatum* Eichwald	*Bighornia orvikui* Kaljo, 1960
40. *Clisiophyllum coniseptum* Keyserling . . .	specimen is lost
41. *Clisiophyllum repandum* Eichwald	*Dibunophyllum percrassum* Gorsky, 1951
42. *Clisiophyllum subturbinatum* Eichwald . .	*Clisiophyllum subturbinatum* Eichwald, 1861
43. *Aulophyllum inflexum* Eichwald	*Aulophyllum fungites* (Fleming, 1828)
44. *Patinula lithuana* Eichwald	specimen is lost
45. *Lithostrotion martini* M.-Edw. & Haime . .	*Lithostrotion* (*Siphonodendron*) cf. *martini* M. -Edwards & Haime, 1851
46. *Lithostrotion basaltiforme* Phill.	specimen is lost
47. *Lithostrotion antiquum* M.-Edw. & Haime	specimen is lost
48. *Lithostrotion portolockii* M.-Edw. & Haime 49. *Lithostrotion mac-coyanum* M.-Edw. & Haime	*Petalaxis mccoyana* (M. -Edwards & Haime, 1851)
50. *Lithostrotion intermedium* Eichwald . . .	*Lithostrotion (Lithostrotion) intermedium* Eichwald, 1861
51. *Lithostrotion affine* Flemm.	*Corwenia eichwaldi* n. sp.
52. *Lithostrotion phillipsii* M.-Edw. & Haime	specimen is lost
53. *Lithostrotion irregulare* M.-Edw. & Haime	*Lithostrotion* (*Siphonodendron*) cf. *martini* M. -Edwards & Haime, 1851
54. *Lithostrotion junceum* Flemm.	*Lithostrotion* (*Siphonodendron*) *junceum* (Fleming, 1828)
55. *Lonsdaleia floriforme* Flemm.	*Lonsdaleia ornata* Dobroljubova, 1958
56. *Lonsdaleia inconferata* Lonsd.	specimen is lost
57. *Lonsdaleia carbonaria* Eichwald	specimen is lost

58. *Cystiphyllum impunctum* Lonsd. . . .	*Microplasma impunctum* (Lonsdale, 1845)
59. *Cystiphyllum vesiculosum* Goldf.	specimen is lost
60. *Cystiphyllum cylindricum* Lonsd.	*Spongophylloides grayi* (M. -Edwards & Haime, 1855)
61. *Spirorbis siluricus* Eichwald	*Phaulactis cyathophylloides* Ryder, 1926 *Phaulactis* sp. *Entelophyllum articulatum* (Wahlenberg, 1821)
62. *Columnaria sulcata* Goldf.	*Cyathophylloides kassariensis* Dybowski, 1873
63. *Aulopora repens* Knorr & Walch	*Gukoviphyllum septatum* (Bulvanker, 1952)

PART I

ORDOVICIAN — DEVONIAN RUGOSE CORALS

Order **Rugosa** M. -Edwards & Haime, 1850
Suborder **Streptelasmatina** Wedekind, 1927
Superfamily **Zaphrenticae** M. -Edwards & Haime, 1850
Family **Streptelasmatidae** Nicholson in Nicholson & Lydekker, 1889
Subfamily **Streptelasmatinae** Nicholson in Nicholson & Lydekker, 1889

Genus *Streptelasma* Hall, 1847
Streptelasma giganteum Kaljo, 1958
(Pl. I, Figs 1a—e; Pl. II, Fig. 1.; Text-fig. 1*a*—*h*)

1861. *Clisiophyllum eminens* Eichw.; E. Eichwald, Paleontologija... p. 145 (partim).
1958a. *Streptelasma (Streptelasma) giganteum* Kaljo.; D. Kaljo, On the Taxonomy... p. 21, Pl. 1, Figs 1—6.

Diagnosis. — Very large *Streptelasma* with (60—67)×2 septa at the diameter of 40—50 mm, and with comparatively narrow septotheca; major septa are long, their axial ends twisted around the axis and partially they are in contiguity.

Material. — One almost complete specimen. The height of the corallite is 85 mm, the diameter of calice is 55 mm.

Measurements (in mm):

Diameter	Number of septa
9.2	33
10.1	37
11.9	39
13.0	40×2
16.2	41×2
20.0	41×2
25.0	49×2
43.0	61×2

Ontogeny. — In the early neanic stage (Text-fig. 1*a-c*) septa are grouped into quadrants and in each quadrant the inner ends of septa are joined either to the lateral or to the adjacent septa.

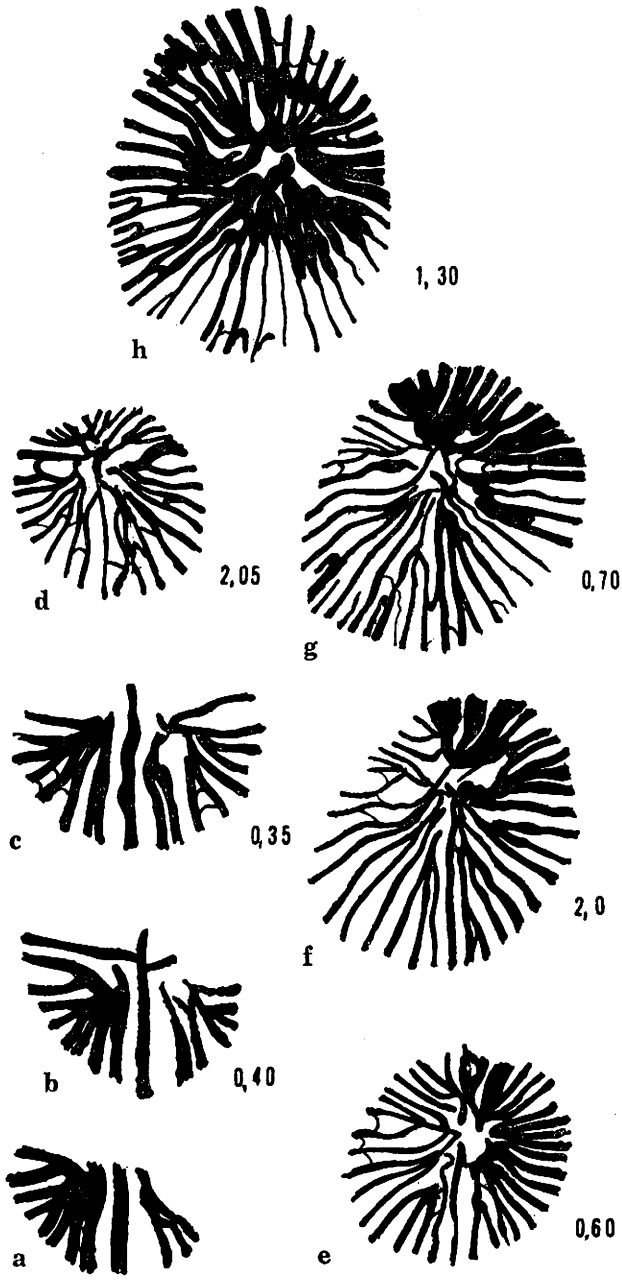


Fig. 1 — *Streptelasma giganteum* Kaljo. Specimen No. 1/1597: *a-c* early neanic stage, ×5; *d-f* middle neanic stage, × 3; *g*, *h* late neanic stage, × 3.

In the middle neanic stage (Text-fig. 1*d-f*) septa form bunches of three to seven. The bunches with the greatest number of septa are near the lateral protosepta. The arrangement of septa by quadrants becomes less apparent.

In the late neanic stage (Text-fig. 1*g, h*; Pl. I, Figs 1*c-d*) the arrangement of septa becomes nearly radial and the minor septa appear. In this stage major septa show considerable dilation which almost disappears at the end of the neanic stage (Pl. I, Fig. 1d). The major septa begin to twist in the same direction.

Occurrence. — After Eichwald Hüumaa-island (specimen No. 1/1597); after Kaljo (1958a) Porkuny-horizon (F_2: Upper Ordovician) in several localities of Estonia.

Streptelasma ornata (Eichwald, 1829)

(Pl. II, Figs 2 a—b)

1829. *Turbinolia ornata* Eichw.; E. Eichwald, Zoologia specialis..., pt. I, p. 186, Pl. 3, Fig. 2.
1830. *Turbinolia ornata* Eichw.; E. Eichwald, Naturhistorische Skizze..., p. 187.
1856. *Zaphrentis ornata* Eichw.; E. Eichwald, Beitrag zur geographischen..., p. 101.
1861. *Zaphrentis ornata* Eichw.; E. Eichwald, Paleontologija Rossii, p. 131—132.

Lectotype:[1] Specimen No. 1/201, Pl. II, Figs 2a—b.

Type locality: Estonia, Kursi.

Type horizon: Raikküla (G—III) or Adavere (H) horizons of Lower Silurian, Llandovery stage.

Diagnosis. — Small trochoid *Streptelasma* with major septa extending to a half of the radius and with wide septotheca.

Material. — Six poorly preserved specimens.

Description. — The corallum is trochoid; its proximal end is usually curved while the major part of corallum is only slightly curved. The calice is inversely conical. The surface is striated by septal grooves; the epitheca, if present, is very thin.

Both major and minor septa are strongly dilated on the periphery of corallum where 1.5—2.0 mm wide septotheca is present. In the nepionic (or early neanic?) stage major septa nearly reach the centre but are not united by their axial ends. In the ephebic stage the major septa extend to one-fourth of the diameter of corallum. Minor septa on one side of the corallum equal one-half of the major septa and on the other side they are very short and do not extend inwards beyond the septotheca. The boundaries of septa consist of contiguous fibre fascides (Pl. II, Fig. 2b).

The tabulae are present, but on the material examined it is impossible to observe their shape.

[1] It is impossible to identify the specimen figured on Pl. 3, Fig. 2 in "Zoologia specialis..." with the existing specimens (Nos. 1/201—206, see Eichwald's label) referred to by Eichwald as *Zaphrentis ornata*.

The height of the lectotype is 12 mm (calice is broken off) and the maximum diameter is 9 mm. The other specimens are 9—13 mm in height and have a diameter of 8—10 mm.

Measurements (in mm):

No	Diameter	Number of major septa	Width of septotheca
1/201	7.0	19	up to 1.2
	9.5	28	up to 1.8
1/202	8.0	18	up to 1.3
1/203	10.0	25	2.1
1/204	9.0	27	—
1/205	3.1	14	0.5
	7.5	23	—
1/206	6	18	

Remarks. — *Streptelasma ornata* differs from all other representatives of the genus *Streptelasma* from the Silurian in: the absence of the axial structure, the presence of a very wide septotheca as well as in small size; this is the smallest of all the *Streptelasma* species discovered in the Ordovician and Silurian of Estonia.

Occurrence. — After Eichwald: near Talkhof (= Kursi) = Raikküla (G_{III}) or Adavere (H) horizons of Llandovery stage of Estonia.

Genus *Grewingkia* Dybowski, 1873
Grewingkia buceros (Eichwald, 1856)

1856. *Clipsiophyllum buceros*; E. Eichwald, Beitrag zur geographischen..., p. 108.
1861. *Clipsiophyllum buceros* Eichw.; E. Eichwald, Paleontologija Rossii, p. 145, Pl. 8, Fig. 17.
1961. *Streptelasma (Grewingkia) buceros* (Eichw.); Kaljo, Some additional data..., p. 54, Pl. 1, Figs 1—8, Text-fig. 2 (*cum synon.*).

Diagnosis. — *Grewingkia* with broad axial complex; during the ontogeny the thickenings of the septa disappear evenly.

Remarks. — The holotype (No. 1/241) from Eichwald's collection was sufficiently described by Kaljo (1961, pp. 54—56), who listed also all the data concerning the stratigraphic and geographic distribution of this species.

Grewingkia europaeum (Roemer, 1861)
Grewingkia europaeum hosholmensis Kaljo, 1961
(Pl. VIII, Figs 1a—c)

1830. *Turbinolia eminens*; E. Eichwald, Naturhistorische Skizze..., p. 187 (partim).
1856. *Clisiophyllum (Turbinolia) eminens* Eichw.; E. Eichwald, Beitrag zur geographische..., p. 108 (partim).

1861. *Clisiophyllum eminens* Eichw.; E. Eichwald, Paleontologija Rossii, p. 145, Pl. 8, Fig. 15, (partim).
1961. *Streptelasma (Grewingkia) europaeum hosholmensis* Kaljo; D. Kaljo, Some additional data..., p. 58, Pl. 3, Figs 1—15, Text-fig. 4.

Diagnosis. — *Grewingkia* with axial complex poorly developped; the thickenings of the septa disappear on the concave side of the corallum earlier than on the convex.

Material. — One well preserved specimen (No 1/242) with broken proximal end; the length of the broken part is about 10 mm.

Measurements (in mm):

Specimen No.	Height	Diameter	Number of major septa	Notice
1/242	60	38		in calice
		36	66	
		31	60	

Remarks. — The specimen described differs from the type specimen of these subspecies in having more strongly developed axial complex. However, Kaljo (1961, p. 59) states that one specimen referred by him to the discussed subspecies has well developed axial complex.

Occurrence. — After Eichwald: Huümaa-island. After Kaljo (*l.c.*): Upper Ordovician of Estonia.

Genus *Brachyelasma* Lang, Smith & Thomas, 1940
Brachyelasma duncani (Dybowski) 1873)
(Pl. II, Figs 3a—c, 4a—b)

1861. *Cythophyllum caespitosum* Goldf.; E. Eichwald, Paleontologija Rossii, p. 139 (partim).
1861. *Acervularia luxurians* Eichw.; *ibid.*, p. 143 (partim).
1958b. *Brachyelasma duncani* (Dybowski); D. Kaljo, Some new..., p. 104, Pl. 1, Figs 7—13 (*cum synon.*).

Diagnosis. — *Brachyelasma* with (30—40)×2 septa at the diameter of 12—18 mm; at the neanic stage there is a poor, interlacing axial complex, and at the ephebic stage septa are thin, short and slightly winding.

Material. — Two fragmentary specimens.

Measurements (in mm):

Specimen No.	Diameter	Number of septa
1/232	8	26×2
	11	29×2
1/1595	14	28×2

Occurrence. — After Eichwald: Huümaa island. After Kaljo (1958b) Pirgu horizon and Porkuny horizon (rare): both of the Upper Ordovician of Estonia.

Genus *Kenophyllum* Dybowski, 1873
Kenophyllum subcylindricum Dybowski, 1873
(Pl. II, Figs 5, 6a—b; Pl. III, Figs 1a—c, Text-fig. 2*a*—*f*)

1856. *Zaphrentis dilatata* Eichw.; E. Eichwald, Beitrag zur geographischen..., p. 101.
1856. *Zaphrentis tenuilamellata* Eichw.; *ibid.*, p. 101.
1861. *Zaphrentis dilatata* Eichw.; E. Eichwald, Paleontologija Rossii, p. 131, Pl. 8, Fig. 2.
1861. *Zaphrentis tenuilamellata* Eichw.; *ibid.*, p. 131, Pl. 8, Fig. 3.
1961. *Kenophyllum subcylindricum* Dybowski; D. Kaljo, Some additional data..., p. 60, Pl. 4, Figs 1—9, Text-fig. 5 (*cum synon.*).

Diagnosis. — See Kaljo (1958, p. 23).

Material. — Two specimens, one of them with a proximal end.

Measurements (in mm):

Specimen No.	Height	Diameter	Number of septa
1/199		1.4	3
		2.0	4
		2.6	12
		3.5	12
		4,1	14
		5.3	17
		8.2	22
		12.0	29
		15.0	31×2
	ca. 65	32.0 (max.)	
1/200		20.0	49×2
		36.0	67×2
	100	52.0 (max.)	

Remarks. — *Kenophyllum subcylindricum* was sufficiently described by Kaljo (1958a, p. 23; 1961, pp. 60—61).

Fine skeletal structure. The septa are composed only of contiguous fascicles of the thin fibres (Pl. II, Fig. 6b). The edges of septa are denticulate.

Ontogeny. — The protosepta are thin in the nepionic stage. The alar septa are not inserted simultaneously but successively (Text-fig. 2*a*, *b*). In the early neanic stage all septa are thickened and join each other over the entire length. During the successive stages of ontogeny all septa are in close contact.

Occurrence. — After Eichwald (Specimen No 1/199) "*Orthoceratites* limestone in the island Dagö (= Huümaa) near Hohenholm (= Korgessaare)". Upper Ordovician Vormsiskian horizon ($F_I b$) of Estonia.

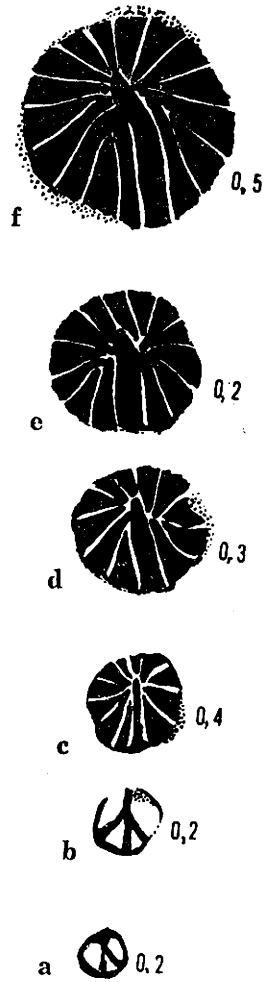


Fig. 2 — *Kenophyllum subcylindricum* Dybowski. Specimen No. 1/199: *a*, *b* nepionic stage; *c*-*f* neanic stage; × 5.

The other specimen (1/200) named by Eichwald *Zaphrentis tenuilamellata* was found according to Eichwald's description "in the coral limestones on the island Dagö near Pühhalep". On the island Huümaa near Päalepa there is the Lower Silurian Juuru-horizon (G_{II}) present. Possibly the locality of the specimen No. 1/200 was indicated erroneously because *K. subcylindricum* was described by Kaljo only from the Upper Ordovician deposits of Estonia.

Genus *Bighornia* Duncan, 1957
Bighornia orvikui Kaljo, 1960
(Pl. VIII, Fig. 2a—b)

1861. *Clisiophyllum cristatum* Eichw.; E. Eichwald, Paleontologija Rossii, p. 146, Pl. 8, Fig. 16.
1960. *Bibhornia orvikui* Kaljo; D. Kaljo, On some problems..., p. 251, Pl. 1, Figs 1—11, Text-fig. 1.

Diagnosis. — *Bighornia* with (37—50)×2 septa at the diameter of 15—20 mm, strongly thickened end of the counter septum, an elevation of septal origin in the calice, and with deep fossular depression on the concave side of the calice.

Material. — One specimen with broken lower part.

Measurements (in mm):

Specimen No.	Depth of calice	Diameter	Number of septa	Notice
1/231	7.0	20	51	in calice
		12	41	

Description. — There is a lens-shaped elevation in the calice about 2.5 mm high. The minor septa are visible only in the structure of septotheca.

Occurrence. — Upper Ordovician (? and Llandovery) of Estonia.

After Eichwald: Dagö (= Huümaa-island), Pühhalep = Juuru-horizon (Llandovery G_{II}). Possibly, the locality was erroneously indicated because *Bighornia orvikui* was described by Kaljo (1960) only from the Upper Ordovician deposits.

Family **Halliidae** Chapman, 1893
Subfamily **Lykophyllinae** Wedekind, 1893
Genus *Pycnactis* Ryder, 1926
Pycnactis aff. *mitratus* (Schlotheim, 1820)
(Pl. III, Figs 2a—d; Text-fig. 3*a*—*i*)

1830. *Turbinolia septigera* Eichw.; E. Eichwald, Naturhistorische Skizze..., p. 187.
1856. *Omphyma septigerum*; E. Eichwald, Beitrag zur geographischen..., p. 107.
1861. *Omphyma septigerum* Eichw.; E. Eichwald, Paleontologija Rossii, p. 144, Pl. 8, Fig. 12.

Material. — One specimen without proximal end.

Measurements (in mm):

Specimen No.	Length	Depth of calice	Diameter	Number of septa	Notice
1/238	34	18	19×13	42×2	in calice
			11	32×2	
			8	27×2	

Description. — The simple, trochoid corallum with an oval calice. A clearly visible fastening paunch is located on the convex side of the corallum, the dimensions of the fastening paunch are 7.0×1.5 mm.

The septa are arranged pinnately. The major septa nearly reach the center where they are slightly twisted. The cardinal septum is placed on the convex side of the corallum. It is longer, while the counter septum is shorter than other major septa. The minor septa are short, usually about one-third the length of the major ones. The septa are dilated and fused to each other laterally, except a little space in the lateral part of tabularium.

The structure of the longitudinal section is unknown because almost the entire internal space of corallum is filled by the dilated septa.

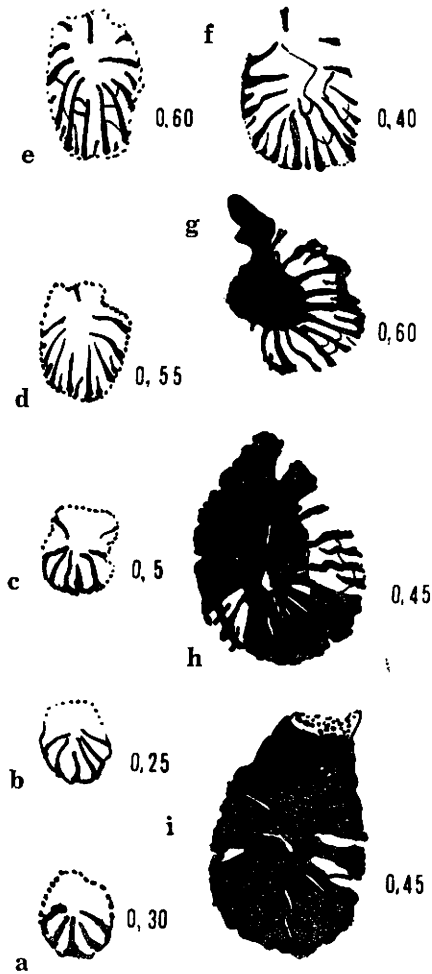


Fig. 3 — *Pycnactis* aff. *mitratus* (Schlotheim). Specimen No. 1/238: *a-c* early neanic stage; *d-f* middle neanic stage; *d, h* late neanic stage; *i* ephebic stage; × 5.

Ontogeny. — The proximal end of the corallite is not preserved. The septa are thin in the early neanic stage (Text-fig. 3*a-c*) and distinctly pinnately arranged. The counter septum is much shortened. In the middle neanic stage (Text-fig. 3*d-f*), after some minor septa appeared, the counter septum starts to lengthen. Both major and minor septa are gradually dilated; the former ones even more distinctly. In the late neanic stage (Text-fig. 3*g-i*) the specific characters were founded: the septa fused to each other, at first in the cardinal quadrants and in the centre, and then over the entire length.

Remarks. — The specimen from Eichwald's collection is nearly identical with those described by Ryder (1926, p. 386, Pl. 9, Figs 1—7). However, the retreat of the septa from the centre during the ephebic stage cannot be seen on the specimen here described. Contrary to what was noticed by Ryder (*ibid.*, p. 387, Pl. 9, Figs 6—7) — Eichwald's specimen did not reach the very late ephebic stage.

Occurrence. — Silurian of Europe. After Eichwald: "Lode on the Ösel-island" = Loode on the Saaremaa-island, Kuressaare-horizon of Ludlow (K_3a).

Genus *Phaulactis* Ryder, 1926
Phaulactis cyathophylloides Ryder, 1926
(Pl. III, Figs. 3a—b)

1861. *Cyathophyllum articulatum* Wahlenberg; E. Eichwald, Paleontologija Rossii, p. 138 (partim).
1861. *Spirorbis siluricus* Eichw.; *ibid.*, p. 191 (partim).
1926. *Phaulactis cyathophylloides* Ryder; T. A. Ryder, Pycnactis..., p. 392, Pl. 11, Figs 1—6; Pl. 12, Fig. 1.

Material. — Three satisfactorily preserved specimens.

Description. — Simple, ceratoid, slightly curved corals. The height of the most complete specimen is 55 mm, the maximum diameter is 20 mm.

The septa are of two orders, slightly flexuous. The major septa either nearly reach the centre or leave a free axial space of less than one-tenth of the diameter. In the ephebic stage the septa are either thin along the entire length or their dilation is restricted to the central part, mainly to the cardinal quadrants. The minor septa are less than one-half of the length of the major septa and may be discontinuous in the dissepimentarium. The last one extends to one-half of the radius of the corallum or a little less than that and consits of five to seven rows of small globose dissepiments. The tabulae are concave and irregular, with numerous tabellae.

Remarks. — The specimens described represent the typical *Phaulactis cyathophylloides*, but they are of the comparatively small sizes.

Occurrence. — Silurian of Europe and Asia. After Eichwald: specimen No. 1/3260 is from "Lode, Ficht" = Saaremaa-island either from Loode, Kuressaare-horizon of Ludlow (K_3a) or Kaugatuma, Kaugatuma-horizon of Downtonian (K_3b). The specimens Nos. 1/3562—63 come from the Kamenetz-Podolsk, Orynyn, = Skalian-horizon of Upper Silurian (post-Ludlow).

Phaulactis sp.

(Pl. III, Figs 4a—e; Text-fig. 4*a*—*n*)

1861. *Spirorbis siluricus* Eichw.; E. Eichwald, Paleontologija Rossii, p. 191 (partim).

Material. — One well preserved specimen.

Description. — Coral ceratoid, very slightly curved. The calice is conical and deep. This specimen exposes the change of direction of growth by nearly 90°; it took place after the coral had fallen down.

In cross-section of 12—13 mm in diameter there are 66—70 septa of two orders. The major septa nearly reach the centre (free axial space is less than one-sixth of the diameter) and are arranged pinnately. In the ephebic stage the thickening of septa is retained only in the cardinal quadrants. The minor septa are short, less than one-third as long as the major ones.

The dissepimentarium on one side of the corallite consists of a few rows of small globose dissepiments, while on the other side dissepiments are either lacking or they are largely stretched along the septotheca and not numerous. Tabulae are concave and split.

Ontogeny. — The nepionic-stage (Text-fig. 4*a*) demonstrates six protosepta connected in the centre and lacking the thickening.

In the early neanic-stage (Text-fig. 4*b*, *c*) septa are sharply thicker in the cardinal quadrants, but in the counter ones they are still thin. The tabulae and dissepiments are absent. In the middle neanic-stage (Text-fig. 4*d*-*m*) the minor septa appear simultaneously in all spaces between the major septa. The septa of counter quadrants become thicker in different moments and to a different degree, but the constant and strong dilation is localized in the cardinal quadrants. In the late neanic-stage (Text-fig. 4*n*, Pl. III, Fig. 4b-c) the thickening of the septa in counter quadrants moves off the centre sharply; in the cardinal quadrants the septa are in a close contact from the wall to the centre. The thickening moves also towards the centre in the cardinal quadrants during the ephebic stage.

Remarks. — The specimen described above is most similar to *Phaulactis cyathophylloides dzwinogrodensis* Sytova (Sytova, 1968, p. 61, Pl. 4, Fig. 2); it differs from that one in having a greater number of septa of the smaller diameter, and in having irregular dissepimentarium.

Occurrence. — After Eichwald: "Lode, Ficht" = either near Loode, Kuressaare-horizon of Ludlow (K_3a) or near Kaugatuma, Kaugatuma-horizon of Downtonian (K_3b).

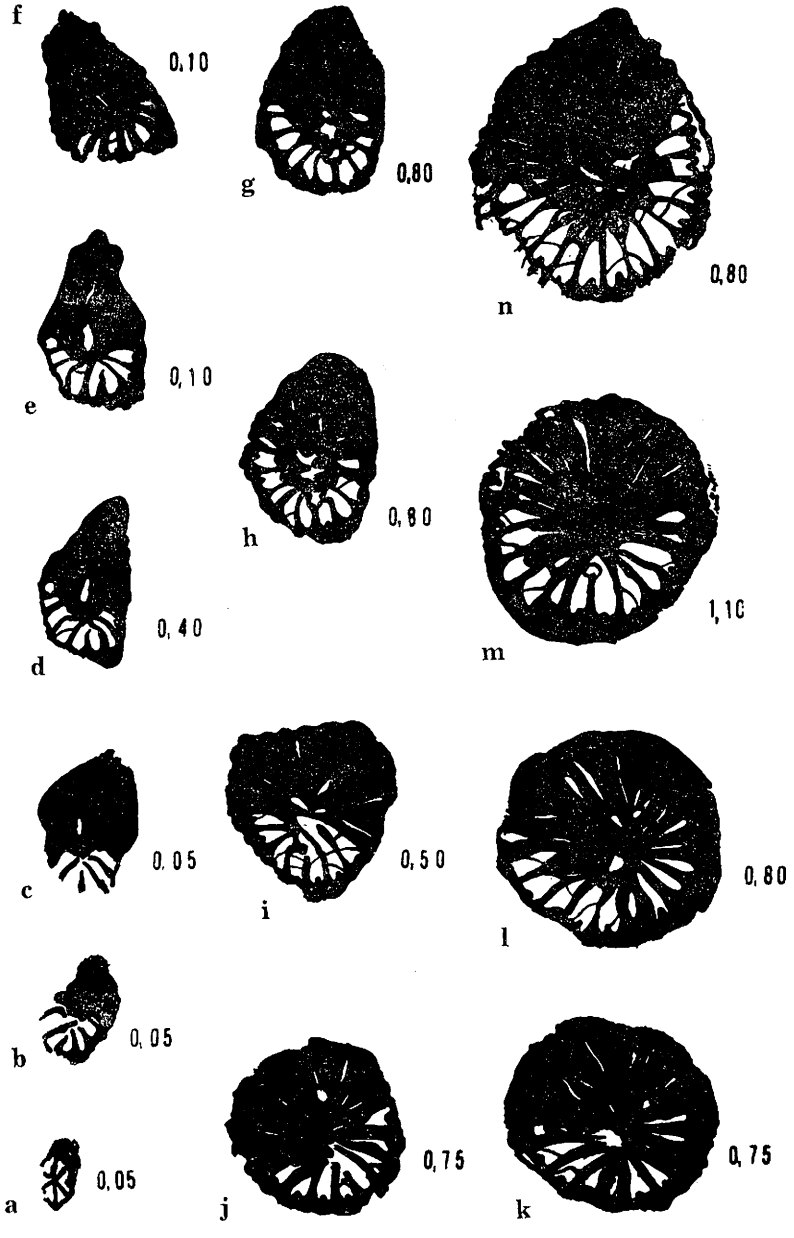


Fig. 4 — *Phaulactis* sp. Specimen No. 1/3261: a nepionic stage; *b*, *c* early neanic stage; *d*-*m* middle neanic stage; *n* late neanic stage; × 5.

Family **Arachnophyllidae** Dybowski, 1873
Subfamily **Arachnophyllinae** Dybowski, 1873
Genus *Entelophyllum* Wedekind, 1927
Entelophyllum articulatum (Wahlenberg, 1821)

(Pl. IV, Figs 1—4; Text-fig. 5)

1821. *Madreporites articulatus* Wahlenberg; Wahlenberg, p. 97.
1861. *Cyathophyllum articulatum* Wahl.; E. Eichwald, Paleontologija Rossii, p. 138.
1861. *Cyathophyllum quadrigeminum* Goldf.; *ibid.*, p. 137.
1861. *Acervularia luxurians* Eichw.; *ibid.*, p. 143 (partim).
1861. *Omphyma fastigatum* Eichw.; *ibid.*, p. 144 (partim).
1861. *Spirorbis siluricus* Eichw.; *ibid.*, p. 191 (partim).
1929. *Xylodes articulatus* (Wahlenberg); S. Smith & R. Tremberth, On the Silurian Corals..., p. 363, Pl. 7, Fig. 1—6 (*cum synon.*).
1963. *Entelophyllum articulatum* (Wahlenberg); A. B. Ivanovsky, Rugosa ordovika i silura..., p. 84, Pl. 22, Fig. 2 (*cum synon.*).

Material. — Twenty two specimens, four of them are the fragments of colonies and others are separate corallites.

Description. — The corallum is dendroid, phaceloid or phaceloid-cerioid; as a rule separate corallites are found. The phaceloid corallum consists of the slender, closely packed corallites of 7 to 12 mm in diameter, often brought in contact by the connecting processes. The phaceloid-cerioid corallum partly consists of polygonal corallites (7 mm to 15 mm along the diagonal) which are in a close contact and partly of the subcylindrical corallites which are not in contact. The colonies are formed both by lateral non-parricidal growth (Pl. IV, Fig. 1) and by peripheral parricidal growth (Pl. IV, Fig. 2). In the last case, three or four buds appear simultaneously in a calice. The septa of two orders are arranged radially. The major septa are long; they reach, or nearly reach, the centre. The minor septa are about one-half or two-thirds as long as the major ones. There are (19-26)×2 septa in corallites of 7-15 mm in diameter.

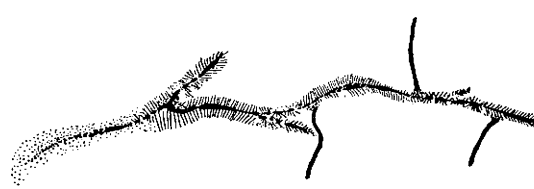


Fig. 5 — *Entelophyllum articulatum* (Wahlenberg). Specimen No. 1/1557: part of septum to show the carination, × 40.

The septa consist of thin trabeculae (0.05-0.1 mm in diameter) which are generally in a close contact; the surface of septa is smooth. In some cases, however, trabeculae may deviate from the septal plane (Text-fig. 5) and a few of the septa may have not numerous carinae.

The axial parts of tabulae are horizontally placed or distally convex with a sag at the center; periaxial parts of the tabulae are strongly inclined. There are 16-20 tabulae on 10 mm longitudinal section. The dissepimentarium consists of three to six rows of small globose dissepiments.

Occurrence. — Silurian. After Eichwald the specimens Nos. 1/1557—1561, 1/1564—1569 are indicated "Hoheneichen, Lode", = Saaremaa island, a) Pilguse (= Hoheneichen), Paadla-horizon of Ludlow (K_2); b) Loode (= Lode), Kuressaare-horizon of the same stahe (K_3a). Specimen No. 1/1602 is from Pilguse (= Hoheneichen) Paadla horizon of Ludlow (K_2). Specimens Nos. 1/1575—1576, 1/3257—3259, 1/3262 are from Loode (= = Lode), = Kuressaare-horizon of Ludlow (K_3a). Specimens Nos. 1/213, 1/1572, 1/1573, 1/1596 are from Kaugatuma, = Kaugatuma-horizon of Downtonian (K_3b).

Entelophyllum losseni (Dybowski, 1874)
(Pl. IV, Figs 5a—c; Text-fig. *F*, *G*)

1861. *Cyathophyllum articulatum* Wahl.; E. Eichwald, Paleontologija Rossii, p. 138 (partim).
1861. *Cyathophyllum flexuosum L.*; *ibid.*, p. 139 (partim).
1874. *Donacophyllum Losseni* Dyb.; W. Dybowski, Monograph..., p. 209, Pl. 4, Figs 6, 6a—b.
?1930. *Petrozium deari* (Smith); S. Smith, Some Valentian Corals..., p. 307, Pl. 26, Figs 20—28.
1958b. *Petrozium losseni* (Dybowski); D. Kaljo, Some new..., p. 114, Pl. 4, Figs 11—17.

Material — Six specimens; three of them are well preserved fragments of colonies, and others are isolated corallites.

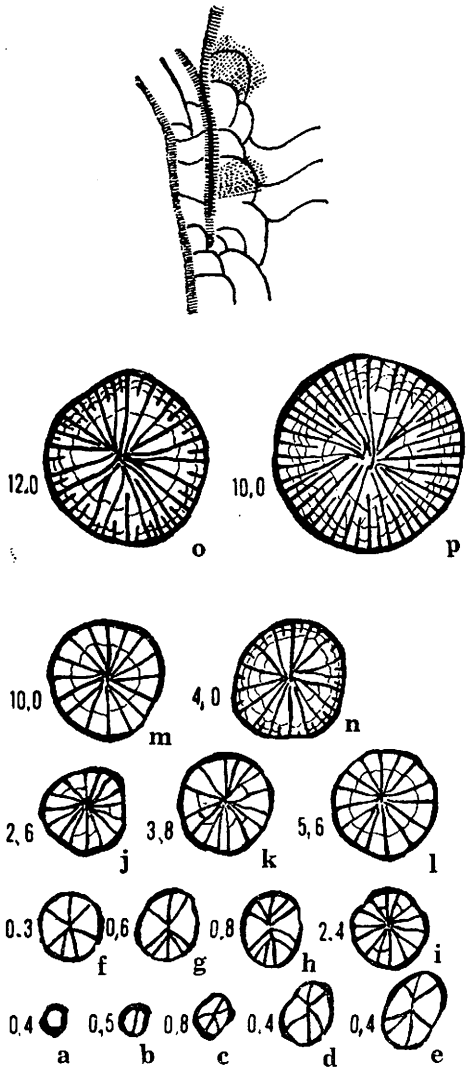
Description. — The corallum is phaceloid, the corallites are cylindrical, straight or slightly wavy; maximum length of the corallites is 12.5 cm, maximum diameter 9.5 mm, the average being 6-7 mm. The calices are bowl-shaped with steep slopes and nearly flat bottom, the average depth of calicies is about 5 mm.

The septa are arranged radially, the cardinal septum in some corallites is somewhat shorter, while the remaining protosepta do not differ from the other major septa. The major septa are long, some of them reach the centre, others are assembled in pairs or in groups of three to four at a short distance from the centre. The minor septa are about half as long as the major ones. Some of the minor septa are traced not from the wall but from the "presepiments" [2]. The septa are composed of slender trabeculae which are generally densely fused, but may deviate from septal plane to form not numerous carinae. There are 23—26 major septa in corallites of 6—8 mm in diameter.

[2] Presepiment after Schouppe-Stacul, 1966.

The tabulae are differentiated into the strongly convex series and the periaxial series of the flatter plates which slope downwards and towards the periphery. There are 12—16 tabulae over the longitudinal section of 10 mm. The dissepimentarium consists of one to three rows of small globose dissepiments, here and there the dissepiments may be absent.

Ontogeny. — The colonies are formed by a peripheral non-parricide growth (Text-fig. 6). The buds are formed cyclically over 3.5-4.00 mm of the length of corallites, nearly simultaneously in all corallites of the colony which are in the ephebic stage of growth; they arise along the



Figs. 6, 7 — *Entelophyllum losseni* (Dybowski). Specimen No. 1/217: *6* longitudinal section through a new offset; *7a-d* nepionic stage; *7e-m* neanic stage; *7n* late neanic of early ephebic stage; *7o, p* ephebic stage, × 5.

circumferential corallites of two to seven in number and the maximum number appears when the space between the corallites in colony is largest.

Nepionic stage (Text-fig. 7*a-d*). The development of this species was traced from the very beginning of growth when no septa were present. At first a joined cardinal and counter septum appears. During the subsequent development, at first two alar septa were laid down and then one of the counter-lateral septum; in this stage five protosepta were connected axially. At the end of the nepionic stage (with the all six protosepta present) the alar and counter-lateral septa are connected with the primary--axial septum but the point of their connection moves off the centre. The tabulae are nearly flat during the nepionic stage.

Neanic stage (Text-fig. 7*e-m*). The first metaseptum increases in one of the cardinal qudrants, somewhat later in the other one. The first pair of metasepta in counter quadrants is laid down when the second metaseptum appears in one of the cardinal quadrants. The zaphrentoid arrangement of septa can be observed till this stage.

Once the metasepta in the counter quadrants appeared, the arrangement of all the major septa becomes pseudoradial; the cardinal and counter septa are a little longer than other major septa; the remaining protosepta do not differ from them. The tabulae become wavy-curved.

In the late neanic (or early ephebic?) stage (Text-Fig. 7*n*) very short minor septa appear simultaneously in all spaces between major septa and at the same time the dissepiments are formed. The cardinal septum becomes shortened.

Remarks. — The specimens described above are typical for *Entelophyllum losseni* (Dybowski). *Entelophyllum dewari* (Smith), the type species of the genus *Petrozium* Smith, 1930, should be probably referred to *Entelophyllum losseni*. Kaljo (1958b, p. 115) states: "From *P. dewari* Smith the species described (*Entelophyllum losseni* — V. G.) differs in smaller size, practical absence of carination, lesser number of septa (*P. dewari* have a number of septa up to 80) and in a dissepimentarium less developed". Smith (1930) in his description of *E. dewari* indicates that there are 28—30 major septa in the corallites of 8-10 mm in diameter but the specimens figured on Pl. 26, Figs 22-24 have a diameter of 6.7-7.3 mm and 24—28 major septa. Only one specimen described by Smith has a diameter of 20 mm with 40 major septa and possibly this one is a local modification of *E. losseni*. In respect of carination (= deviation of trabeculae from septal plane) Smith states that "neither the carinae nor the stereome are strongly developed".

Occurrence. — Llandovery of Estonia and England (?). After Eichwald specimens Nos. 1/217—1/219 are from Hüumaa-island, near Pühalepa = Juuru-horizon of Llandovery stage (G_{II}). Specimens No. 1409 and 1569a are from "Lode, Ösel", = Lode on the Saaremaa island, Ku-

ressaare horizon of Ludlow (K_3a). Most likely this is an error because *P. losseni* is described by Kaljo only from the Lower Silurian. Specimen No. 1/220 is from "Fellin in the Lifljandien", = Viljandi in the South Estonia where this coral might be collected only from the erratic boulders.

Genus *Carinophyllum* Strelnikov, 1965
Carinophyllum confusum (Počta, 1902)
(Pl. V, Figs 1, 2a—b)

1829. *Turbinolia pileolus* Eichwald; E. Eichwald, Zoologia specialis..., p. 186, Pl. 3, Fig. 1.
1830. *Turbinolia pileolus* Eichw.; E. Eichwald, Naturhistorische Skizze..., p. 187.
1830. *Turbinolia gibberosa* Eich.; *ibid.*, p. 187.
1856. *Streptelasma pileolus* Eichwald; E. Eichwald, Beitrag zur geographische..., p. 106.
1856. *Pachyphyllum gibberosum* Eichw.; *ibid.*, p. 106.
1861. *Cyathophyllum pileolus* Eichw.; E. Eichwald, Paleontologija Rossii, p. 141, Pl. 8, Fig. 10.
1861. *Pachyphyllum gibberosum* Eichw.; *ibid.*, p. 145, Pl. 8, Fig. 5.
1902. *Cythophyllum confusum* Počta; P. Počta, Antozoaires et Alcyonaires..., p. 103, Pl. 99, Figs 3—11.
1940. *Xylodes confusus* (Počta); F. Prantl, Korallen gattung Xylodes..., p. 16, Pl. 3, Figs 5—6, Text-figs 11—12.

Material. — Three specimens. One of them is a small fragment of the dendroid colony, others are fragments of separate corallites.

Description. — Dendroid coral with the cylindrical, slightly wavy corallites of diameter 7 to 10 mm. The calices are bowl-shaped and shallow. The epitheca shows thin growth-wrinkles.

The septa are thick and intensively carinate in the dissepimentarium, where they nearly contact, and thin in the tabularium; the boundary between the thick and thin parts of the septa is very clear. The major septa extend to the axis, or nearly to the axis, and the minor ones terminate at the inner margin of the dissepimentarium. The number of septa ranges from 17 × 2 to 26 × 2.

A tangential longitudinal section shows a dissepimentarium composed of small globose dissepiments and the peripheral part of domed tabulae.

Remarks. — The specimens described do not differ in their internal structure from the lectotype and other typical specimens of *C. confusum*, but they are the smallest specimens known (see Prantl, 1940, p. 16—18).

Occurrence. — Upper Silurian of Bohemia and Estonia. After Eichwald the specimen 1/240 is from "Hoheneichen" = Pilguse, Paadla horizon (K_2). The specimens 1/1593, 1/2842 are from "Lode" = Lode, Kiressaare horizon (K_3a), both Ludlowian age.

Subfamily **Kyphophyllinae** Wedekind, 1937
Genus *Sclerophyllum* Reiman, 1956
Sclerophyllum sokolovi Reiman, 1956

(Pl. V, Figs 3a—b)

1861. *Cyathophyllum vermiculare* Goldf.; E. Eichwald, Paleontologija Rossii, p. 139 (partim).
1956. *Sclerophyllum sokolovi* Reiman; V. Reiman, *In:* Materialy po..., p. 38, Pl. 10, Figs 5—9, Text-fig. 4.

Diagnosis. — *Sclerophyllum* with (45—65)×2 septa at the diameter of 20—35 mm; axial complex consists of thin interweavig elements; major septa reach the axial complex and are united with each other by their axial ends; minor septa are from one-half to two-thirds as long as the major septa.

Material. — One fragmentary specimen.

Description. — A deformed fragment about 56 mm long and with a maximum cross-section of 18 × 22 mm; epitheca is disturbed. In cross-section of 18 mm diameter there are 47 major septa (all of them reaching axial complex) and a corresponding number of the minor septa; the latter are as long as two-thirds of the major septa.

Occurrence. — Upper Ordovician of Estonia. After Eichwald the specimen 1/1581 is from "Fellin in the Lifljandien" = near Viljandi. In South Estonia *S. sokolovi* is found only in the erratic boulders.

Family **Acervulariidae** Lecompte, 1952
Genus *Diplophyllum* Hall, 1851
Diplophyllum luxurians (Eichwald, 1829)

(Pl. V, Figs 4a—c)

1829. *F. luxurians* Eichw.; E. Eichwald, Zoologia specialis, V. I, p. 188, Pl. 2, Fig, 5.
1830. *F. luxurians* Eichw.; E. Eichwald, Naturhistorische Skizze..., p. 187.
1855. *Acervularia luxurians* Eichw.; M. Edwards & J. Haime, A Monograph..., p. 292, Pl. 69, Figs 2a—f.
1861. *Acervularia luxurians* Eichw.; Paleontologija Rossii, p. 143.

Lectotype[3]: specimen No. 1/234, Pl. 5, Figs 4a—c.
Type locality: Saaremaa-island.
Type horizon: unknown.

Diagnosis. — Corallum cerioid, major septa reach or nearly reach the centre; tabulae horizontal outside inner wall, inside inner wall tabulae with axial depression.

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[3] It is impossible to identify the specimen figured on the Pl. 2, Fig. 5 in "Zoologia specialis..." with one of the specimens (Nos. 1/233—235, see Eichwald's label) referred by Eichwald to *Acervularia luxurians*.

Material. — Three specimens, represented by small fragment of cerioid colonies.

Description. — A cerioid coral which consists of the polygonal (mainly hexagonal) corallites up to 6.2 mm in diagonal, the average being about 5.0 mm. The calices are bowl-shaped with depth from 1.5 to 2.5 mm; each calice has a peripheral platform corresponding to the outer zone of horizontal tabulae. Some corallites have a small elevation of septal origin on the bottom of calices.

The septa are of two orders. In the ephebic stage (the diagonal is more than 3.5 mm) all major septa reach or nearly reach the centre. In many corallites one of the protosepta may be longer than other major septa; this protoseptum crosses the inner space and other major septa may be in connection with the prominent protoseptum. In the neanic stage (the diagonal is less than 3.5 mm) the major septa end just inside the inner wall and are not easily differentiated from the minor ones.

Data on the number of major septa given in the following table concern the corallites of the ephebic stage of the development.

No.	1/233	1/234	1/235
Number of corallites studied	12	17	6
Number of major septa:			
average	11.7	11.9	12.2
observed range	8—15	9—16	9—14
Diagonal, in mm:			
average	4.85	4.9	4.9
observed range	3.6—5.9	3.5—6.2	3.7—6.0

The inner wall is formed both by septal dilation and by lateral process of septa. The thickness of inner wall is from 0.2 to 0.6 mm.

The tabulae are divided by the inner wall into outer and inner series. Outside the inner wall tabulae are subhorizontal or slightly raised towards the inner wall. The inner series consists of the convex tabulae, sometimes with a narrow axial depression. There are 16 to 20 tabulae per 10 mm of the longitudinal section. No dissepiments.

Remarks. — Most closely related to *D. luxurians* is *D. breviseptata* Weissermel (Weissermel, 1894, p. 608, Pl. 49, Figs 4, 5; Smith & Lang, 1931, p. 91, Pl. 2, Figs 15—17; Pl. 3, Fig. 4) which differs from *D. luxurians* in having septa ending just inside the inner wall.

Occurrence. — Saaremaa-island. Exact locality and horizon are unknown.

Family **Mucophyllidae** Hill, 1940
Genus *Mucophyllum* Etheridge, 1894
Mucophyllum sp.
(Pl. VIII, Figs 3a—e)

1856. *Omphyma discus* Eichw.; E. Eichwald, Beitrag zur geographischen..., p. 107.
1861. *Omphyma discus* Eichw.; E. Eichwald, Paleontologija Rossii, p. 144, Pl. 8, Figs 13a—b.

Material. — One fragment of corallite. Approximately a quarter of the corallite is preserved, the central part being complete.

Description. — Patellate coral with the radius more than 35 mm and the depth of the calice about 10 mm. The calicular platform is almost flat, wide, edges are slightly everted. On the lower surface, mainly in the central part, numerous hollow fastening rootlets up to 4.0 mm long are developed. The septa are wide (up to 1.7 mm at the outer margin and up to 0.6 mm on the inner ends); closely packed and made up of the complex rhabdacanths. The last ones are immersed in the lamellar sclerenchyme. The tabulae are complete and nearly horizontal; some of them are greatly thickened. In longitudinal section one can see the separate rhabdacanths extending from the septotheca and directed slantwise upwards.

Remarks. — This specimen is impossible to describe under a specific name because of the poor preservation.

Occurrence. — After Eichwald specimen No. 1/239 is from "Hohen-eichen" = Saaremaa-island near Pilguse, Paadla-horizon of Ludlow (K_3).

Suborder **Columnariina** Rominger, 1876
Family **Stauriidae** M.-Edwards & J. Haime, 1850
Genus *Cyathophylloides* Dybowski, 1873
Cyathophylloides kassariensis Dybowski, 1873
(Pl. VI, Figs 1a—b)

1861. *Columnaria sulcata* Goldf.; E. Eichwald, Paleontologija Rossii, p. 105.
1873. *Cyathophylloides kassariensis* Dybowski; W. Dybowski, Monographie der Zoantharia..., p. 123.
1969. *Cyathophylloides kassariensis* Dybowski; A. B. Ivanovsky, Korally semeistv..., p. 74, Pl. 5, Figs 1, 2.

Diagnosis. — *Cyathophylloides* with (20—21) septa at the diagonal of 4 mm; major septa are connected in the centre, minor septa are as long as one-half of major ones.

Material. — Single fragment of a colony measuring 80×70×100 mm, the maximal observed height of corallites equals 85 mm, maximal diameter equals 4 mm, the average one being about 3.5 mm.

Occurrence. — Lower Silurian of Estonia. After Eichwald specimen No. 1/136 is from Dagö-island near Pühlhalepgrange = near Pühalepa on the Saaremaa-island Juuru-horizon of Llandovery (G_{II}).

Genus *Columnaria* Goldfuss, 1826

Columnaria (?) *vagranensis* (Soshkina, 1949)

(Pl. VI, Fig 2a—b; Text-fig. 8)

1861. *Trypelasma aequabile* Lonsd.; E. Eichwald, Paleontologija Rossii, p. 142.
1949. *Neocolumnaria vagranensis* Sosh.; Soshkina, Devonskie korally..., p. 146, Pl. 42.

Diagnosis. — *Columnaria* (?) with (25—30)×2 septa in the corallites of 10—15 mm in diameter; major septa nearly reach the centre; septotheca comparatively wide.

Material. — One specimen represented by a fragment of non-dense dendroid colony. There are 26×2 septa in the corallite of 10 mm in diameter.

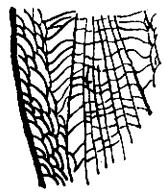


Fig. 8 — *Columnaria* (?) *vagranensis* (Soshkina). Specimen No. 1/262: longitudinal section, × 2.

Occurrence. — Ural Mts, Eifelian stage. After Eichwald, specimen No. 1/262 is found in "the limestone on the Kakva-river in the North Urals in the neighbourhood of the Bogoslovsk-works" = the region of Karpinsk, where along the rivers Kakva, Tota and Turja mainly the Middle Devonian is present.

Family **Ptenophyllidae** Wedekind, 1925

Genus *Spongophylloides* Meyer, 1881

Spongophylloides grayi (Milne-Edwards & Haime, 1855)

(Pl. VI, Fig. 3)

1855. *Cystiphyllum grayi* M. Edw. & H.; H. M. Edwards & J. Haime, A monograph..., p. 297, Pl. 72, Fig. 3.
1861. *Cystiphyllum cylindricum* Lonsd.; E. Eichwald, Paleontologija Rossii, p. 155.
1946. *Spongophylloides grayi* M. Edw. & H.; M. Różkowska, The Silurian..., p. 17, Pl. 5, Fig. 5 (*cum synon.*).

Material. — One well preserved specimen.

Description. — Simple, slightly curved trochoid coral with a height of 24 mm and diameter of calice of 17 mm. In the calice there is one large

offset, i.e. the growth increase is axial parricidal. The marginarium consists of presepiments. The width of a zone of presepiments is 1.2 mm on the convex side of the corallum and about 2.5 mm on the concave side. Presepiments are small and globose. The shape of dissepiments is irregular in cross-section. The septa begin from the presepiments. There are 57 septa in a diameter of 13 mm. The major septa reach or nearly reach the axis; their axial ends are slightly thickened. The minor septa are one-third to one-half as long as the major ones.

Longitudinal section was not made.

Occurrence. — Silurian of Europe. After Eichwald specimen No. 1/263 is from "Ösel island near Lode" = Lode on the Saaremaa-island, Kuressaare-horizon of Ludlow (K_3a).

Spongophylloides perfecta (Wedekind, 1927)
(Pl. VI, Fig. 4a—b; Text-fig, 9)

1861. *Cyathophyllum dianthus* Goldf.; E. Eichwald, Paleontologija Rossii, p. 140.
1927. *Actinocystis perfecta* Wdkd.; Wedekind, Die Zoantharia..., p. 45, Pl. 26, Figs 15—18.
1946. *Spongophylloides perfecta* Wedekind; M. Różkowska, The Silurian..., p. 18, Pl. 5, Fig. 6.

Material. — Two fragments of the upper part of corallites. The height of the larger fragment is 36 mm.

Description. — Corallum ceratoid, weakly curved with the broad growth wrinkles and faint longitudinal grooves on the surface. The calices are bowl-shaped 10 mm deep and 19 mm in diameter.

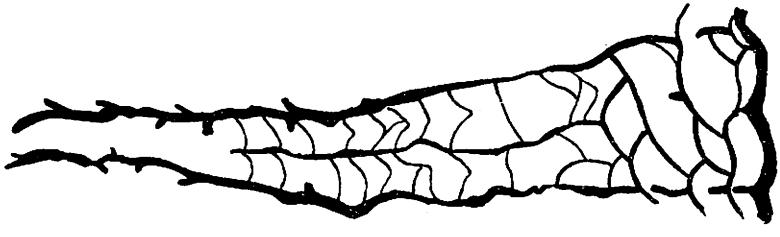


Fig. 9 — *Spongophylloides perfecta* (Wedekind). Specimen No. 1/1411: part of cross-section to show presepiments and carination, × 10.

The dissepimentarium consists of presepiments and dissepiments. The presepiments are rather homogenous, large and semisphere-like. The dissepiments have various forms mainly with lengthening in longitudinal section and with somewhat thinner wall. The tabulae are concave, split and with numerous tabellae.

The structure of septa differs within two zones. There are only major septa in the zone of presepiments. They are traced in the form of a short

piece beginning of the convex side of the presepiments. From the boundary between the zones of presepiments and dissepiments both major and minor septa are traced continuously. The major septa nearly reach the centre; they are zigzag and carinate; carinae are especially numerous in the tabularium. Two major septa cross the axial space and nearly meet at the centre; these two septa project the plane of symmetry. The minor septa extend near the boundary of dissepimentarium and tabularium. They are also zigzag but thinner than the major septa and without the carinae. There are 35×2 septa in cross-section of 16×18 mm.

Remarks. — The specimens here described differ from *Spongophylloides nikiforovae* (Bulvanker) from the Upper Silurian of Podolia (Bulvanker, 1952, p. 31, Pl. 3, Fig. 3; Sytova, 1962, Pl. 5, Fig. 3) only in their slightly larger dimensions and better developed carination. Most probably that *S. nikiforovae is* a junior synonym of *S. perfecta.*

Occurrence. — Upper Silurian of Gotland, Podolia and Estonia. After Eichwald specimens Nos. 1/1410—11 are from "Osel, Ficht" = Kaugatuma on the Saaremaa-island, Kaugatuma-horizon of Downtonian (K_3b).

Genus *Grypophyllum* Wedekind, 1922
Grypophyllum vermiculare (Goldfuss, 1826)
(Pl. VI, Figs 5a—b)

1826. *Cyathophyllum vermiculare* Goldf.; A. Goldfuss, Petrefacta..., p. 58, Pl. 17, Fig. 4.
1861. *Cyathophyllum vermiculare* Goldf.; E. Eichwald, Paleontologija Rossii, p. 139 (partim).
1961. *Acanthophyllum (Grypophyllum) vermiculare* (Goldf.); R. Birenheide, Die Acanthophyllum-Arten (Rugosa)..., p. 117, Pl. 1, Fig. 7; Pl. 6, Figs 19—21; Pl. 7, Fig. 22 (*cum synon.*).
1965. *Grypophyllum (Leptoinophyllum) vermiculare* (Goldf.); A. v. Schouppé, Die Mittel- bis..., p. 17, Pl. 1, Figs 1—4, Text-figs. 1 (*cum synon.*).

Diagnosis. — *Grypophyllum* with (30—40)×2 septa in the corallites of 25—35 mm in diameter; major septa nearly reach the centre and are twisted in the axial part; dissepimentarium consists of dissepiments and not numerous presepiments.

Material. — One specimen 55 mm long (calice and proximal end are broken off) and maximum diameter of 23 mm. There are 34 major septa of the diameter of 21 mm, nearly reaching the axis. The minor septa equal in number are about three-fourth as long as the major one. The presepiments are relatively numerous.

Remarks. — The specimen from the Eichwald's collection does not differ in its internal structure from typically developed specimens of this species, but is relatively small in size (for the measurements see Birenheide, 1961.

Occurrence. — Middle Devonian: Germany (Eifel, Bergisches Landes), Austria (Graz), England (Devonshire), USSR (Urals, Tien-Shan), Pakistan

(Kuragh). After Eichwald specimen No. 1/222 is from "Dagö, Ficht" = = Kaugatuma on the Saaremaa-island, Kaugatuma-horizon of the Downtonian (K_3b). *G. vermiculare* was never described from such an old deposit. However, Kaljo states (in letter) that: "Rugosa of *Acanthophyllum*- and *Grypophyllum*-type are really found in Kaugatuma-horizon".

Suborder **Cystiphyllina** Nicholson in Nicholson & Lydekker, 1889
Family **Tryplasmatidae** Etheridge, 1907
Genus *Tryplasma* Lonsdale, 1845
Tryplasma loveni (M.-Edwards & Haime, 1851)
(Pl. VI, Figs 6a—d; Pl. VII, Figs 1a—e; Text-fig. 10)

1830. *Trypelasma fastigata* Eichw.; E. Eichwald, Naturhistorische Skizze..., p. 187.
1854. *Cyathophyllum?* Loveni M. -Edw. & H.; H. Milne-Edwards & J. Haime, A monograph..., p. 280, Pl. 66, Fig. 2.
1856. *Omphyma fastigatum* Eichw.; E. Eichwald, Beitrag zur geographischen..., p. 107.
1861. *Cyathophyllum articulatum* Wahl.; E. Eichwald, Paleontologija Rossii, p. 138 (partim).
1861. *Omphyma fastigatum* Eichw.; *ibid.*, p. 144, Pl. 8, Fig. 11, (partim).
1882. *Pholidophyllum loveni* Edw. & H.; G. Koch, Mitteilung über die Struktur..., p. 216, Pl. 1 (43), Figs 4—22.
1936. *Tryplasma loveni* (Edw. & H.); D. Hill, The British Silurian Rugose..., p. 206, Pl. 30, Figs 46—47, Text-figs 24, 32.
1969. *Tryplasma loveni* (Edw. & H.); A. B. Ivanovsky, Korally semeistv..., p. 38, Pl. 5, Figs 3—5; Pl. 6, Figs 1—5, Text-fig. 4.

Fig. 10 — *Tryplasma loveni* (M.-Edwards & Haime). Specimen No. 1/1570; part of cross section to show the fine structure, × 45.

Diagnosis. — See Hill, 1936, p. 206.
Material. — Six specimens.
Measurements (in mm):

No.	Height of coral-lites	Maxi-mum diameter	Diameter and number of major septa		Number of tabul-lae*)	Angle between stereo-zone and trabe-culae	Diameter of trabeculae
			diam-eter	Number of major septa			
1/236	19	14	7.5	26	—	—	up to 0.35
			13.0	29	—	—	up to 0.4
			14.0	29	—	—	—
			—	—	11/10	75°	—
1/237	18	9.5	7.5	27	—	—	up to 0.35
			8.0	27	—	—	up to 0.35
1/1600	19	10.5	8.0	26	—	—	—
			10.0	29	—	—	up to 0.4
1/1570	35	14.5	10.5	30	—	—	up to 0.5
			14.0	35	—	—	up to 0.5
			—	—	6/5	60—80°	—
1/1571	—	14	13.5	34	—	—	up to 0.5
1/1574	~16	11	7.5	30	—	—	up to 0.4

*) Numerator — number of tabulae, denominator — length of longitudinal section, mm

Occurrence. — Silurian. After Eichwald specimens Nos. 1/1570—71, 1/1574 are from "Ösel, Ficht" = Kaugatuma on the Saaremaa-island, Kaugatuma-horizon of Downtonian (K_3b). Specimens Nos. 1/236—237, 1/1600 are from "Hoheneichen Ficht" = Saaremaa-island near Pilguse (= Hoheneichen), Paadla-horizon of Ludlow (K_2).

Family **Cystiphyllidae** M.-Edwards & J. Haime, 1850

Genus *Microplasma* Dybowski, 1873

Microplasma impunctum (Lonsdale, 1845)

(Pl. VII, Figs 2a—e)

1845. *Cystiphyllum impunctum* Lonsd.; W. Lonsdale, Description of some..., p. 615.
1861. *Cystiphyllum impunctum* Lonsd.; E. Eichwald, Paleontologija Rossii..., p. 155.

1875. *Microplasma impunctum* Lonsd.; W. Dybowski, Beitrag zur Kenntnis..., p. 3—3 (*cum synon.*).

Material. — Two specimens. One of them is a large fragment of the phaceloid colony, and the other is a separate corallite.

Description. — Large phaceloid colony consisting of the wavy, densely adjoined cylindrical corallites with diameter up to 22 mm, commonly 16-18 mm.

The septa are made up of holocanths and are developed to the various degrees in the corallites of the same colony. They may form a continuous septotheca up to 2 mm wide (Pl. VII, Fig. 2a), and also may look like teeth with the length of 0.6—0.8 mm either along the entire wall (Pl. VII, Fig 26) or from one side of the wall (Pl. VII, Fig. 2c). On the presepiments there are the holacants up to 1.0 mm long which are the continuations of the septa.

The dissepimentarium consists of presepiments and dissepiments. The presepiments are large and mainly of a right roundish shape; short holacants extend off the rounded surface of the presepiments. The dissepiments take up the interseptal position and one can see them in cross-section in the shape of the straight or irregular wavy lines.

In longitudinal section the differentiation of dissepimentarium is less distinct. Presepiments may be easily distinguished only when the holacants move away aslant upwards inside from the surface. Whole central part is filled by the tabellae having flat sloping form.

Remarks. — In Eichwald's collection there are typical *M. impunctum*, the specimens described were collected from the same locality as the holotype.

Occurrence. — Lower Devonian and possibly Upper Silurian of the Ural Mts. After Eichwald specimens Nos 1/259—260 are from "Near Bogoslovks in the North Urals near the Petropavlovsk-pond" = near Severourals, lower and middle parts of Petropavlovsk-Formation.

Genus *Gukoviphyllum* Sytova, 1968
Gukoviphyllum septatum (Bulvanker, 1952)
(Pl. VI, Figs 7a—b)

1861. *Aulopora repens* Knorr & Walch.; E. Eichwald, Paleontologija Rossii, p. 126 (partim).
1952. *Holmophyllum septatum* Bulv.; E. Z. Bulvanker, Korally Rugosa..., p. 13, Pl. 4, Figs 2a—b.
1968. *Gukoviphyllum septatum* (Bulv.); V. A. Sytova, Tetracorally skalskogo..., p. 54, Pl. 1, Fig. 5 (*cum synon.*).

Diagnosis. — See Sytova, 1968, p. 54

Material. — One well preserved specimen.

Occurrence. — Upper Silurian of Podolia and Estonia. After Eichwald specimen No. 1/1550 is from "Ösel, Ficht", = Kaugatuma on the Saaremaa-island, Kaugatuma-horizon (K_3b).

INCERTAE SEDIS

Genus *Zelophyllum* Wedekind, 1927

Zelophyllum (?) sp.

(Pl. VIII, Fig. 3)

1861. *Trypelasma aequabile* Lonsd.; E. Eichwald, Paleontologija Rossii, p. 142 (partim).

Material. — One fragment of a cylindrical corallite 20 mm high and 22 mm in diameter.

Description. — The short septa form the septotheca which is up to 1.5 wide. Three-cornered and rounded millcogs up to 0.5 mm long are traced inside the septotheca. The boundaries between the septa in the septotheca are not clear. The fine skeletal structure of the septa is characterized by the presence of the middle line; the fibres (?) which make up the septa are arranged pinnately towards the middle line.

Remarks. — Wedekind (1927, p. 34) did not describe the fine structure of septa of the genus *Zelophyllum*. Therefore the specimen is referred to the genus *Zelophyllum* on a basis of resemblance of the fine skeletal structure described and figured by Wang (1950, p. 228, Pl. 8, Figs 68—69).

Occurrence. — After Eichwald specimen No. 1/283) is from "Bogoslovsk". Near Karpinsk (= Bogoslovsk) along the rivers Kakva, Tota and Tura mainly Middle Devonian deposits are exposed, but there is also Lower Devonian developed.

PART II

CARBONIFEROUS AND PERMIAN RUGOSE CORALS

Order **Rugosa** M. -Edwards & Haime, 1850

Suborder **Streptelasmatina** Wedekind, 1927

Superfamily **Lindstroemiicae** Počta, 1902

Family **Amplexocariniidae** Soshkina, 1941 emend. Różkowska, 1969

Remarks. — Scrutton (1971) suggests to include the family Amplexocariniidae to the synonymy of the Lindstroemiidae. The present writer is, however, convinced about the correctness of his former standpoint

(Fedorowski, 1965) concerning the taxonomic rank of the aulos in the systematics of this group of corals and continues to use the name Amplexocariniidae.

Genus *Amplexocarinia* Soshkina, 1928
Amplexocarinia alternans (Eichwald, 1856)
(Pl. IX, Fig. 4)

1856. *Amplexus alternans* Eichwald; E. Eichwald, Beitrag zur..., p. 102.
1861. *Amplexus alternans* Eichwald; E. Eichwald, Paleontologija Rossii, p. 133.

Lectotype: Specimen No 1/208; Pl. IX, Fig. 4.
Type locality: Sterlitamak Hill.
Type stratum: Lower Permian, Sakmarian and Artinskian Stages.

Diagnosis. — *Amplexocarinia* with an index of septa of 18:6; the length of major septa equalling about one-third of the radius; minor septa well-developed.

Material. — One specimen (No 1/20), not separated from the rock.

Description. — Major septa straight or, in the axial part, slightly bent, reaching the aulos. Minor septa on the whole well-developed, varying in length, between some of the major septa they may be subject to considerable shortening. Tabulotheca occupying about or more than two-thirds of the diameter of corallite.

Remarks. — In the ratio of the number of septa to the diameter of corallite (n/d), this species is most similar to *A. heimei* Heritsch (*sensu* Soshkina, 1941), from which it differs in the occurrence of minor septa. A similar n/d ratio is also recorded in *A. muralis*, which differs in longer major septa and a merely incipient development of minor septa at the end of the ephebic stage. Somewhat similar *A. smithi* Heritsch and *A. ruzhentsevi* Soshkina are considerably larger.

Occurrence. — After Eichwald: Upper limestone near Sterlitamak = = S. Ural Mts, Sterlitamak Region, Lower Permian, Sakmarian-Artinskian.

Superfamily **Aulophyllicae** Dybowski, 1873
Family **Aulophyllidae** Dybowski, 1873
Subfamily **Aulophyllinae** Dybowski, 1873
Genus *Aulophyllum* M.- Edwards & Haime, 1850
Aulophyllum fungites (Fleming, 1828)
(Pl. IX, Fig. 5)

1861. *Aulophyllum inflexum* Eichwald; E. Eichwald, Paleontologija Rossii, p. 147, Pl. 8, Fig. 14a, b.
1971. *Aulophyllum fungites* (Fleming); J. Fedorowski, Aulophyllidae..., pp. 24—26, Text-fig. 5, Pl. 1, Figs 1—5 (cum synon.).

Diagnosis. — See Hill, 1938—1941, p. 82.

Material. — One specimen (No 1/245) with an index of septa of 57:27.

Remarks. — Eichwald's specimen differs neither in morphological nor measurable characters from typically developed British specimens and from the holotype. Other remarks — see Fedorowski, 1971, pp. 25 and 26.

Occurrence. — After Eichwald: near Aleksin and Mjatshkov = Lower Carboniferous, Viséan.

Subfamily **Clisiophyllinae** Nicholson & Thomson, 1883
Genus *Clisiophyllum* M'Coy, 1849
Clisophyllum subturbinatum Eichwald, 1861
(Pl. IX, Fig. 6, Text-fig. 11)

1861. *Clisiophyllum subturbinatum* Eichwald; E. Eichwald, Paleontologija Rossii, p. 147.

Lectotype: Specimen No 1/244; Pl. IX, Fig. 6; Text-fig. 11*a*—*c*.
Type locality: Aleksin City.
Type stratum: Viséan.

Diagnosis. — *Clisiophyllum* with (62—64)×2 septa and 32—34 mm in diameter; axial structure of *C. keyserlingi* type occupies more than 1/2 of corallite diameter; minor septa shortened; dissepimentarium narrow, with dissepiments mostly rectangular.

Material. — An almost complete specimen (No 1/244) with a preserved calice, lacking only the ontogenetically youngest part of the proximal end.

Description. — Transverse section (Pl. IX, Fig. 6*a*; Text-fig. 11*c*). Major septa complete, straight, not longer than a half of the radius, in cardinal quadrants thickened in tabularium. Cardinal septum markedly shortened. Cardinal fossula open, depressed down to a half of dissepimentarium. Counter septum indistinguishable. Minor septa very thin, shortened, locally interrupted or almost completely reduced, not entering deeper than to two-thirds of the width of dissepimentarium. Axial structure occupying more than a half of the diameter of corallite. It consists of: (1) a very slightly thickened columella, almost to the end of ontogeny connected by means of a very thin lamella with cardinal septum; (2) septal lamellae numbering 38 to 42, that is, always more than a half of the number of major septa, slightly arcuate and arranged to form a loosely coiled spiral; (3) many, fine axial tabellae. Dissepimentarium composed mostly of rectangular and less frequently irregular dissepiments. Herringbone dissepiments are non-typically developed over some of shortened minor septa, while flat, more frequent, dissepiments are arranged obliquely.

Longitudinal section (Pl. IX, Fig. 6*b*). Dissepiments plano-convex, near the internal wall arranged vertically. The peripheral area of tabularium very narrow, composed of vesicular tabellae ascending towards columella and frequently turning directly into the tabellae of axial structure. The last-named are usually fine, plano-convex and arranged semicircularly. The border of axial structure is indistinct.

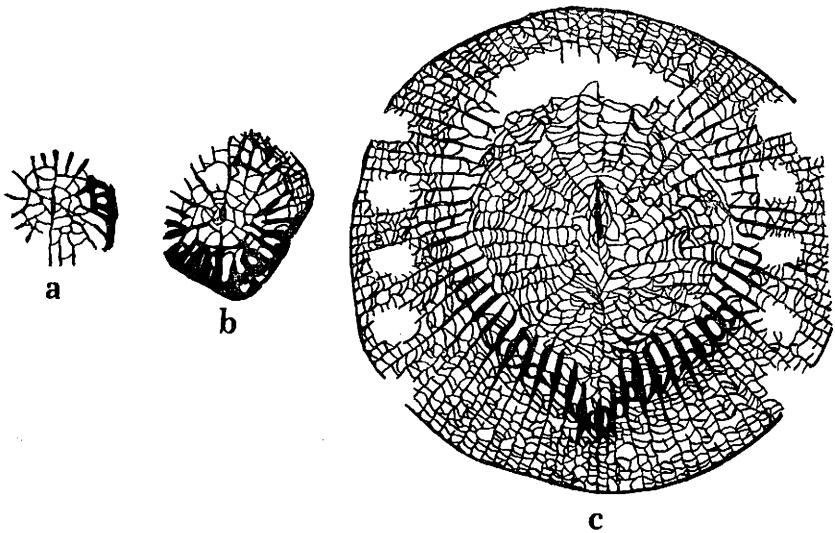


Fig. 11 — *Clisiophyllum subturbinatum* Eichwald. Specimen No. 1/244: lectotype, Aleksin City, Viséan: *a*, *b* successive transverse sections of the neanic stage, × 3; *c* transverse section of the late ephebic stage, in counetr quadrants a part of calice is visible, × 2.

Ontogeny — (Text-fig. 11*a*, *b*). Development typical of the genus. Cardinal and counter septa, connected axially, form a biseptal columella contacted by the axial ends of a few and later a dozen or so metasepta. Together with tabellae which connect them they form the axial structure. Dissepimentarium appears early in ontogeny.

Remarks. — The species belongs to the group *C. keyserlingi*, but Eichwald's specimen cannot be identified with it even upon adopting a very wide range of ontogenetic variability determined for this species by Hill (1938—1941). Eichwald's specimen differs from the holotype of *C. keyserlingi* in: (1) a very wide axial structure, (2) a slightly thickened columella, which almost to the end of ontogeny is connected with cardinal septum, (3) shortened minor septa and (4) a larger number of septa with an identical diameter. Some of these characters, e.g. the shortening of minor septa, may develop in certain specimens included by Hill (*l.c.*) in *C. keyserlingi*. A certain similarity is also displayed by *C. neaversoni* Fedorowski whose minor septa are shortened, but it differs mostly in the width of axial structure.

Occurrence. — After Eichwald: near Aleksin City = Lower Carboniferous, Viséan.

Genus *Dibunophyllum* Thomson & Nicholson, 1876
Dibunophyllum pachyseptatum n.sp.
(Pl. IX, Figs 1 and 2; Text-fig. 12)

Holotype: Specimen No 1/197; Pl. IX, Fig. 2; Text-fig. 12*d*.
Type locality: Aleksin City.
Type stratum: Visean.
Derivation of the name: Lat. *pachyseptatum* — after stout septa.

Diagnosis. — *Dibunophyllum* with (58 to 65)×2 septa and 42 to 50 mm in diameter; columella disappearing in the ephebic stage; minor septa strongly shortened; cardinal fossula considerably sunk into dissepimentarium; a thick deposit of stereoplasma on tabular parts of major septa.

Material. — Two solitary corallites, Nos 1/197 and 1/198, with a well preserved inner structure and incomplete proximal ends.

Dimensions (in mm):

No	Number of septa	Corallite diameter
1/197	58	44×50
1/198	61	42×44
1/198	65	35×48

Description. — Transverse section (Pl. IV, Figs 1*b* and 2*a*, *b*; Text-fig. 12*d*). Major septa complete, long, in tabularium conspicuously and equally thickened in all quadrants and forming a distinctly outlined ring. Cardinal septum very strongly thickened, not reaching the internal border of dissepimentarium. Cardinal fossulla deeply incising dissepimentarium. Minor septa mostly do not enter deeper than into the first vertical of dissepiments and frequently even do not pierce it. Between some of major septa, minor septa are strongly reduced. Axial structure occupies somewhat less than a quarter of the diameter of corallite. Columella reduced in the ephebic stage. Septal lamellae few (10 to 14), mostly radially arranged. Axial tabellae more regular and closely spaced in the marginal part of axial structure. Dissepimentarium wide, less compact in the marginal part. It mostly consists of rectangular and irregular dissepiments, flat herringbone dissepiments occurring only near the inner wall where they are visible, however, not in all spaces between major septa.

Longitudinal section (Pl. IX, Fig. 1*a*; Text-fig. 12*c*). Dissepiments plano-convex, large, arranged steeply and near tabularium vertically. Internal row thickened. Peripheral tabellae vesicular or flat, very slightly ascending towards the axial structure and variously spaced. In the axial

structure, steeply arranged tabellae are more vesicular in the marginal part, becoming flat towards the center and concave in the axis of corallite. They may ascend in a tentlike manner close to the sections of lamellae. In the stage under study, columella does not already occur, vertical elements visible in the illustration being sections of lamellae.

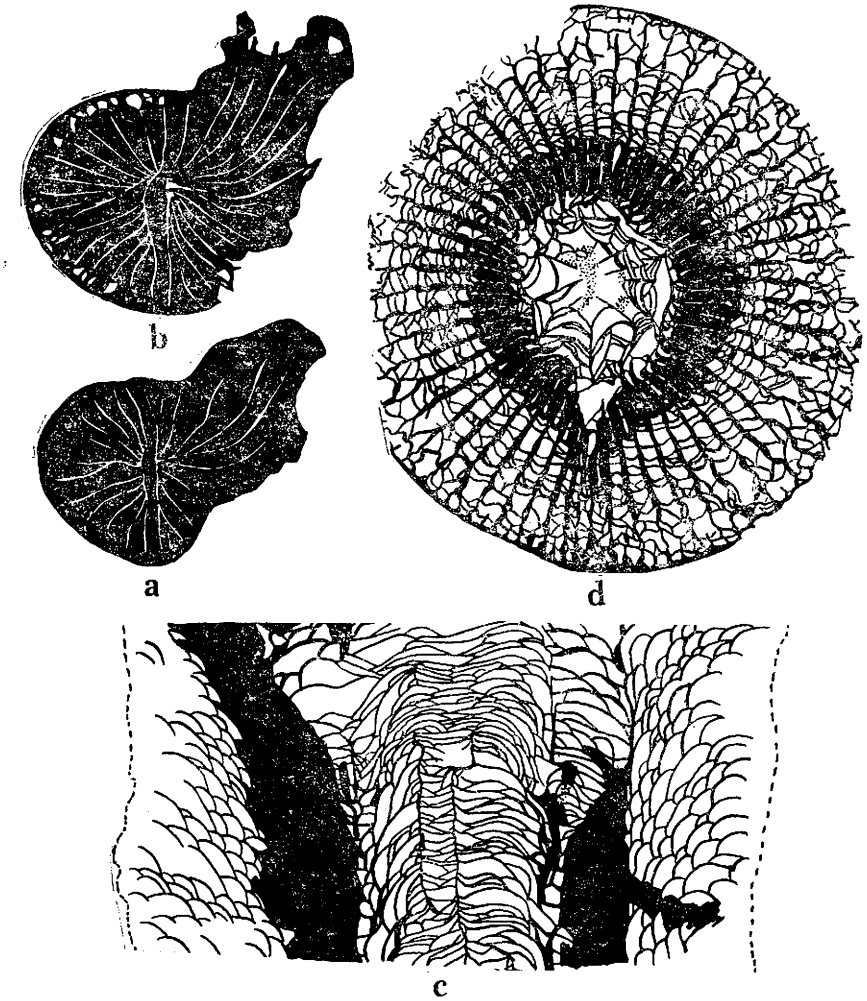


Fig. 12 — *Dibunophyllum pachyseptatum* n.sp. *a*, *b* specimen No. 1/198, Aleksin City, Viséan: successive transverse sections of the neanic stage, × 3; *c* the same specimen, longitudinal section, × 2; *d* specimen No. 1/197, holotype, the same locality and age: transverse section of the ephebic stage, × 2.

Ontogeny — (Text-fig. 12*a*, *b*). The youngest development stage studied with septal indexes of 23:9 and 32:11 (diameters measured in a cardinal-counter septum plane, with talon not taken into account) are marked by a clearly visible, zaphrentoid arrangement of major septa, their thick-

ness uncommon in the genus *Dibunophyllum* and cardinal and counter septa connected to form a biseptal columella, which is not separated distinctly. The development of dissepimentarium and appearance of minor septa takes place normally from counter towards cardinal septum. A permanent thickening of septa in tabularium from the beginning to the end of ontogeny is a specific character. New structural elements, appearing with the growth in the marginal part of corallite are from the beginning devoid of the deposit of stereoplasm.

Remarks. — Eichwald's specimens are similar to *D. bipartitum craigianum* in the lack of columella in the ephebic stage and in shortened minor septa. On the other hand, they differ in: (1) very strongly thickened septa in younger ontogenetic stages; (2) tabular parts of septa very strongly and uniformly thickened in all quadrants; (3) an almost complete lack of herringbone dissepiments and development of large dissepiments in the peripheral part; (4) strongly shortened minor septa; (5) a ratio of the number of septa to the diameter of corallite (considerably larger dimensions with an approximately the same number of septa); (6) a narrower axial structure; (7) a very deep cardinal fossula. In the author's opinion, the differences mentioned above are quite sufficient for recognizing the specific separateness of Eichwald's specimens, even taking into account an unusually wide range of the ontogenetic variability observed in this group of corals.

Another similar species is *D. fomitshevi* Vassiljuk, which is also marked by major septa thickened in tabularium, very large dimensions and shortened minor septa. The last-named species has, however, a columella distinct up to the end of the ontogenetic development and strong herringbone dissepiments. Both probably belong to one and the same group of species.

Occurrence. — After Eichwald: near Aleksin City = Lower Carboniferous, Viséan.

Dibunophyllum percrassum Gorsky, 1951
(Pl. IX, Fig. 3)

1861. *Clisiophyllum repandum* Eichwald; E. Eichwald, Paleontologija Rossii, p. 146.
1970. *Dibunophyllum volgense* Dobroljubova; T. A. Dobroljubova, Novye odinočnye..., p. 127, Pl. 45, Fig. 2.
1971. *Dibunophyllum percrassum* Gorsky; J. Fedorowski, Aulophyllidae..., p. 74, 75, Text-fig. 28, Pl. 7, Figs. 1, 2; Pl. 17, Fig. 4; Pl. 18, Figs 1, 2 (cum synon.).

Diagnosis. — See Fedorowski, 1971, p. 74.

Material. — Specimen No 1/243 with a very well preserved calice. Its longitudinal section has mistakenly been made parallel to columella.

Remarks. — Eichwald's specimen is most similar to the representatives of this species from the Donets Basin and Poland whose structural ele-

ments are only slightly thickened. The author believes that *D. volgense* Dobroljubova, separated mostly on the basis of small differences in the thickening of the structural elements, should be included in the synonymy of *D. percrassum*. The remaining remarks concerning the species see Fedorowski, 1971, pp. 74 and 75.

Occurrence. — Novaja Zemlja, Upper Viséan — Lower Namurian; Donets Basin, Lower Namurian; Moscow Basin, Mikhailov and Serpukhov Stage. After Eichwald:: Borovitshi City = Oka Stage, Upper Viséan. Poland: Upper Viséan D_2 (top).

Genus *Corwenia* Smith & Ryder, 1926
Corwenia eichwaldi n.sp.
(Pl. X, Fig. 4; Text-fig 13, 14)

1861. *Lithostrotion affine* Fleming; E. Eichwald, Paleontologija Rossii, p. 151.
1958. *Corwenia vaga* Smith & Ryder; T. A. Dobroljubova, Nižnekamennougolnye kolonialnye..., pp. 119—122, Pl. 15, Fig. 12.

Holotype: Specimen No 1/252; Pl. X, Fig. 4*a*, *b*; Text-Figs 13 and 14.
Type locality: Borovitshi City.
Type stratum: Oka Stage, Upper Viséan.
Derivation of the name: In honour of Edouard von Eichwald.

Diagnosis. — *Corwenia* with (33 to 38)×2 septa and 9 to 15 mm in diameter; axial structure mostly of the *Lithostrotion* type; minor septa long, sometimes entering tabularium.

Material. — A fragmentary phaceloid colony. Corallites oval or round, closely spaced, mostly silicified and recrystallized. Dimensions shown in Text-fig. 14.

Remarks. — The specimens described by Dobroljubova (1958) do not belong, in the present author's opinion, to *C. vaga* Smith & Ryder since they have long minor septa, a differently formed and fine-vesicular dissepimentarium, major septa mostly thickened in tabularium and an elongate columella which is provided with a long lamella on the side of cardinal septum. The ratio of the number of septa to the diameter of corallites is also different. Eichwald's and Dobroljubova's specimens are marked by a considerably higher rate of the growth of septa in younger stages of ontogeny. They are related to *C. vaga* only in a similar ratio of the number of septa to the diameter of corallites in some of the adult specimens. The fact that the specimens from Russia occur in a higher geological horizon than those from Great Britain is of a certain importance to underscore the separateness of the species.

The species under study is fairly extensively treated by the present author, in particular in regard to the index of septa. On the one hand, he is induced to do so by the fact that the number of so far described colonies of this species is very low (four specimens only) and, on the

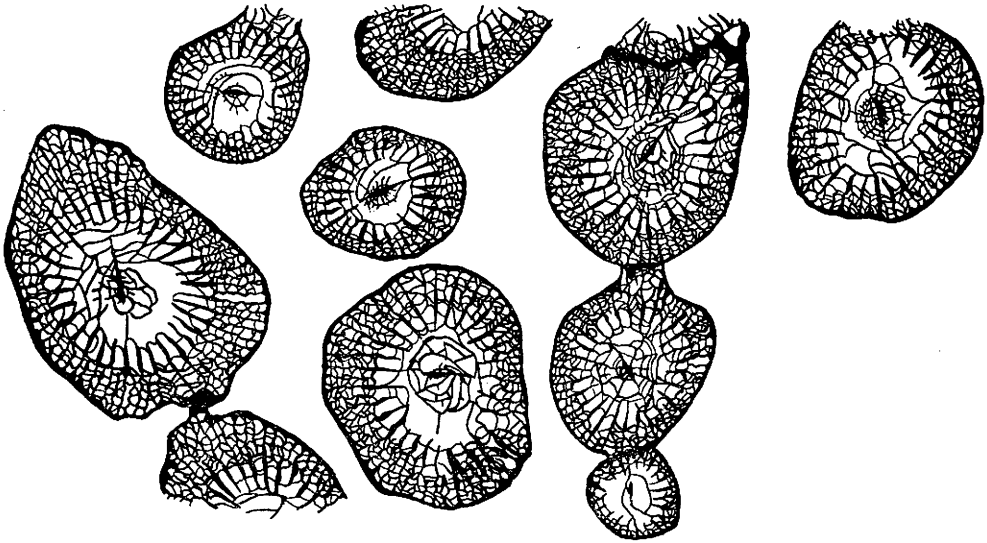


Fig. 13. — *Corwenia eichwaldi* n.sp. Specimen No. 1/252, holotype, Borovitshi City, Oka Stage, Upper Viséan: transverse section, × 3.

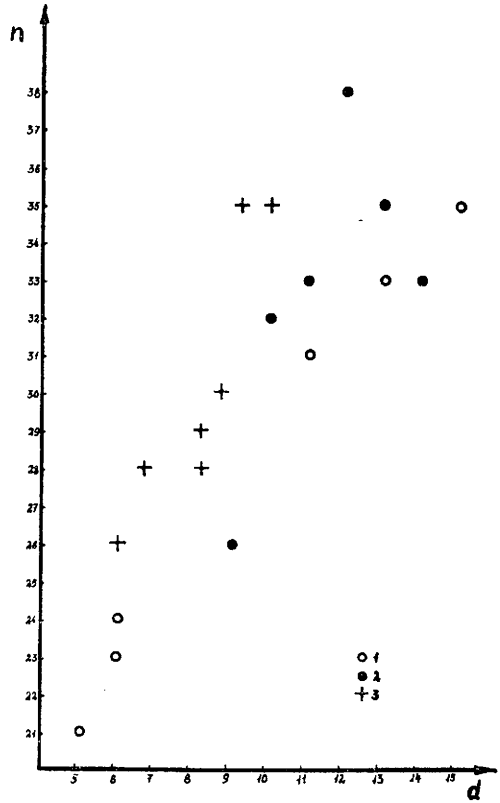


Fig. 14 — *Corwenia eichwaldi* n.sp. Relationship of number of major septa (n) to corallite diameter (d); 1 corallites measured by Dobroljubova 1958, p. 120; 2 other corallites of Dobroljubova's specimen (*l.c.*, Pl. XV, Fig. 2) measured by the present writer; 3 corallites of holotype.

other, by a very wide dispersion of points corresponding to particular corallites in the diagram (Text-fig. 14). In addition, he has measured some of the corallites, illustrated by Dobroljubova (*l.c.*, Pl. 15, Fig. 2*a*), but not listed by her in the table (*l.c.*, p. 120). This allows him to state that the range of the species may be extended, with such a scarce material, proportionally to the number of the specimens measured and, therefore, this character remains indeterminate. Eichwald's specimens are among fine and multi-septal representatives of the species. Some of them have an excellently developed, dibunophylloid structure, some others — only a columella, as in *Lithostrotion*. The simple structure of the axial part predominates in particular in very young specimens.

Occurrence. — Moscow Basin, NW part, beds b and c, Upper Viséan. After Eichwald: Borovitschi City = Oka Stage, Upper Viséan.

Family **Lophophyllidae** Grabau, 1928, emend.
(Type genus: *Lophophyllum* M.-Edw. & Haime, 1850, emend. Lecompte, 1955)

Genera assigned: Lophophyllum M.-Edwards & Haime, 1850.
Stratigraphic and geographical range. — Lower Carboniferous, Europe.

Diagnosis. — Solitary corallites without dissepiments; columella strongly developed, biseptal; zaphrentoid system of septa observed up to the end of ontogeny; cardinal septum shortened at the end of development.

Remarks. — The family Lophophyllidae had been erected by Grabau to include various, mutually unrelated genera, which later were mostly assigned to the family Lophophyllidiidae Moore & Jeffords, 1945. Grabau (*l.c.*) does not determine a type genus, but mentions *Lophophyllum* M. -Edward. & Haime, 1850, from which he derives the name of the family as the first genus among other genera included in this family. This author excludes from *Lophophyllum* a group of species related to *Cyathaxonia prolifera* McChesney for which he suggests a name of *Lophophyllidium*, generally accepted later. He believed that the name *Lophophyllum* should include only the species related to *Cyathaxonia tortuosa* Michelin, 1846, emend. Carruthers, 1913, that is, provided (according to Carruthers) with a dissepimentarium. Revising the genera *Lophophyllum* and *Cyathaxonia*, Carruthers (*l.c.*) had not found in museums the holotypes of *L. konincki* M. -Edw. & H and *C. tortuosa* Michelin and, conseqently, he recognized their conspecifity only on the basis of topotypes. A similar revision of these genera was performed by Lecompte (1955). On the basis of original specimens of *L. konincki* M. -Edw. & Haime (without dissepiments) he found and those assigned by Koninck to *Lophophyllum tortuosum* Michelin (with dissepiments) he showed the specific separateness of these species. In the present author's opinion, this

separateness is much more significant and reaches at least the level of family. At the same time, he believes that the name of the family Lophophyllidae Grabau, 1928, should be maintained since it is based on the generic name then in force (Intern. Code of Zool. Nomen. Art. 11e). The range of this family is, however, quite different and much less extensive than that ascribed to it by Grabau (*l.c.*) and does not include species having dissepiments.

The separate character of genera *Lophophyllum* M. -Edwards & Haime, 1850, emend. Lecompte, 1955 and *Lophophyllidium* Grabau, 1928 results primarily from: (1) a biseptal origin of columella, which in younger development stages is more closely related with the cardinal than counter septum, (2) a zaphrentoid arrangement of major septa and (3) a structure of cardinal fossula. At the same time, these features are quite sufficient for separating the genus *Lophophyllum* from the family Lophophyllidiidae.

From *Koninckophyllum,* which in the present author's opinion includes "*Cyathaxonia*" *tortuosa* Michelin, 1846, this genus differs primarily in the lack of dissepiments. This character excludes it at the same time from the family Aulophyllidae.

The accurate study of the ontogeny of *Lophophyllum* and *Cravenia* Hudson, 1928, may allow one to include also the latter genus to the family Lophophyllidae and simultaneously to solve the problem of the assignment to the superfamily which in the present author's opinion is uncertain.

Genus *Lophophyllum* M.-Edw. & H., 1850, emend. Lecompte, 1955

(Type species: *L. konincki* M.-Edw. & H., 1850)

Diagnosis, stratigraphic and geographical range — as for the family.

Lophophyllum rosula (Eichwald, 1856)
(Pl. X, Fig. 1; Text.-fig. 15)

1856. *Menophyllum rosula* Eichwald; E. Eichwald, Beitrag zur..., p. 103.
1861. *Menophyllum rosula* Eichwald; E. Eichwald, Paleontologija Rossii, p. 136, Pl. 8, Fig. 8a, b.

Lectotype: Specimen No 1/214; Pl. X, Fig. 1*a*, *b*; Text-fig. 15*a*—*c*.
Type locality: Aleksin City.
Type stratum: Viséan, probably Aleksin Stage.

Diagnosis. — *Lophophyllum* with a calice 14 mm in diameter and 45 septa arranged zaphrentoidally up to the end of ontogeny; cardinal fossula strongly depressed; cardinal septum shortened; minor septa very short or lacking.

Material. — A corallite with a well preserved calice. Part of proximal end youngest ontogenetically and epitheca lacking.

Description. — Calice (Pl. X, Fig. 1*a*) shallow, with upturned margins. Cardinal fossula very deep, slightly extended towards the axis of corallite. Cardinal septum short, elongating only on the bottom of fossula. Alar pseudo-fossules marked. Alar septa long, nearly reaching columella. Counter septum slightly thinner than adjoining major septa. Septal margins smooth, bent in an arcuate manner from periphery to the inside of calice. Columella prominent, ascending arcuately, reaching cardinal fossula, fused with counter and, on the bottom of fossula, also with cardinal septum.

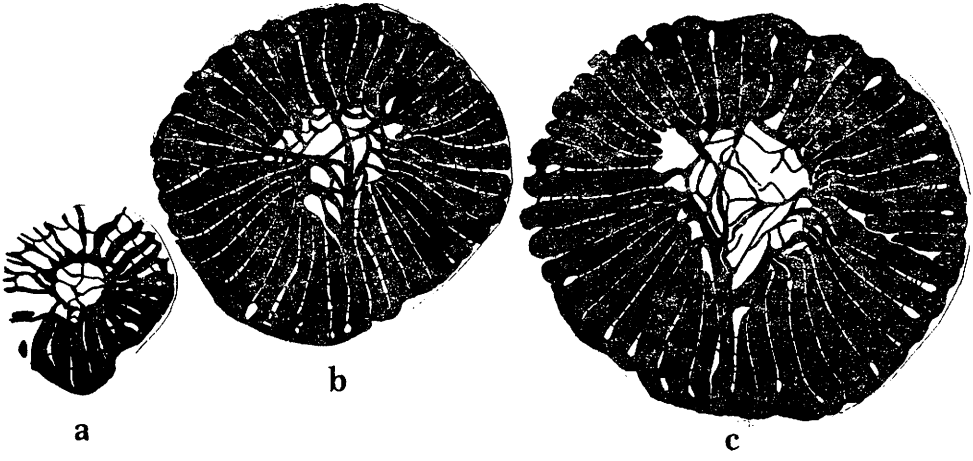


Fig. 15. — *Lophophyllum rosula* (Eichwald, 1861). Specimen No. 19214, holotype, Aleksin City, probably Aleksin Stage, Upper Viséan: *a* transverse section of the neanic stage; *b*, *c* successive transverse sections of the ephebic stage; × 5.

Transverse section (Text-fig. 15*c*) reveals 41 major septa with a diameter of 11 mm. A pinnate arrangement of septa very distinctly marked in all quadrants. Cardinal septum slightly thinner and longer than the adjoining major septa. Cardinal fossula widened towards the axis. Counter septum not distinguished. Alar septa longer than all septa of cardinal quadrants. The structure of the axial part very loose. It is composed of a thin, bent columella connected with cardinal and counter septum, of one to three axial ends of septa on each of its sides and of a few sections of tabellae. Dissepimentarium not developed.

Ontogeny. — The youngest stage studied (Text-fig. 15*a*) is 4×4.7 mm in diameter and has 24 major septa considerably more thickened in cardinal quadrants. Periaxial ends of septa of all quadrants reach a thickened tabula forming a sort of a "cyathotheca". They may be also somewhat thickened. Cardinal and counter septa connected with each other by a thin, tortuous, biseptal columella. In addition, some four, very thin septal lamellae or axial ends of septa are situated inside of the "cyathotheca".

The specimen is in this stage poorly preserved and the structure of the axial part of corallite poorly visible.

Remarks. — The author considers the specimen described as a representative of *Lophophyllum sensu stricto* (Lecompte, 1955), to which he feels entitled by the fundamental diagnostic characters. A different shape of calice in Eichwald's specimen as compared to the calices of other specimens of the type species is to a considerable extent the result of weathering and eroding of its margins and epitheca. Provided that they were developed at all, minor septa might be also destroyed along with the epitheca. The type of a loose axial structure, visible in transverse section, is also evidence that tabulae are steeply ascending in this part. Due to the lack of paratypes, no longitudinal section could be made by the author.

Eichwald's specimen differs from *L. konincki* M.-Edw. & H. and from *L. dumonti* M.-Edw. & H. primarily in a considerably larger number of septa with an approximately the same diameter of corallites, as well as in the thickness of septa and very short (or lacking) minor septa. Also different are their stratigraphic positions.

Occurrence. — Aleksin City, Tula Region, Viséan, probably Aleksin Stage.

Superfamily **Cyathopsicae** Dybowski, 1873
Family **Cyathopsidae** Dybowski, 1873
Genus *Caninia* Michelin in Gervais, 1840
Caninia jerofeewi (Stuckenberg, 1904)
(Pl. X, Fig. 3; Text-fig. 16)

1861. *Anisophyllum connivens* Eichwald; E. Eichwald, Paleontologija Rossii, p. 136, Pl. 8, Fig. 4*a*, *b*.
1904. *Pseudozaphrentoides jerofeewi* Stuckenberg; A. Stuckenberg, Korally i mšanki..., p. 33, Pl. 8, Fig. 5*a*—*c*; Pl. 9, Fig. 7.

Material. — A corallite (No 1/215) with a partly preserved proximal end.

Remarks. — *P. jerofeewi* Stuckenberg was included by Dobroljubova (1952) in the synonymy of *Caninia inostranzevi* Stuckenberg. After having the opportunity of examining the holotype of *P. jerofeewi*, the present author found that it had an amplexoid development stage never observed in any of the studied specimens of *C. inostranzevi*. The remaining ontogenetic characters of the latter species also are not in conformity with the development of *C. cornucopiae*.

The development of the herringbone type dissepiments and, locally, of a relatively wide dissepimentarium, not observed in the variability of *C. cornucopiae*, is the fundamental difference between *P. jerofeewi* and the last-named species. Unfortunately, neither the holotype of *P. jerofeewi* Stuckenberg, nor here discussed Eichwald's specimen have the youngest development stages and, therefore, there is no possibility to find whether

or not they had a zaphrentoid structure. Under these conditions, the author considers the occurrence of the amplexoid stage in the development and the fibro-lamellar microstructure of septa as sufficient criteria for assigning Stuckenberg's species to the genus *Caninia*.

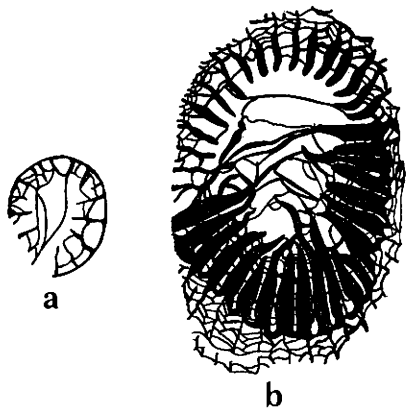


Fig. 16 — *Caninia jerofeewi* (Stuckenberg, 1904). Specimen No. 1/215, Aleksin City, Viséan, probably Aleksin Stage: *a* transverse section of the neanic „amplexoid" stage; *b* transverse section of the ephebic stage; × 2.

The indices of septa in Eichwald's (38 : 20×27) and Stuckenberg's (38 : 20×25) specimens are almost identical. Eichwald's specimen has somewhat longer and more irregularly arranged major septa and a dissepimentarium wider in some parts of the section.

Occurrence. — Tula Region, Viséan. After Eichwald: Aleksin City, Tula Region = Viséan, probably Aleksin Stage.

"*Zaphrentis*" *arietina* Fischer, 1837
(Pl. X, Fig. 2)

1861. *Zaphrentis arietina* Fischer; E. Eichwald, Paleontologija Rossii, p. 132.

Material. — One, very strongly damaged and incomplete specimen (No 1/207).

Remarks. — On the basis of the existing fragments of the specimen one may conclude that it belongs to "*Caninia*" *kokscharowi* Stuckenberg or "*Caninia*" *ruprechti* Stuckenberg or else to a related species of Lower Carboniferous and Lower Permian "*Caninia*". The state of preservation of Eichwald's specimen precludes the possibility of an accurate description and identification. Trautschold (1879) assigns it to the synonymy of *Bothrophyllum conicum*.

Occurrence. — After Eichwald: Ural Mts, Sterlitamak Region — Lower Permian, Sakmarian-Artinskian.

Family **Palaeosmiliidae** Hill, 1940
Genus *Palaeosmilia* M.-Edw. & H., 1848
Palaeosmilia murchisoni M.-Edw. & H., 1848
(Pl. XI, Figs 2, 3)

1848. *Palaeosmilia murchisoni* M. Edw. & Haime; H. M. Edwards & J. Haime, Lower Carboniferous..., p. 261.
1861. *Cyathophyllum Stutschburyi* M. Edw. & H.; E. Eichwald, Paleontologija Rossii, p. 140.
1869. *Cyathophyllum Murchisoni* Edwards & Haime; A. Kunth, Beiträge..., pp. 197, 198.
1913. *Cyathophyllum* Q Vaughan; A. Carpentier, Contribution..., pp. 353, 354, Pl. 5, Fig. 8.
1917. *Cyathophyllum multilamellatum* M'Coy; E. J. Garwood, The Faunal..., Pl. 14, Fig. 7.
1927. *Cyathophyllum fraternum* Reed; F. R. C. Reed, Palaeozoic..., pp. 29, 30; Pl. 5, Figs 1, 1a, 2, 2a.
1927. *Cyathophyllum sororium* Reed; F. R. C. Reed, *Ibid.*, pp. 30, 31, Pl. 5, Figs 4, 4a.
1928. *Paeosmilia fornix* Hudson; R. G. S. Hudson, On the Lower Carboniferous..., pp. 248—251, Pl. 1, Figs 1—9.
1928. *Laccophyllum* (?) sp.; V. D. Fomitshev *in*: D. Nalivkin *et all.*, Turnejskij jarus..., p. 7, Text-fig. 1a, b.
1928. *Hapsiphyllum* (?) sp.; V. D. Fomitshev, *Ibid.*, p. 8, Text-fig. 2.
1932. *Cyathophyllum* aff. *multilamellatum* M'Coy; I. I. Gorsky, Korally..., pp. 28—30, Pl. 4, Figs 7—10.
1933. *Palaeosmilia carinthiaca* Kuntschning; F. Heritsch, Rugose Korallen, pp. 140—146, Pl. 3, Figs 1—8; Pl. 4, Figs 1—7 (*cum synon.*).
1933. *Cyathophyllum* (*Palaeosmilia*) *murchisoni* M. -E. & H.; Fl. Charles, Contribution à l'Étude..., pp. 129—131, Pl. 5, Figs 28, 29.
1933. *Cyathophyllum stutchburyi* var. *merophylloides* Yü; C. C. Yü, Lower Carboniferous..., pp. 67, 68, Pl. 8, Fig. 4a—d; Pl. 12, Fig. 6a—c.
1933. *Cyathophyllum stutchburyi* var. *marginocarinatum* Yü; C. C. Yü, Ibid., p. 69, Pl. 7, Fig. 6a—d; Pl. 8, Fig. 5a, b.
1934. *Palaeosmilia yohi* Yü; C. C. Yü, Description of corals..., p. 65, Pl. 12, Figs 4, 5.
1935. *Palaeosmilia* (*Cyathophyllum*) *murchisoni* E. H. var. *extravesicularis* Gorsky; I. I. Gorsky, Nekotorye Coelenterata, pp. 62—64, Text-fig. 25, Pl. 11, Figs 3, 4; Pl. 12, Figs 1, 2.
1935. *Cyathophyllum* (*Palaeosmilia*) *murchisoni* M. -Edwards & Haime; N. Menchikoff & T. Y. Hsu, Les Polypiers..., pp. 242, 243, Pl. 11, Fig. 14.
1935. *Cyathophyllum* (*Palaeosmilia*) *Resotti* Menchikoff & Hsu; N. Menchikoff & T. Y. Hsu, *Ibid.*, pp. 243, 244, Pl. 11, Figs 15a, b, 16.
1938. *Cyathophyllum* (*Palaeosmilia*) *kasachstanicum* Volkova; M. S. Volkova, Niżnekamennougolnye otloženija..., pp. 30, 31; Pl. 9, Figs 1—3.
1938—1941. *Palaeosmilia murchisoni* Edwards & Haime; D. Hill, A monograph..., pp. 117—121, Pl. 6, Figs 12, 13 (*cum synon.*).
1941. *Palaeosmilia murchisoni* Edwards & Haime; I. I. Gorsky, Atlas..., T. 4; p. 61; Pl. 6, Fig. 4.
1951. *Palaeosmilia murchisoni* var. *amygdalophylloides* Gorsky; I. I. Gorsky, Kamennougolnye i permskie..., pp. 42, 43, Pl. 10, Fig. 4.
1951. *Palaeosmilia planum* Gorsky; I. I. Gorsky, *Ibid.*, pp. 44, 45, Pl. 11, Fig. 2a, b.

1951. *Palaeosmilia vesiculosum* Gorsky; I. I. Gorsky, *Ibid.*,. pp. 45, 46, Pl. 11, Figs 3a, b, 4a, b; Pl. 12, Fig. 1. Note: for Gorsky's other specific names see in the synonymy of Ivanowsky's paper of 1967.

1952. *Palaeosmilia murchisoni murchisoni* Edwards & Haime; N. V. Kabakovitsch, Korally roda Palaeosmilia..., pp. 104, 105, Text-fig. 1, Pl. 1; Pl. 2, Figs 1—4.

1952. *Palaeosmilia murchisoni stutchburyi* Edwards & Haime; N. V. Kabakovitsch, Ibid., pp. 105, 106, Text-figs 2, 3, Pl. 4; Pl. 5, Figs 2—4; Pl. 6, Figs 1—3.

1952. *Palaeosmilia nodosa* Kabakovitsch; N. V. Kabakovitsch, Ibid., pp. 106—110, Text-fig. 4, Pl. 6, Fig. 4; Pl. 7, Figs 1—4.

1952. *Palaeosmilia tulensis* Kabakovitsch; N. V. Kabakovitsch, Ibid., pp. 110, 111; Pl. 7, Figs 5, 6.

1957. *Palaeosmilia murchisoni stutchburyi* M. E. H.; V. Kostič-Podgorska, Koralska fauna..., pp. 54—56, Pl. 1, Figs 1, 2.

1958. *Palaeosmilia murchisoni stutchburyi* M. E. H; V. Kostič-Podgorska, Fauna i biostratigrafski..., pp. 53, 54; Pl. 29, Fig. 1.

1959. *Palaeosmilia* cf. *murchisoni* (Edwards & Haime); M. Kato, Some Carboniferous..., pp. 282—284 (*cum synon.*).

1961. *Palaeosmilia murchisoni stutchburyi* Edwards & Haime; V. Zukalova, Spodnokarbonska koralova..., pp. 22, 23, Pl. 6, Figs 2, 3.

1966. *Palaeosmilia murchisoni murchisoni* Edwards & Haime; M. S. Bikova, Nižnekamennougolnye korally..., pp. 35—37, Pl. 1, Fig. 5; Pl. 2, Fig. 2.

1966. *Palaeosmilia murchisoni stutchburyi* Edwards & Haime; M. S. Bikova, *Ibid.*, pp. 37, 38; Pl. 1, Fig. 6; Pl. 2, Fig. 1.

1967. *Palaeosmilia* (*Palaeosmilia*) *murchisoni* M. -Edwards & Haime; A. B. Ivanovsky, Etjudy..., pp. 54, 55, Pl. 12; Pl. 13, Fig. 1 (*cum synon.*).

1970. *Palaeosmilia nodosa nodosa* Kabakovithch; V. Y. Shchukina, Novye kamennougolnye..., p. 143.

1970. *Palaeosmilia nodosa grandis* Shchukina, Ibid., pp. 143, 144, Pl. 51, Fig. 1.

Diagnosis. — See Hill, 1938—1941, p. 118.

Material. — Four fragmentary solitary corallites Nos 1/223, 1/1225, 1/1583 and 1/1584. Inner structure not equally well preserved in all of them.

Dimensions:

No	Index of septa
1/223	84:44
1/1225	96 45

Remarks. — *P. murchisoni* is one of the most common of Carboniferous tetracorals. Its interpretation remains, however, still debatable. It seems that, in view of a vast descriptive material and numerous and abundant collections, only a monograph of the species based on so far described specimens might elucidate the actual range of its intraspecific variability, development trends, formation of new varieties, etc. Unfortunately, the realization of such a work at present seems hardly probable. In the author's opinion the only possibility is to combine most of the forms described under a common specific name, regardless of the fact that it would include specimens occurring in the entire Eurasia and

North Africa. To take such a standpoint the author feels entitled by so far performed studies and comparison from which it follows that particular sets of characters or features characteristic of certain groups of specimens in one area are unsuitable in another area. Thus, for instance, Kabakovitsh (1952) divides the species into *P. m. murchisoni* and *P. m. stutchburyi* on the basis of the width of tabularium, while Vassiljuk (1960) shows that it is impossible to make such a division in the Donets Basin. Yü (1933) separates subspecies on the basis of, among other things, the occurrence of carinae, while Kabakovitsh (*l.c.*) includes these subspecies in the synonymy of *P. m. stutchburyi* and, at the the same time, erects a new species based mostly on a strong carination of septa. On the basis of literature, it seems that there is no regularity in the occurrence of marginal vesicles, which with a given index of septa may occur or not occur. Frequently, they do not appear even in very large specimens. Likewise, the structure of axial part, strongly variable, does not display any degree of regularity. The occurrence of an elongate counter septum or a wide free axial area, seems to the writer to be at most ecologically determined.

The author believes that the specimens of the type "*Cythophyllum*" *aquisgranense* Frech, 1885, described from the Etroeungt zone, do not belong to *P. murchisoni*. These specimens, judging by the structure and mutual relation of major and minor septa, should be separated into a new genus or subgenus intermediate between *Campophyllum* and *Palaeosmilia*.

Eichwald's specimens belong to large representatives of the species with a typical structure, which is not here described. Specimen No 1/1225 has carinate septa, in which it is similar to the specimens described as *P. nodosa* and due to its large dimensions it is very similar to a specimen determined as *P. n. grandis* Shchukina, 1970.

Occurrence. — Eurasia, N. Africa, Upper Tournaisian (?), Viséan. After Eichwald: Kamenskij zavod u Ekaterinburga = Kamensk Uralskij City, Lower-Middle (?) Carboniferous.

Family **Bothrophyllidae** Fomitshev, 1953
Genus *Bothrophyllum* Trautschold, 1879
Bothrophyllum conicum Trautschold, 1879, emend. Dobroljubova, 1937
(Text-fig. 17)

1861. *Campophyllum conicum* Fischer; E. Eichwald, Paleontogija Rossii, p. 142.
1879. *Bothrophyllum conicum* Trautschold; H. Trautschold, die Kalkbrüche..., p. 128, Pl. 25, Fig. 1a—e.
? 1934. *Bothrophyllum conicum* Trautschold; F. Heritsch, Rugose Korallen..., pp. 152—154, Text-figs 19—21.
1940. *Bothrophyllum conicum* Trautschold; T. A. Dobroljubova, Korally Rugosa..., pp. 27—29, Pl. 4, Figs 1—9; Pl. 5, Figs 1—5 (*cum synon.*).
1948. *Bothrophyllum conicum* Trautschold; T. A. Dobroljubova, Stratigrafičeskoe raspredelenie..., Pl. 1, Fig. 1; Pl. 2, Figs 1—11.

Diagnosis. — *Bothrophyllum* with an index of septa of 50 : 30; counter septum and some of metasepta elongate; cardinal septum shortened; minor septa long, entering tabularium; a caninoidal stage may occur at the end of development.

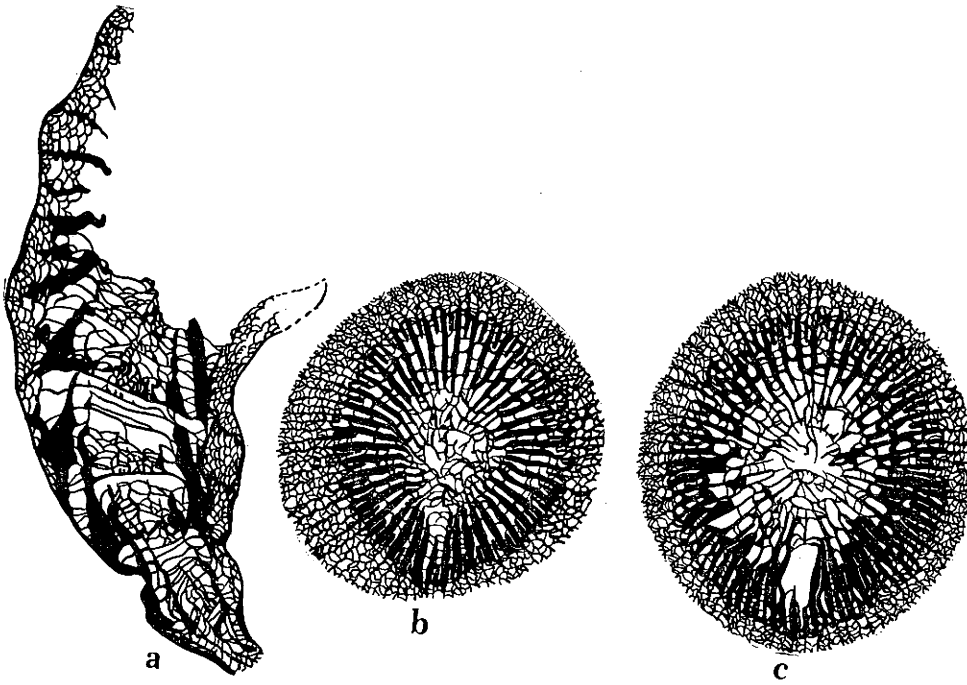


Fig. 17 — *Bothrophyllum conicum* Trautschold, 1879. Mjatshkovo village, Mjatshkov Stage: *a* specimen No. 1/3541: longitudinal section; *b*, *c* specimen No. 1/3540: successive transverse section of the ephebic stage; × 2

Material. — Two well preserved specimens, not completely filled with deposit: No 1/3540 of which two transverse and No 1/3541 of which a longitudinal section have been made.

Remark. — Eichwald's specimens are topotypes, having 45×2 septa with diameters of 22×24 mm and 25×25 mm and a typical structure. The extensive ontogenetic variability of the species was discused by Dobroljubova (1937).

Occurrence. — Moscow Basin, Mjatshkov and Teguliferina stages. After Eichwald: Mjatshkovo village = Mjatshkov Stage.

? *Bothrophyllum inostranzevi* (Stuckenberg, 1904)
(Text-fig. 18)

1861. *Trochophyllum radiatum* Eichwald; E. Eichwald, Paleontologija Rossii, pp. 134, 135, Pl. 12, Fig. 10a, b.

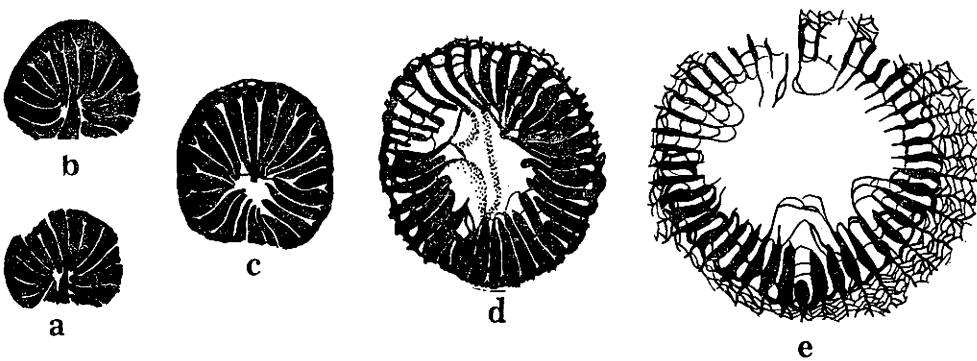
1904. *Caninia inostranzevi* Stuckenberg; A. Stuckenberg, Korally..., p. 26, Pl. 2, Fig. 1a—d.
1952. *Caninia inostranzevi* Stuck.; T. A. Dobroljubova, Caninia inostranzevi..., pp. 72—81, Pls 1—3.
1952. *Caninia inostranzewi* Stuck. forma *densa* Dobr.; T. A. Dobroljubova, Ibid., pp. 81—83, Pl. 4.
1968. *Caninophyllum inostranzevi* (Stuckenberg, 1904); J. Fedorowski, Upper Viséan..., pp. 211, 121, Pl. 2, Figs 2, 3a, b.

Diagnosis. — See Dobroljubova, 1952, p. 72.

Material. — One specimen No 1/212a with a partly preserved proximal end and without calice.

Remarks. — Eichwald's specimen has an index of an early-ephebic (37 : 22) and ephebic (45 : 32) stage. It is marked by transitional characters between *C. inostranzevi s. stricto* and *C. inostranzevi* forma *densa* Dobroljubova. In the author's opinion, the separation of this "form" even if the rank of subspecies is pointless, since it does not display characters which might exceed the range of a considerable ontogenetic variability of the species.

The ontogeny studied by Dobroljubova (*l.c.*) and the present author (Text-fig. 18), has revealed certain differences between particular specimens in a stronger or slighter emphasis on some morphological charac-



Rig. 18 — ?*Bothrophyllum inostranzevi* (Stuckenberg, 1904). Specimen No. 1/212a, Kaluga City: *a—c* successive transverse section of the neanic stage, ×3; *d* transverse section of the early ephebic stage, ×1,5; *e* transverse section of the late ephebic stage, × 1,5.

ters such as a stronger or slighter thickening of septa in counter quadrants, earlier or later shortening of cardinal septum and more or less conspicuous elongation of counter septum. In a very young ontogenetic stage, it may be shortened up to the dimensions of the remaining septa of counter quadrants.

The bothrophylloid characters are not expressed in this species clearly and unequivocally. Nevertheless, they are marked in young stages of almost all specimens, in particular in a specimen determined by Dobro-

ljubova (*l.c.*) as forma *densa* and in that presented by that author in Pl. II, Figs 1—8. Development stages very similar to those observed in Eichwald's specimen were illustrated by Lewis (1931, Pl. II, Fig. 4*a*). All specimens of this species which were studied displayed caninoid ephebic stages.

The species under study is undoubtedly one of the most difficult to assign taxonomically. In the writer's opinion, it is not a representative of the genus *Caninia sensu stricto*, since it differs from *C. cornucopiae* in ontogeny and in the development of a complex dissepimentarium. This species has previously been included by the author (Fedorowski, 1968) to *Caninophyllum*, now, however, the last-named genus seems to him (Fedorowski, in press) to be a younger synonym of *Bothrophyllum*.

The author does not agree with Dobroljubova's (*l.c.*) opinion that *Pseudozaphrentoides jerofeewi* Stuckenberg is a synonym of "*Caninia*" *inostranzevi*. As stated above and in another publication (Fedorowski, in press), *P. jerofeewi* has a typically amplexoid stage in its ontogeny and it should be included, at least for the time being, in the genus *Caninia* Michelin (in Gervais, 1840).

Occurrence. — Moscow Basin, Serpukhov Stage, Steshe Horizon. After Eichwald: Kaluga City = Devonian to Lower Carboniferous (most probably Viséan). Poland: Upper Viséan, D_2.

Genus *Gshelia* Stuckenberg, 1888
Gshelia rouilleri Stuckenberg, 1888
Pl. XI, Fig. 1; Text.-fig. 19)

1861. *Lophophyllum breviceps* Eichwald; E. Eichwald, Paleontologija Rossii, pp. 134, 135, Pl. 8, Fig. 6a, b.
1861. *Lophophyllum solare* Eichwald; E. Eichwald, *Ibid.*, p. 134; Pl. 8, Fig. 7.
1888. *Gshelia rouilleri* Stuckenberg; A. Stuckenberg, Korally i mšanki..., pp. 24, 25, Pl. 3, Figs. 27—33.
1940. *Gshelia rouilleri* Stuckenberg; T. A. Dobroljubova, Korally Rugosa..., pp. 41—49, Pl. 9, Figs 1, 2; Pl. 13, Figs 11—17; Pls 14—19; Pl. 20, Fig. 1; Pls 22—25.
1948. *Gshelia rouilleri* Stuckenberg; T. A. Dobroljubova, Stratigraficeskoe raspredelenie..., Pl. 1, Figs 2—4; Pl. 5, Figs 4—10.

Material. — Two solitary corallites, not reaching the ephebic stage. Specimen No 1/211 has an almost complete proximal end and well preserved calice.

Dimensions (in mm):

No	Index of septa	
1/210	35 : 15	smaller diameter of calice
1/210	33 : 11.5 × 12	Under the calice
1/211	36 : 14 × 16	Calice
1/211	22 : 5 × 7	Neanic stage

Remarks. — This species and its ontogenetic variability were accurately described by Dobroljubova (1940). The present author intends to underscore a very interesting development of its alar septa. Very conspicuous at the beginning of ontogeny (Text-fig. $191_{f,g}$), they become shortened still in the neanic stage, sometimes even considerably (the calice of specimen No 1/211). This shortening, not very distinct in all specimens, escape attention.

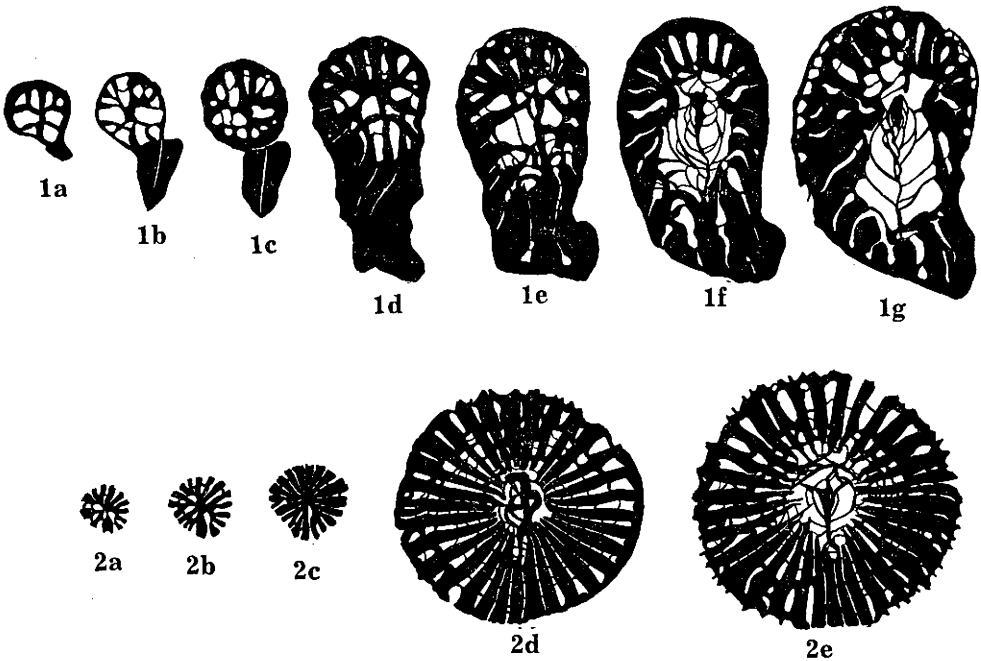


Fig. 19. — *Gshelia rouilleri* Stuckenberg, 1888. Majtshkovo village, Mjatshkov Stage. 1*a*—*g* specimen No. 1/211: transverse sections of the neanic stage, × 5; 2*a*—*e* specimen No 1/210: transverse sections of the neanic stage, × 3.

Eichwald's both specimens have a similar index of septa, identical zaphrentoid development in jounger ontogenetic stages and a columella connected with cardinal septum. However, in specimen No 1/210 a sort of a simple axial structure is formed since its columella is joined by two septal lamellae. In view of a vast intraspecific variability (Dobroljubova, *l.c.*), this character is insignificant.

Since Eichwald's specimens did not reach the ephebic stage, they may be compared only with juvenile stages described by Dobroljubova (*l.c.*). They are most similar to specimen No 130 (Dobroljubova, *l.c.*, Pl. 16, Figs 4—7) and the ontogenetically oldest stage of specimen No 1/210 is very similar to the late-neanic stage of specimen No 92 (Dobroljubova, *l.c.*, Pl. 13, Fig. 16). Eichwald's specimens are the oldest of so far described representatives of the species.

Occurrence. — Moscow Basin, Omphalotrochus Stage (C^1_{III}). After Eichwald: Mjatshkovo village = Mjatshkov Stage (C^4_{II}).

Superfamily **Lithostrotionicae** d'Orbigny, 1851
Family **Lithostrotionidae** d'Orbigny, 1850
Genus *Lithostrotion* Fleming, 1828
Subgenus *Siphonodendron* M'Coy, 1849
Lithostrotion (Siphonodendron) junceum (Fleming, 1828)
(Pl. XI, Figs 4, 5)

1828. *Caryophyllia juncea* Fleming; J. Fleming, A history..., p. 508 = Junci lapidei Ure, 1793, p. 327, Pl. 19, Fig. 12.
1861. *Lithostrotion junceum* Fleming; E. Eichwald, Paleontologija Rossii, p. 151.
1861. *Lithostrotion irregulare* M. -Edwards & Haime; E. Eichwald, *Ibid.*, p. 151 (partim, specimen No 1604 only).
1935. *Lithostrotion (Siphonodendron) junceum* Fleming; W. Weissermel, Über ein..., p. 115—119, Pls 9, 10.
1940. *Lithostrotion junceum* (Fleming); D. Hill, A monograph..., pp. 171, 173, Pl. 9, Figs 3—8 (*cum synon.*).
1960. *Lithostrotion junceum* (Fleming); N. P. Vassiljuk, Nižnekamennougolnye korally..., pp. 77—79, Pl. 19, Fig. 1 (*cum synon.*).
1961. *Lithostrotion junceum* (Fleming); V. Zukalova, Spodnokarbonska..., pp. 16, 17, Pl. 4, Figs 4—6.
1962. *Lithostrotion junceum* (Fleming); H. Żakowa & C. Żak, Dolny Karbon..., Pl. 6, Fig. 4; Pl. 7, Fig. 1; Pl. 8, Fig. 1a—c.
1966. *Lithostrotion junceum* (Fleming); H. Żakowa, Poziom Goniatites..., Pl. 21, Figs. 1, 7.
1968. *Lithostrotion junceum* (Fleming); J. Fedorowski, Upper Viséan..., p. 213, Pl. 2, Fig. 5.

Diagnosis. — See Hill, 1940, p. 172.

Material. — Two colonies Nos 1/255 and 1/1604. Corallites mostly poorly preserved and recrystallized.

Remarks. — Eichwald's both specimens belong to larger representatives of the species. Corallites reach 4 mm in diameter and have 19 to 20 major septa. Specimen No 1/1604 is composed more typically, without corallites having a disappearing columella and frequently with long major septa reaching columella. Specimen No 1/255 has many diphymorphic corallites.

Occurrence. — Europe: Upper Viséan, D_1—D_2. After Eichwald: Kamenskij zavod u Ekaterinburga = Kamensk Uralskij City, Lower — Middle (?) Carboniferous.

Lithostrotion (Siphonodendron) cf. *martini* M.-Edwards & Haime, 1851
(Pl. XII, Figs 1, 2)

1861. *Lithostrotion martini*, M.-Edw. & Haime; E. Eichwald, Paleontologija Rossii, pp. 148, 149.

1861. *Lithostrotion irregulare* M.-Edw. & Haime; E. Eichwald, *Ibid.*, p. 151.

1932. *Lithostrotion* (*Lithodendron* (*Diphyphyllum*)) cf. *martini* Edw. & H.; O. H. Schindewolf, Wissenschaftlichen..., pp. 132, 133, Pl. 17, Figs 2—4.

1966. *Lithostrotion* aff. *irregulare* (Phillips); M. S. Bikova, Nižnekamennougolnye..., pp. 133, 134, Pl. 21, Fig. 5.

Material. — Two specimens, No 1/1412 described by Eichwald as *Lithostrotion martini,* having partly crushed and slightly recrystallized corallites and No 1/1414, described as *L. irregulare.* The latter is silicified and its corallites, with frequently damaged internal structure, are partly filled with deposit.

Dimensions (in mm):

No	Index of septa
1/1412	25×2:6.2×7.2
,,	26×2:6.2
,,	24×2:6.0×7.4

Maximum diameter, found in the longitudinal section, amounts to 8.3

1/1414	26×2:6.0×6.4
,,	27×2:5.8×6.8
,,	25×2:5.2×5.4
,,	26×2:6.2×6.2

Remarks. — Eichwald's specimens differ from each other slightly in the index of septa and length of minor and major septa. Approximately the same differences occur in Bikova's (1966) and Schinderwolf's (1932) specimens. The latter may, in addition, be diphyphylloid. In addition to very similar dimensions, number and length of septa and width of dissepimentarium, this common range of variability allows one to recognize them as conspecific.

The specific name of this group of specimens has to remain indeterminate until the lectotype will be selected, and *L. martini* revised on the basis of British specimens. It probably belongs to a group including *L.* (*S.*) *caespitosum, L.* (*S.*) *pauciradiale and L.* (*S.*) *scoticum* and it may be identified with one of them. Under such circumstances, giving the specimens under study a new specific name seems to the author not to be purposeful.

Occurrence. — Central Asia (K'un-lun and Karakorum), Lower Carboniferous; Kazakhstan, Middle — Upper Viséan. After Eichwald: Ekaterinburg = Sverdlovsk City, Upper Devonian (?) — Lower Carboniferous. Note: Eichwald's locality is not determined precisely enough: it is most likely to be Lower Carboniferous.

Subgenus *Lithostrotion* Fleming, 1828
Lithostrotion (*Lithostrotion*) *intermedium* Eichwald, 1861
(Pl. XII, Fig. 3)

1861. *Lithostrotion intermedium* Eichwald; E. Eichwald, Paleontologija Rossii, p. 150, Pl. 12, Fig. 11a—c.

Lectotype: Specimen No 1/1413; Pl. XII, Fig. 3a—f.
Type locality: Tshu River.
Type stratum: not precised.

Diagnosis. — *Lithostrotion* with (18 to 20) x 2 septa and 8 to 11 mm in diameter; columella thin, disappearing; major and minor septa complete, long.

Material. — A partly silicified, cerioid, hemispherical colony. Corallites mostly well preserved.

Dimensions (in mm):

16×2: 5.7×4.9	19×2: 8.0×7.8
17×2: 6.4×4.6	20×2: 10.8×9.0
18×2: 8.0×5.6	20×2: 10.0×8.4
18×2: 8.1×6.5	20×2: 8.2×7.8

Description. — Transverse section (Pl. XII, Fig. 3d—f). Major septa tortuous, long, in tabularium not thickened, mostly reaching nearly as far as the axis of corallites. They may fuse with columella. Minor septa very long, in some corallites hardly distinguishable from major septa, tortuous and thin. Columella listlike, thin, tortuous, in many corallites discontinuous or atrophying, nearly in all cases fused with cardinal and counter septum. Dissepimentarium occupies from one-third in younger to a half of diameter in older corallites. It is composed of dissepiments of the rectangular or irregular type, usually considerably larger near epitheca.

Longitudinal section (Pl. VII, Fig. 3a—c). Dissepimentarium wide, with plano-convex, not thickened dissepiments arranged at an angle of about 45° to epitheca. Tabulae widely spaced, hemispherical, on the whole complete and with very few accessory plates. Near columella they do not take a steeper position.

Intra-colonial variability. — Young specimens are on the whole very similar to each other and have a more regular structure than the older ones. They differ from each other in the presence or absence of columella. The differentiation in the length of minor septa and width and structure of dissepimentarium becomes particularly distinct with individual's age. Columella remains unstable up to the end of development.

Remarks. — *L. acolumellata acolumellata* Dobroljubova and *L. a. diphystrotionoides* Dobroljubova are most closely related morphologically to Eichwald's species, but they usually have fine corallites with few septa.

Specimens similar in the index of septa were described by Minato, 1955, as *L. hinozuchiense*. They differ in a very well developed columella. Very closely related morphologically is also *Diphyphyllum* (?) *vesicotabulata* Yü, 1933, which differs primarily in the form of colony (a phaceloid colony).

Occurrence. — Tshu River in SE Kazakhstan. Since the Silurian to Upper Carboniferous deposits are outcropped along the Tshu River, the age could not be determined preciselly.

Suborder **Columnariina** Rominger, 1876
Family **Lonsdaleiidae** Chapman, 1893
Genus *Lonsdaleia* M'Coy, 1849
Lonsdaleia ornata Dobroljubova, 1958
(Pl. XII, Figs 1—3)

1861. *Lonsdaleia floriforme* Flem.; E. Eichwald, Paleontologija Rossii, pp. 152, 153.
1958. *Lonsdaleia ornata* Dobroljubova; T. A. Dobroljubova, Nižnekamennougolnye..., pp. 93—96, Text-fig. 20, Pl. 12, Fig. 1.

Material. — Three fragmentary cerioid colonies with partly silicified corallites. Internal structure of specimens well preserved.

Dimensions (in mm):

No	Number of septa	Diameter of corallite	Diameter of tabularium	Diameter of axial structure
1/256	20×2	8×7	4.0×3.0	1.7×1.1
,,	21×2	9×6	4.5×3.5	2.0×1.1
,,	22×2	10×7	5.5×4.5	2.4×1.6
,,	25×2	10.5	6.0×5.2	3.3×2.3
,,	26×2	12×10	6.0×5.5	destroyed
1/1415	25×2	15×10	8.5×6.0	4.0×3.0
,,	27×2	16×12	9.0×7.0	4.0×3.0
1/1609	25×2	15×14	7.5×6.5	4.3×3.2

Remarks. — Dobrojubova (1958) distinguished many species of *Lonsdaleia*, frequently on the basis of very small morphological differences. In the present author's opinion at least part of them are synonyms. For this reason he assigned Eichwald's specimens to Dobroljubova's (*l.c.*) already existing species, despite the fact that they display certain differences both between themselves and in relation to the holotype.

Thus, a difference as compared with the holotype consists primarily in the irregular development of minor septa, which only in some fragments of corallites enter deeper into tabularium. The axial structure, very accurately described by Dobroljubova (*l.c.*) displays considerable individual differences both in the same colony and in the corallites of various colonies, including the holotype and, therefore, its structure is

not a diagnostic character. It seems that even putting aside a complete intra-specific variability and taking into account only an intra-colonial variability of the holotype, *L. rossica minor* Dobrolujbova and *L. ossipovae* Dobroljubova should be included in the synonymy of *L. ornata*.

Occurrence. — Moscow Basin, NW part, Upper Viséan (C_1^{2tr}). After Eichwald specimens Nos 1/256 and 1/1415: Borovichi = Oka Stage, Upper Viséan, specimen No 1/1609: Aleksin = Viséan, probably Aleksin Stage.

Genus *Petalaxis* M.-Edwards & Haime, 1852

Petalaxis (M.-Edwards & Haime, 1851)

(Pl. XII, Fig. 4; Text-fig. 20)

1851. *Stylaxis* M'Coyana M.-Edwards & Haime; H. M.-Edwards & J. Haime, Monographie..., p. 453, Pl. 12, Figs 5, 5a.
1861. *Lithostrotion Portlocki* M.-Edw. & Haime; E. Eichwald, Paleontologija Rossii, pp. 149, 150.
1861. *Lithostrotion Mac-Coyanum* M.-Edw. & Haime; E. Eichwald, *Ibid.*, p. 150.

Material. — Two colonies, No 1/250, described by Eichwald as *L. mac-coyanum* and No 1/251, described as *L. portolocki*. Corallites with a well preserved structure, partly filled with deposit.

Dimensions (in mm):

No	Index of septa	
1/250	13 : 6	
,,	13 : 5.8	
,,	14 : ?	
1/251	15 : 5.8 × 5.4	16 : 5.6 × 5.6
,,	15 : 5.8 × 5.4	16 : 5.6 × 5.6
,,	15 : 6.1 × 4.5	16 : 6.3 × 4.1
,,	15 : 5.4 × 4.6	16 : 7.8 × 5.0
,,	14 : 6.2 × 4.4	16 : 5.2 × 4.4

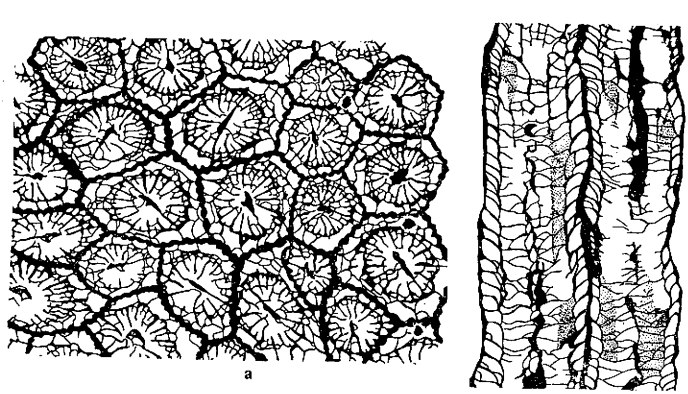


Fig. 20 — *Petalaxis mccoyana* (M.-Edwards & Haime, 1851). Specimen No. 1/251, Kolomna City, Middle Carboniferous: *a* transverse section, × 2,5; *b* longitudinal section, × 2,5.

Remarks. — Despite certain small differences in their index of septa, Eichwald's both specimens have been assigned by the present author to the same species. This species is marked by a considerable intraspecific variability and therefore these differences are insignificant. A revision of the genus and species have recently been performed by Sutherland (in press) whose kind oral information was used by the present writer.

Occurrence. — Moscow Basin, Donets Basin, Middle Carboniferous. After Eichwald: Mjatshkovo village = Mjatshkov Stage.

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J. FEDOROWSKI & V. B. GORIANOV

REWIZJA TETRAKORALI OPISANYCH W MONOGRAFII E. EICHWALDA „PALEONTOLOGIJA ROSSII".

Streszczenie

Przeprowadzono rewizję tetrakorali z kolekcji E. Eichwalda, opisanej w jego monografii „Paleontologija Rossii" (1861). Kolekcja jest przechowywana w katedrze geologii historycznej Uniwersytetu Leningradzkiego.

Systematyczny przegląd tetrakorali pozwolił stwierdzić, że przytłaczająca większość nazw gatunkowych wprowadzonych przez Eichwalda jest nieważna zgodnie z prawem *nomen oblitum*. Aktualne nazwy gatunków Eichwalda podano w spisie porównywaczym na początku pracy. Autorzy proponują zachować priorytet Eichwalda dla następujących gatunków:

Streptelasma ornata (Eichwald, 1829)
Grewingkia buceras (Eichwald, 1856)
Diplophyllum luxurians (Eichwald, 1829)
Amplexocarinia alternans (Eichwald, 1856)
Clisiophyllum subturbinatum Eichwald, 1861
Lophophyllum rosula (Eichwald, 1856)
Lithostrotion (Lithostrotion) intermedium Eichwald, 1861

Ponadto wprowadzono dwie nowe nazwy gatunkowe dla okazów, które Eichwald mylnie zaliczył do istniejących już gatunków. Są to:
Dibunophyllum pachyseptatum n.sp.
Corwenia eichwaldi n.sp.

Е. ФЕДОРОВСКИ & В. Б. ГОРЯНОВ

ПЕРЕОПИСАНИЕ КОРАЛЛОВ (TETRACORALLA, RUGOSA) ОПИСАННЫХ ЭДУАРДОМ ЭЙХВАЛЬДОМ В МОНОГРАФИИ „ПАЛЕОНТОЛОГИЯ РОССИИ"

Резюме

Проведена ревизия ругоз из коллекции Эдуарда Эйхвальда к его монографии „Палеонтология России" (1861). Коллекция хранится на кафедре Исторической геологии Ленинградского университета за № 1.

Пересмотр систематического состава кораллов показал, что подавляющее большинство установленных Э. Эйхвальдом видов согласно правилу *nomen oblitum* являются недействительными. Наименовнаия, которые следует использовать для видов, определенных Э. Эйхвальдом, приведены в сравнительном списке в начале полного текста статьи.

Предлагается сохранить приоритет Э. Эйхвальда со следующими видами, диагнозы которых приводятся ниже:

Streptelasma ornata (Eichwald, 1829)
Табл. II, фиг. 2a-b

Маленькая трохоидная *Streptelasma* с септами 1-го порядка длиной около половины радиуса и с широкой септотекой.

Grewingkia buceros (Eichwald, 1856)

„Крупный разнообразно изогнутый коралл с широким осевым комплексом и широким сегментированным ободком. Многочисленные септы первого порядка короткие, их число 75—100. Септы второго порядка погружены в ободок или очень мало выделяются из него. В осевой зоне уже сравнительно рано начинается отшнурование толстых осевых концов септ. Днища выпуклые". (по Кальо, 1961, стр. 54).

Diplophyllum luxurians (Eichwald, 1829)
Табл. V, фиг. 4. a-d.

Цериоидный *Diplophyllum* с септами 1-го порядка достигающими или почти достигающими центра. Днища вне внутренней стенки почти горизонтальные, внутри — выпуклые с центральным углублением.

Amplexocarinia alternans (Eichwald, 1856)

Amplexocarinia с септальным индексом 18 : 6; септы первого порядка длиной 1/4 радиуса коралла, септы второго порядка хорошо развиты.

Clisiophyllum subturbinatum Eichwald, 1861

Clisiophyllum с (62—64) × 2 септами при диаметре 32—34 мм; осевая колонна типа таковой у *C. keyserlingi* занимает более половины радиуса коралла; септы второго порядка укорочены; диссепиментариум узкий, состоит преимущественно из прямоугольных диссепиментов.

Dibunophyllum pachyseptatum n.sp.

Dibunophyllum с (58—65) × 2 септами при диаметре 42—50 мм; столбик на взрослой стадии исчезает; септы второго порядка развиты неполно; главная фоссула сильно углублена в диссепиментариум.

Corwenia eichwaldi n.sp.

Corwenia с (33—38) × 2 септами при диаметре 9—15 мм; превышает литостроционойдный тип строения центральной зоны; септы второго порядка длинные, часто заходящие в табуляриум.

Lophophyllum rosula (Eichwald, 1856)

Lophophyllum с диаметром чашки 14 мм и 45-ью септами, имеющими зафрентойдное расположение до самой поздней стадии развития; главная фоссула очень глубокая; главная септа укорочена; септы второго порядка или очень короткие, или отсутствуют.

EXPLANATION OF PLATES

Plate I

Streptelasma giganteum Kaljo

Fig. 1. Specimen No. 1/1957:
a — side view; b — calice view; × 1; c, d — cross sections, late neanic stage; e — cross section, ephebic stage; × 1.5.

Plate II

Streptelasma giganteum Kaljo

Fig. 1. Specimen No. 1/1957; longitudinal section, × 1.5.

Streptelasma ornata (Eichwald)

Fig. 2. Lectotype, No. 1/201: a — cross section, ephebic stage, × 4; b — part of cross section to show the fine structure.

Brachyelasma duncani (Dybowski)

Fig. 3. Specimen No. 1/232: a — cross section, neanic stage; b — cross section, ephebic stage; c — longitudinal section; × 2.
Fig. 4. Specimen No. 1/1595: a — cross section, ephebic stage; b — longitudinal section; × 2.

Kenophyllum subcylindricum Dybowski

Fig. 5. Specimen No. 1/199 (holotype of *Zaphrentis dilatata* Eichwald, 1856): cross section, neanic stage, × 1.5.
Fig. 6. Specimen No. 1/200 (holotype of *Zaphrentis tenuilamellata*, Eichwald, 1856): a — cross section, ephebic stage, × 1.5; b — part of the same cross section, × 40.

Plate III

Kenophyllum subcylindricum Dybowski

Fig. 1. Specimen No. 1/200: a — side view; b — calice view, × 0.5; c — cross section, late neanic stage, × 1.5.

Pycnactis aff. *mitratus* (Schlotheim)

Fig. 2. Specimen No. 1/238 (holotype of *Omphyma septigerum* Eichwald, 1830): a — side view; b — calice view; × 1; c, d — cross sections, late neanic or ephebic stage and ephebic stage, respectively, × 4.

Phaulactis cyathophylloides (Ryder)

Fig. 3. Specimen No. 1/3562: a cross section, ephebic stage; b longitudinal section; × 2.

Phaulactis sp.

Fig. 4. Specimen No. 1/3261: a — side view, × 1; b, c — cross sections, late neanic stage; d — cross section, ephebic stage; e — longitudinal section; × 4.

Plate IV

Entelophyllum articulatum (Wahlenberg)

Fig. 1. Specimen No. 1/1558: side view, to show lateral non-parricidal increase, × 1.
Fig. 2. Specimen No. 1/1572: side view, to show peripheral parricidal increase, × 1.
Fig. 3. Specimen No. 1/1557, corallite from the phaceloid colony: a — cross section; b — longitudinal section; × 4.
Fig. 4. Specimen No. 1/1575, corallite from the phaceloid-ceriod colony: a — cross section; b — longitudinal section; 4 ×.

Entelophyllum losseni (Dybowski)

Fig. 5. Specimen No. 1/217: a — side view, × 0.5; b — cross section; c — longitudinal section; × 4.

Plate V

Carinophyllum confusum (Počta)

Fig. 1. Specimen No. 1/1593 (holotype of *Cyathophyllum pileolus* Eichwald, 1829): cross section, ephebic stage, × 4.
Fig. 2. Specimen No. 1/240 (holotype of *Pachyphyllum gibberosum* Eichwald, 1830): a — side view, × 1; b — cross section, ephebic stage, × 4.

Sclerophyllum sokolovi Reiman

Fig. 3. Specimen No. 1/1581: a — cross section; b — longitudinal section; × 2.

Diplophyllum luxurians (Eichwald)

Fig. 4. Lectotype, No. 1/234: a — the surface of colony, × 1; b — separate calicies; c — cross section; d — longitudinal section; × 5.

Plate VI

Cyathophylloides kassariensis Dybowski

Fig. 1. Specimen No. 1/136: a — cross section; b — longitudinal section; × 4.

Columnaria (?) vagranensis (Soshkina)

Fig. 2. Specimen No. 1/262: a cross section; b longitudinal section; × 2.

Spongophylloides grayi (M.-Edwards & Haime)

Fig. 3. Specimen No. 1/263: cross section, ephebic stage, × 2.

Spongophylloides perfecta (Wedekind)

Fig. 4. Specimen No. 1/1411: a — cross section, ephebic stage; b — longitudinal section; × 2.

Grypophyllum vermiculare (Goldfuss)

Fig. 5. Specimen No. 1/222: a — cross section, ephebic stage; b — longitudinal section; × 2.

Tryplasma loveni (M.-Edwards & Haime)

Fig. 6. Specimen No. 1/236 (holotype of *Omphyma fastigatum* Eichwald): a — side view; b — calice view; × 1; c — cross section; d — longitudinal section; × 5.

Gukoviphyllum septatum (Bulvanker)

Fig. 7. Specimen No. 1/1550: a — cross section, ephebic stage; b — longitudinal section; × 2.

Plate VII

Tryplasma loveni (M.-Edwards & Haime)

Fig. 1. Specimen No. 1/1570: a — side view, × 1; b — cross section, × 4; c — part of this cross section, × 40; d — longitudinal section, × 4; e — part of this section to show the rhabdacanths in longitudinal section, × 40.

Microplasma impunctum (Lonsdale)

Fig. 2. Specimen No. 1/239: a-c — cross sections; d — longitudinal section; × 2; e — separate holacanths in the longitudinal section, × 40.

Zelophyllum (?) sp.

Fig. 3. Specimen No. 1/283: cross section, × 2.

Plate VIII

Grewingkia europaeum hosholmensis Kaljo

Fig. 1. Specimen No. 1/242 (holotype of *Clisophyllum eminens* Eichwald, 1830): a — cross section, late neanic stage; b — cross section, ephebic stage: c — longitudinal section; × 1.5.

Bighornia orvikui Kaljo

Fig. 2. Specimen No. 1/231 (holotype of *Clisophyllum cristatum* Eichwald, 1861): a — calice view, × 1; b — cross section, × 4.

Mucophyllum sp.

Fig. 3. Specimen No. 1/239 (holotype of *Omphyma discus* Eichwald, 1856): a — base of corallum; b — side view; c — calice view; × 1; a — part of cross section; e — longitudinal section; × 2.

Plate IX

Dibunophyllum pachyseptatum n.sp.

Fig. 1. Specimen No. 1/198, Aleksin City, Viséan: a — longitudinal section, × 2; b — transverse section, ephebic stage, × 1.

Fig. 2. Specimen No. 1/197, holotype: the same locality and age; a, b — transverse sections of the ephebic stage, × 1.

Dibunophyllum percrassum Gorsky, 1951

Fig. 3. Specimen No. 1/243, Borovitshi City, Oka Stage, Upper Viséan: a — transverse section; b — longitudinal section, parallel to the columella; × 1

Amplexocarinia alternans (Eichwald, 1856)

Fig. 4. Specimen No. 1/208, lectotype. Sterlitamak Hill, Lower Permian Sakmarian and Artinskian Stages: transverse section, × 3.

Aulophyllum fungites (Fleming, 1828)

Fig. 5. Specimen No. 1/245 (holotype of *A. inflexum* Eichwald, 1861), Aleksin and Mjatshkov Cities, Lower Carboniferous, Viséan: a — longitudinal section; b — transverse section, ephebic stage; × 2.

Clipsiophyllum subturbinatum Eichwald, 1861

Fig. 6. Specimen No. 1/244, lectotype, Aleksin City, Viséan: a — transverse section; b — longitudinal section; × 2.

Plate X

Lophophyllum rosula (Eichwald, 1856)

Fig. 1. Specimen No. 1/214, lectotype, Aleksin City, Viséan, probably Aleksin Stage: a — calice view; b — side view; × 4.

„Zaphrentis" arietina Fischer, 1837

Fig. 2. Specimen No. 1/207, Sterlitamak Hill, Lower Permian, Sakmarian-Artinskian Stages: a, b — transverse sections, × 2.

Caninia jerofeewi (Stuckenberg, 1904)

Fig. 3. Specimen No. 1/215 (holotype of *Anisophyllum connivens* Eichwald, 1861), Aleksin City, Viséan, probably Aleksin Stage: a, b — successive transverse sections, ephebic stage, × 2.

Corwenia eichwaldi n.sp.

Fig. 4. Holotype No. 1/252, Borovitshi City, Oka Stage, Upper Viséan: a — longitudinal section; b — transverse section; × 3.

Plate XI

Gshelia rouilleri Stuckenberg, 1888

Fig. 1. Specimen No. 1/211 (holotype of *Lophophyllum solare* Eichwald, 1861), Mjatshkovo village, Mjatshkov Stage: a — view of calice; b — view of the cardinal quadrants; c — side view; × 4.

Palaeosmilia murchisoni M.-Edwards & Haime, 1848

Fig. 2. Specimen No. 1/223, Kamensk Uralskij City, Lower — Middle (?) Carboniferous: a, b — transverse sections, ephebic stage; c — somewhat oblique longitudinal section; × 1.

Fig. 3. Specimen No. 1/1225, the same locality and age: transverse section, ephebic stage, × 1.

Lithostrotion (Siphonodendron) junceum (Fleming, 1828)

Fig. 4. Specimen No. 1/255, Kamensk Uralskij City, Lower — Middle (?) Carboniferous: longitudinal section, × 3.

Fig. 5. Specimen No. 1/1604, the same locality and age: a — longitudinal and oblique sections; b — transverse section; × 2.

Plate XII

Lithostrotion (Siphonodendron) cf. martini M.-Edwards & Haime

Fig. 1. Specimen No. 1/1412, Sverdlovsk City, Upper Devonian (?) to Lower Carboniferous: a — longitudinal section, b — transverse section.

Fig. 2. Specimen No. 1/1414, the same locality and age: a — transverse section; b — longitudinal section.

Lithostrotion (Lithostrotion) intermedium Eichwald, 1861

Fig. 3. Specimen No. 1/1413, lectotype, Tshu River, age not precised: a — longitudinal section without columella; b — longitudinal section with columella. Inked and bleached photograph; c — oblique section; d-f — transverse sections.

Petalaxis mccoyana (M.-Edwards & Haime, 1851)

Fig. 4. Specimen No. 1/250, Mjatshkovo village, Middle Carboniferous: a — transverse section; b — longitudinal section.

All figures × 2.

Plate XIII

Lonsdaleia ornata Dobroljubova, 1958

Fig. 1. Specimen No. 1/1415, Borovitshi City, Oka Stage, Upper Viséan: a — transverse section; b — longitudinal section.

Fig. 2. Specimen No. 1/1609, Aleksin City, Viséan: a, b — successive transverse sections.

Fig. 3. Specimen No. 1/256, Borovitshi City, Oka Stage, Upper Viséan: a — transverse section; b — longitudinal section.

All figures × 2.

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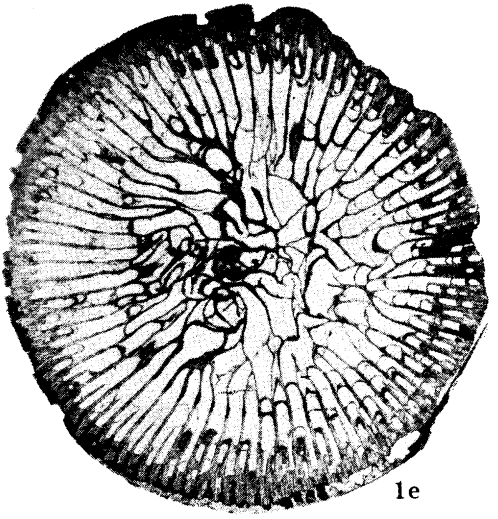

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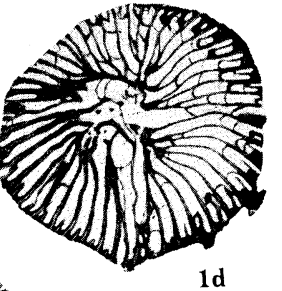

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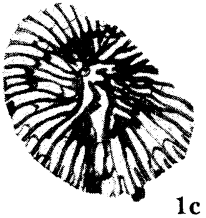

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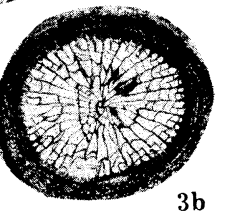

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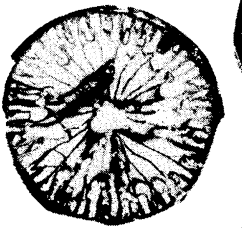

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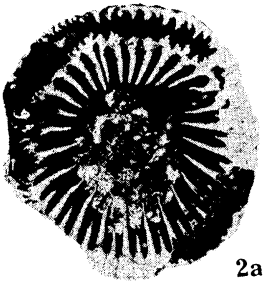

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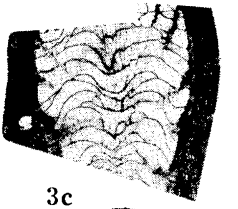

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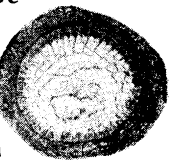

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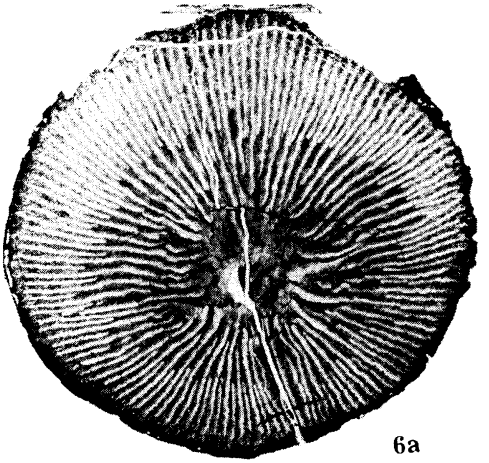

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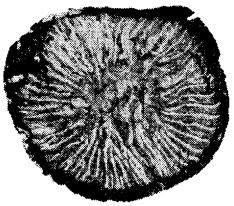
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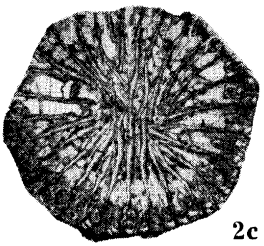
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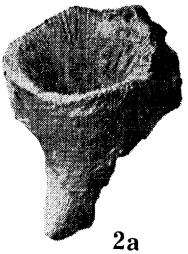
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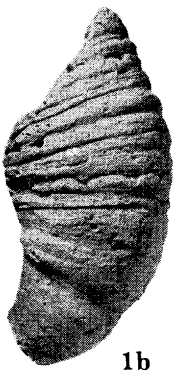
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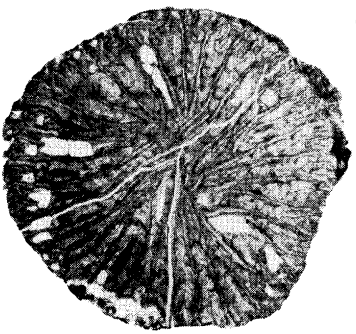
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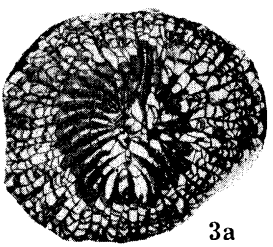
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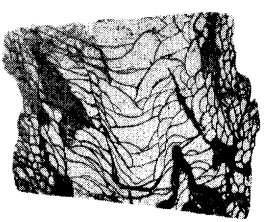
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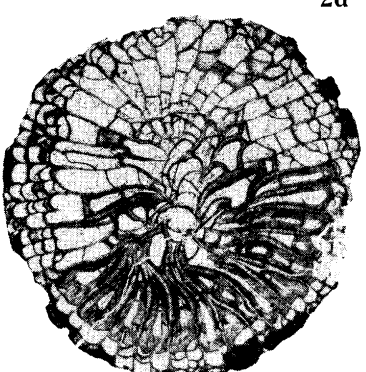
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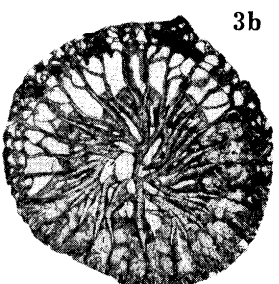
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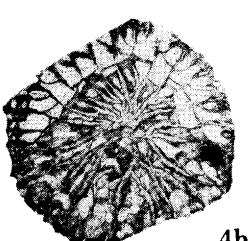
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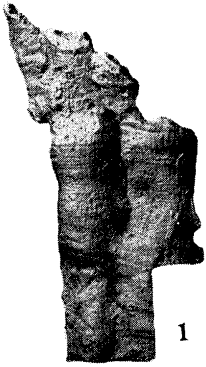
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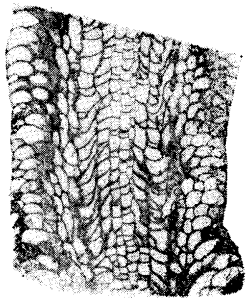
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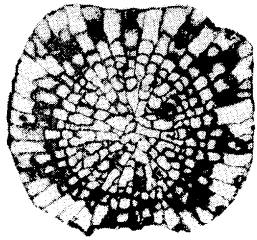
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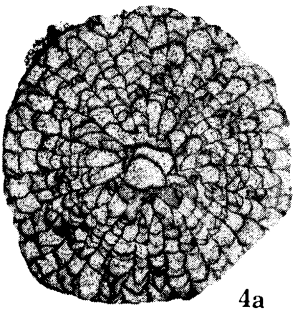
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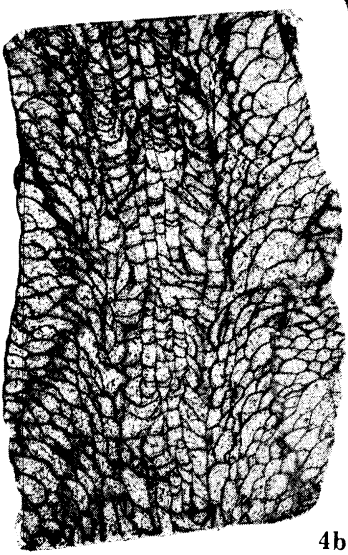
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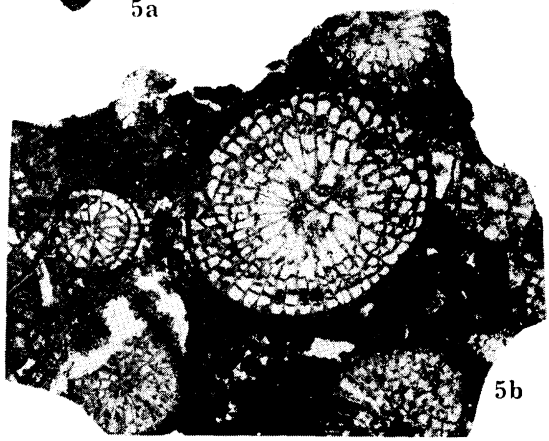
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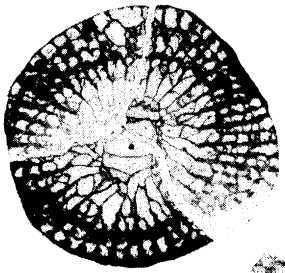

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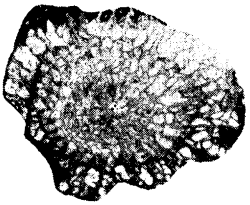

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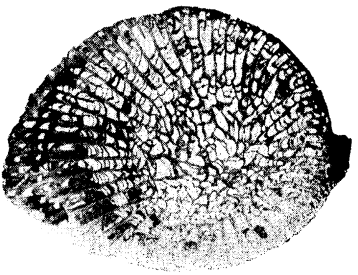

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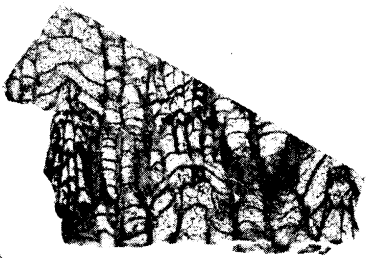

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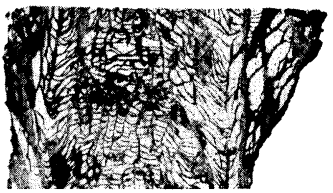

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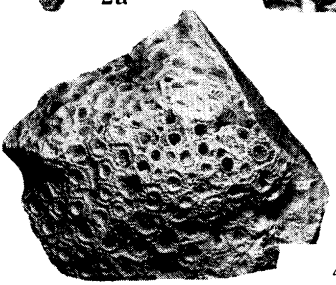

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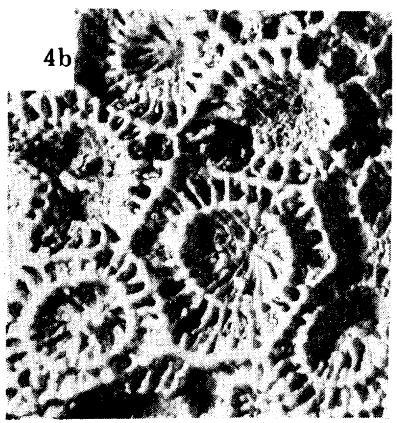

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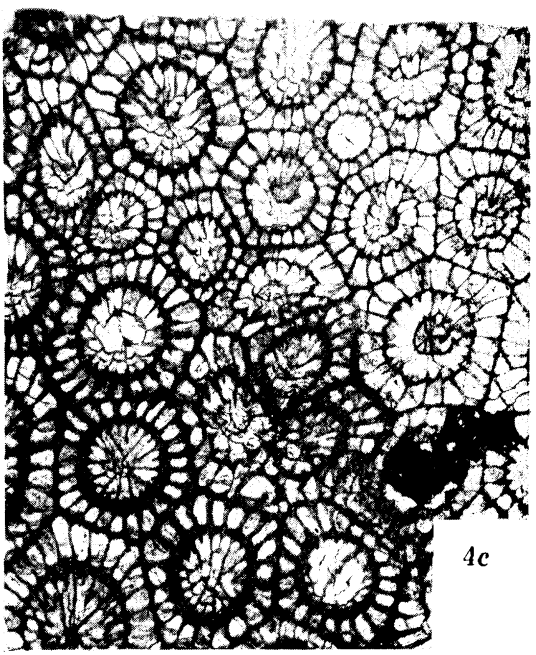

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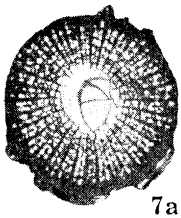
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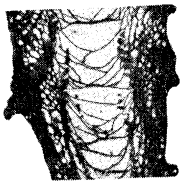
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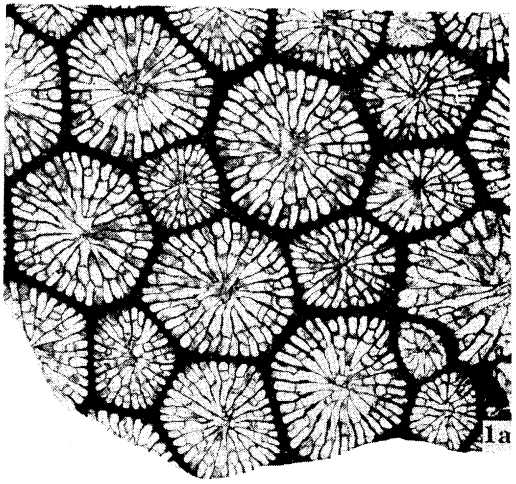
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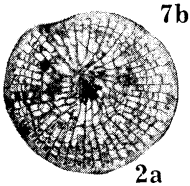
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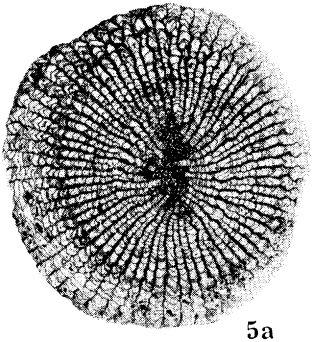
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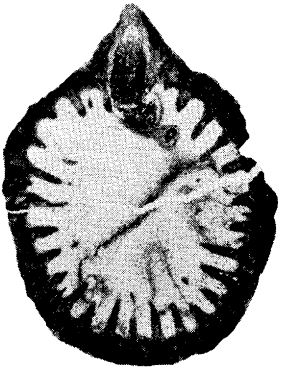
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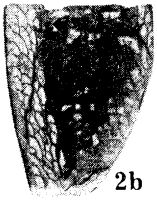
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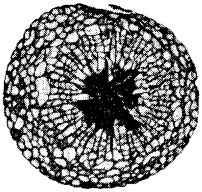
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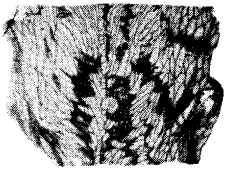
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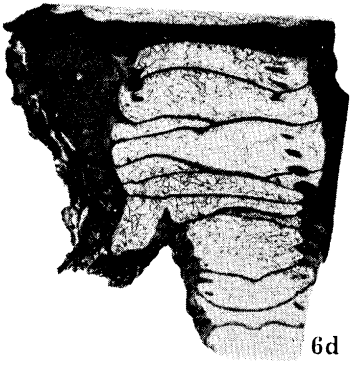
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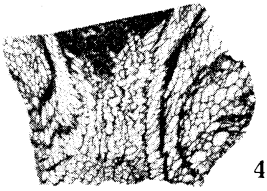
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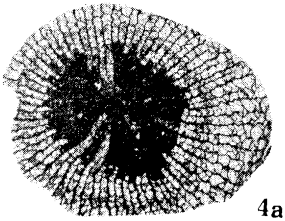
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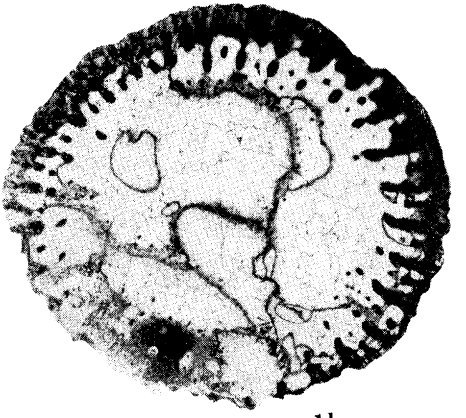

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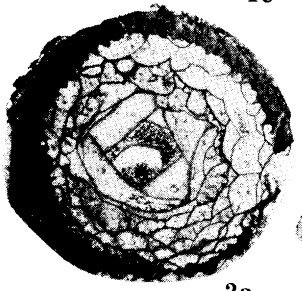

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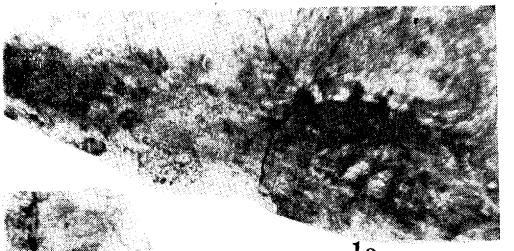

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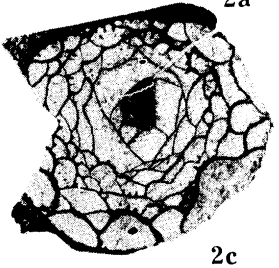

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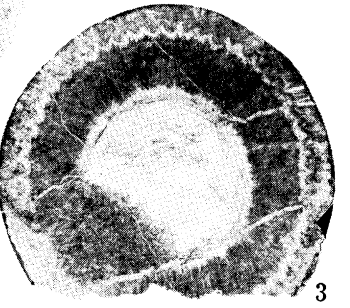

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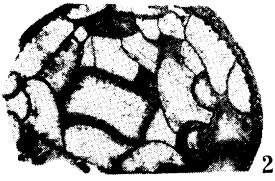

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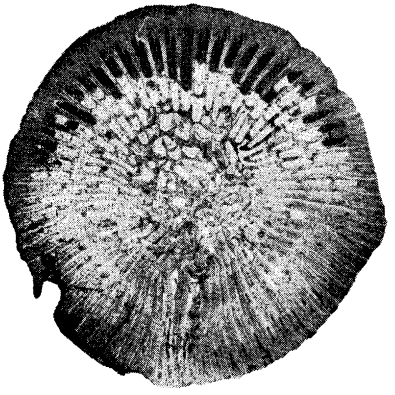

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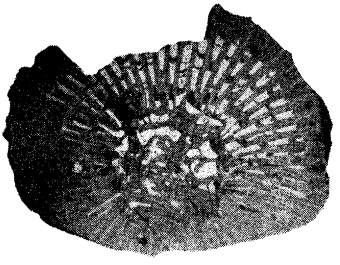

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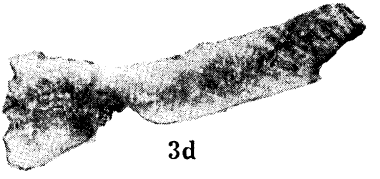

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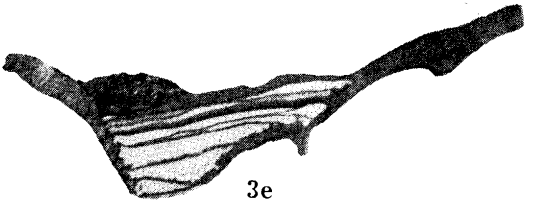

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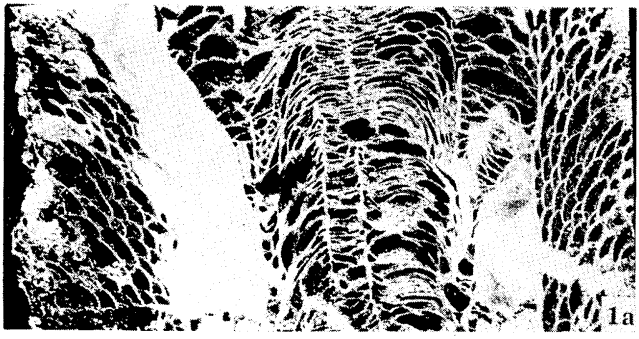
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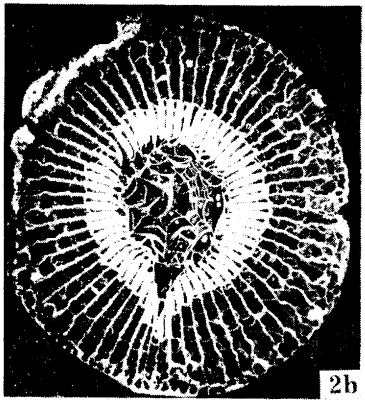
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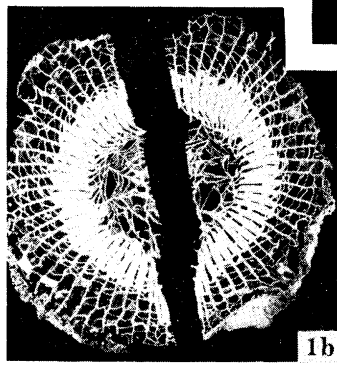
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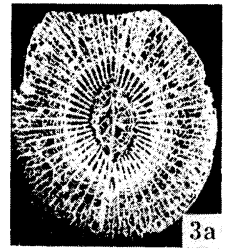
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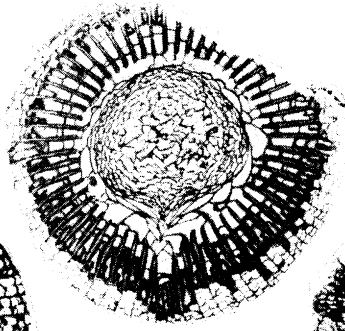
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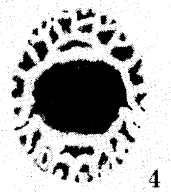
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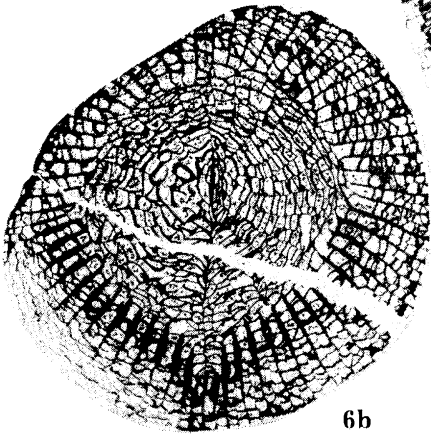
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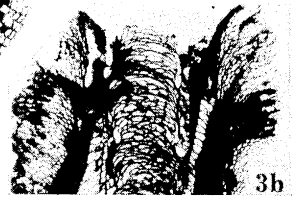
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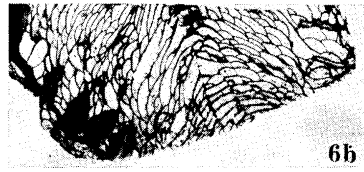
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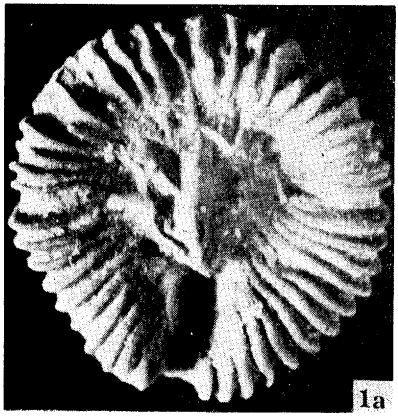
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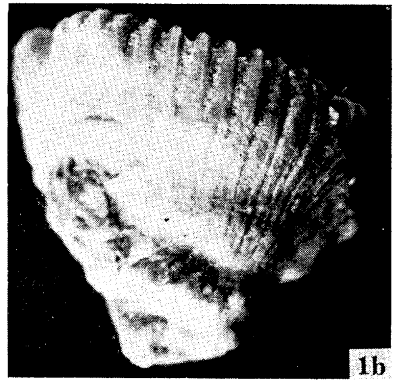
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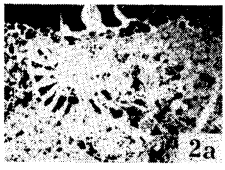
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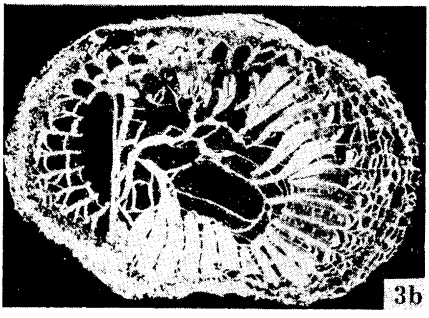
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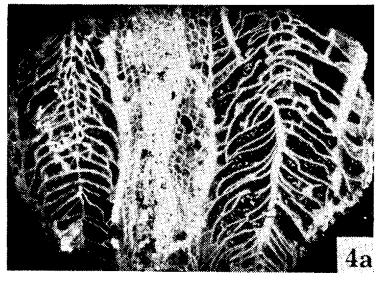
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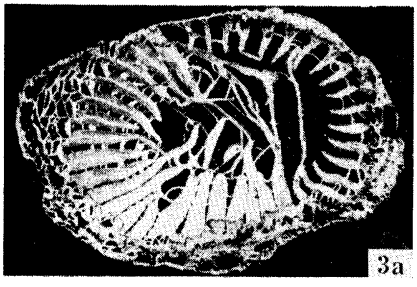
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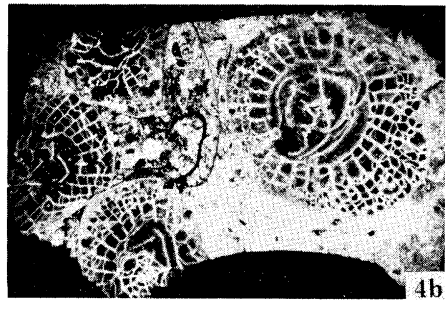
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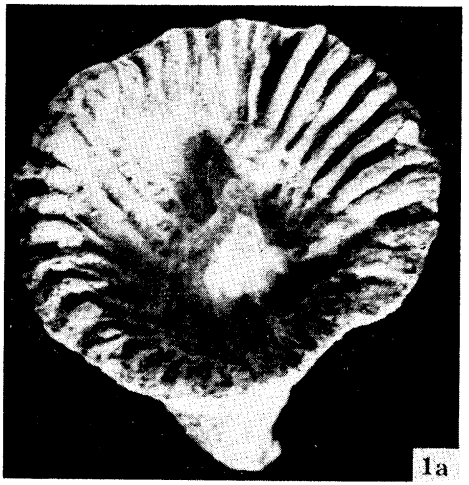
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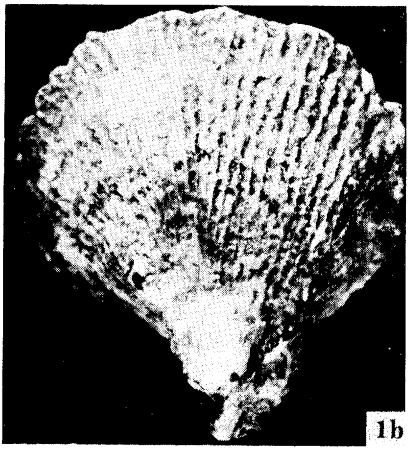
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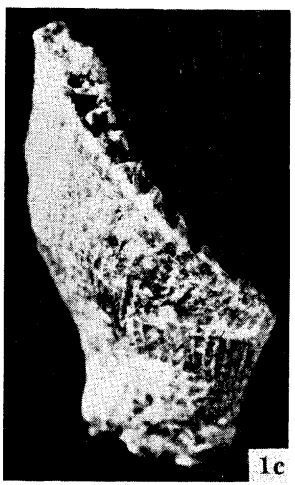
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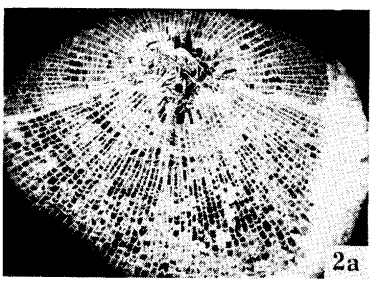
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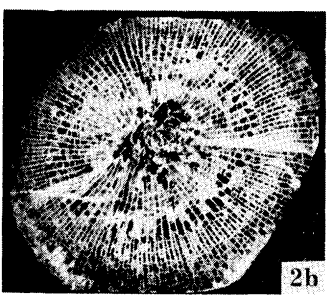
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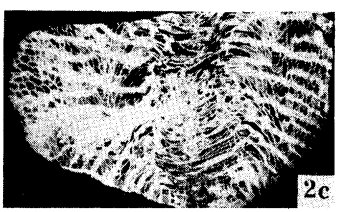
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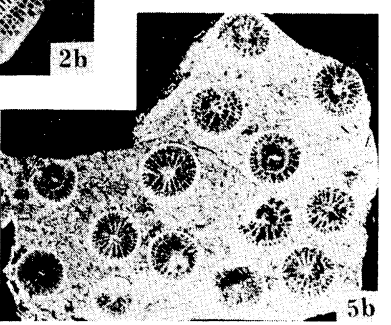
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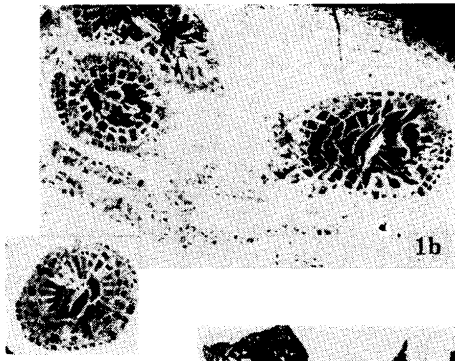
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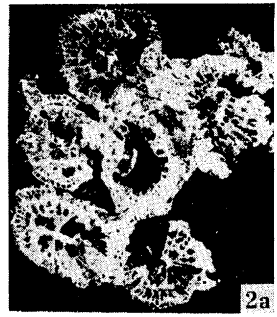
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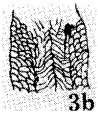
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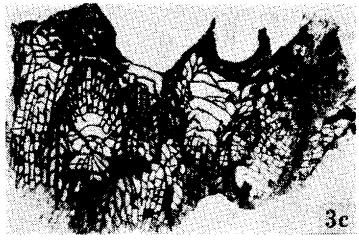
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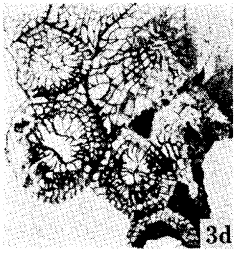
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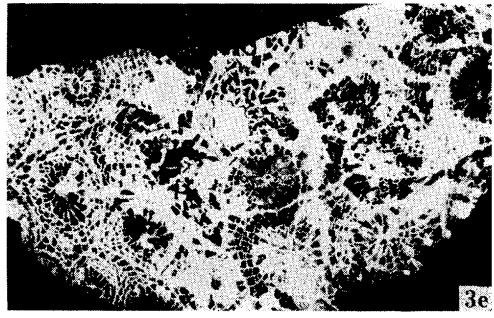
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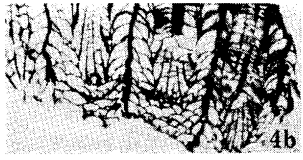
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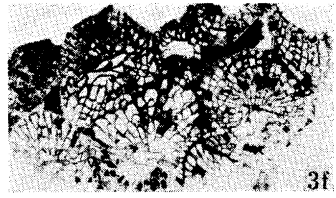
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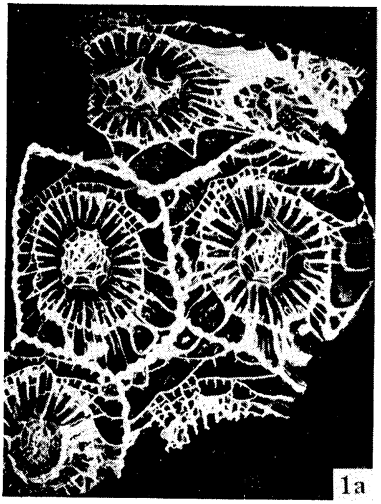
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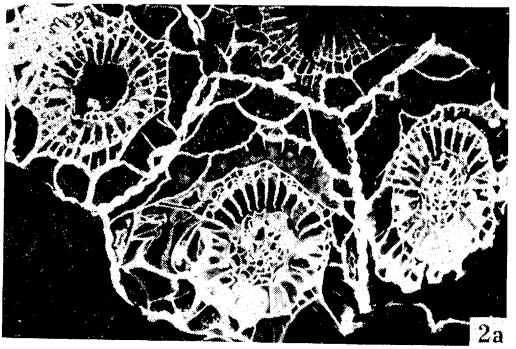
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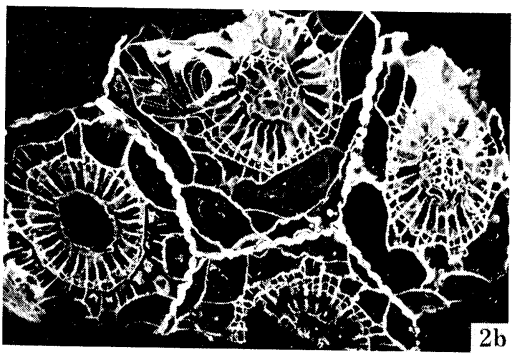
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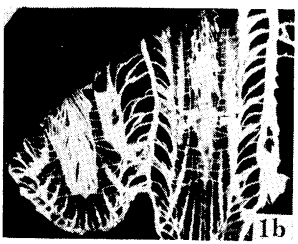
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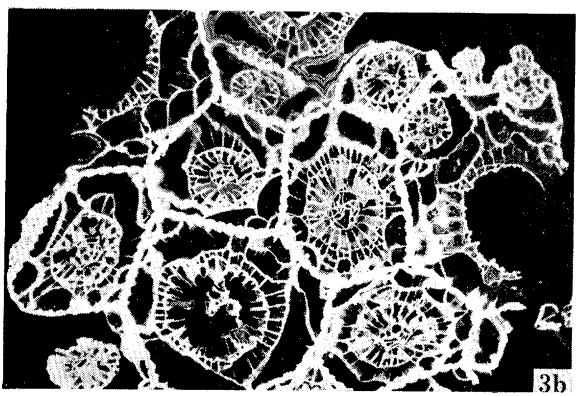
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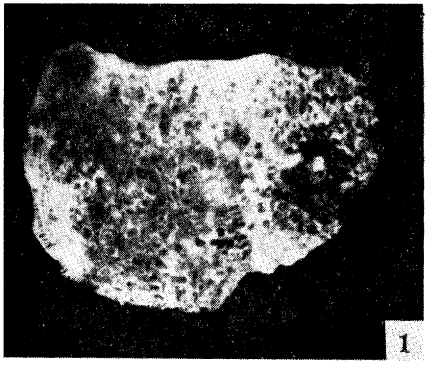
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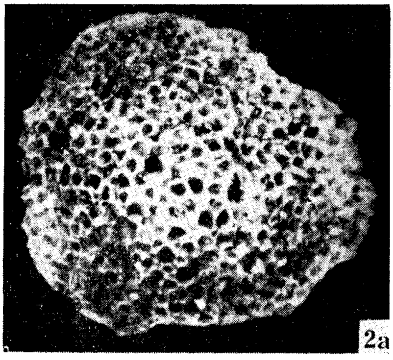
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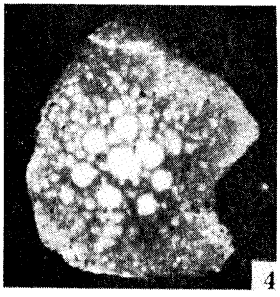
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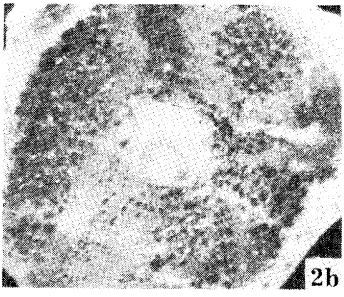
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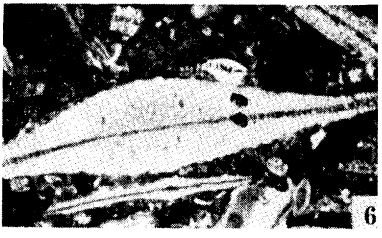
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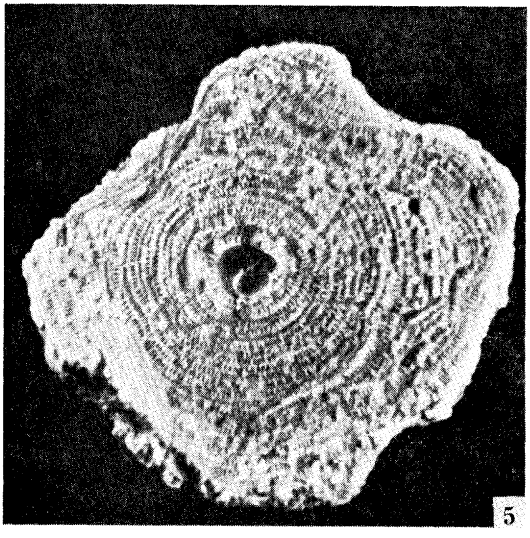
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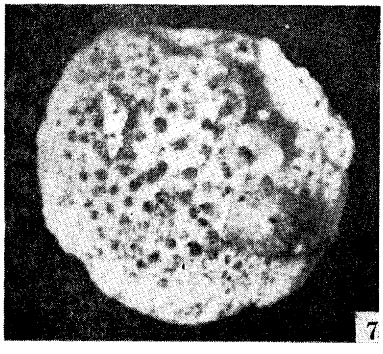
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