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TABULATA FROM THE GIVETIAN OF THE SOUTH-EASTERN POLAND

Abstract. — The characteristics of a Tabulata assemblage from the Devonian of the Lublin area are given; the coral-bearing strata are correlated with the Givetian of other parts of Poland as well as west and east European regions.

INTRODUCTION

The Devonin of the Lublin area has been investigated by the Geological Institute of Poland and the petroleum industry since the sixties. Stratigraphic, petrographic and palaeontological analyses of the core material (see Pajchlowa, 1968, 1975) have shown that the section of the Devonian is complete in the Radom-Lublin area, ranging from the Silurian-Devonian junction beds to the Upper Famennian, the Gedinnian and the Lower Siegenian strata, developed in marine facies, yield innumerous fragments of Coelenterata. The Upper Siegenian and the Emsian are developed in the Old Red facies and the Middle and Upper Devonian — in the carbonate facies. Coelenterata are known from the lowermost Eifelian, Givetian and Frasnian. Tabulata are most common in the Givetian.

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TABULATA FROM THE DEVONIAN OF THE SOUTH-EASTERN POLAND

The Devonian deposits discussed in the paper originated in the sea which was occupying the central and southern Poland since the Silurian. The sea was connected with the basin of the Harz, Rheinische Schiefergebirge and Ardennes in the west and with shallowing Volhynian and Podolian basins existing from the Silurian times, in the east (Pajchlowa, 1968). It was locked from the south by the land uplifted in result of the Caledonian orogeny; from the north-east — by the elevated land areas of the East European Platform. The onset of carbonate deposition and the appearance of coelenterates in Poland took place at the turn of the Early and Middle Devonian. The sea transgressed during the Middle Devonian the early-Paleozoic massifs of the southern Poland and the Old Red land of the north-eastern Poland. The submerged early-Paleozoic massifs effected distribution and development of reef facies during the Devonian.

During the Givetian carbonates were deposited throughout a large part of Poland. The sedimentary environment was favourable for the development of coelenterates (Stromatoporoidea, Tabulata and Tetracoralla). Coelenterate assemblages were rapidly changing along with the changes in bathymetry and in result of marked mobility of the sea bottom and vivid action of the agents responsible for denudation of the neighbouring land areas. The Lublin area is situated between the Holy Cross Mts and the Bug river. Here the Devonian deposits occur in a zone stretching eastwards from Radom to the state boundary. Their thickness is fairly large, exceeding 2,500 m throughout the area. The lowermost Lower Devonian (Gedinnian and Lower Siegenian) is represented by marine deposits; the upper Lower Devonian (Siegenian and Emsian) — by brackish-terrestial deposits. The Middle Devonian is characterized by predominance of carbonate deposits: marls, limestones, and dolomites, usually rich in faunal remains. The thickness of the Eifelian and Givetian is estimated at about 100 and 300 m, respectively. The rocks with corals were pierced by several boreholes (Bąkowa IG-1, Płusy IG-1, Lublin IG-1, Kock IG-2 and Korczmin IG-1 boreholes).

Bąkowa IG-1 borehole displayed the most complete coral bearing profile of the Devonian. The strata have been assigned to the Eifelian, Givetian and Frasnian (Pajchlowa, 1975):

Eifelian (2433.8—2394 m) begins with sandstones overlayed by limestone-dolomitic rocks. Brachiopods, gastropods, crinoids and Coelenterata were found there (Table 1).

Givetian (2394.5—1462.7 m) comprises clay-carbonate deposits; this section was divided into six series (Pajchlowa, 1975):

1. Basal series comprising dolomites and *Amphipora* limestones with *Amphipora* banks.

Table 1

DISTRIBUTION OF THE TABULATA, HELIOLITIDA AND CHAETETIDA IN THE GIVETIAN OF THE LUBLIN REGION

Species \ Bore-holes	Bąkowa IG-1	Płusy IG-1	Kock IG-2	Korczmin IG-1	Tyszowce IG-2	Lublin IG-1
Favosites goldfussi d'Orbigny		+				
Thamnopora alta (Tchernychev)	+					
Thamnopora boloniensis (Gosselet)		+				
Thamnopora cervicornis (de Blainville)	+			+		
Thamnopora reticulata (de Blainville)		+				
Thamnopora reticulata legibilis Sokolov		+				
Alveolites maillieuxi Salee *sensu* Lecompte		+				
Alveolites parvus Lecompte	+	+				
Alveolites surborbicularis Lamarck	+					
Alveolitella fecunda (Salée in Lecompte)	+			+		
Crassialveolites crassus (Lecompte)	+					
Caliapora battersbyi (Milne-Edwards & Haime)		+				
Coenites laminosa Gürich	+	+		+		
Scoliopora denticulata (Milne-Edwards & Haime)	+	+	+	+	+	+
Heliolites porosus (Goldfuss)		+				
Chaetetes lonsdalei Etheridge & Foord		+				
Chaetetes yunnanensis (Mansuy) emend Fontaine				+		

2. A series of black and spotty claystones with marly limestone intercalations and black siltstone at the base; the limestone layers yield Tabulata (Table 1).

3. A series of gray brachiopod-bearing claystones with marly and marly limestone intercalations yielding branching Tabulata (e.g. *Coenites laminosa* and *Thamnopora cervicornis*).

4. A series of limestones and claystones (1996.5—1711 m) comprises limestones rich in coelenterates intercalating with claystones yielding solitary Tetracoralla and brachiopods. Tabulata are represented by: *Thamnopora cervicornis, T. tumefacta, T. alta, Alveolites parvus, Alveolitella fecunda,*

Table 2

DISTRIBUTION OF THE COMMON SPECIES OF TABULATA IN THE DEVONIAN OF USSR, POLAND AND BELGIUM

SPECIES	USSR							POLAND			BELGIUM		
	Main Devonian Field	Central Devonian Field		N-E slope of the Russian Platform		West Ural Mts							
	F	G	F	G	F	E+G	F	E	G	F	E	G	F
Favosites goldfussi d'Orbigny				+		+			+		+	+	+
Favosites goldfussi eifeliensis (Penecke)						+		+			+		
Favosites saginatus (Lecompte)						+					+	+	
Favosites spinosus (Lecompte)						+					+		
Thamnopora angusta Lecompte						+		+	+			+	
Thamnopora bolonsiensis (Gosselet)							+		+	+			+
Thamnopora cervicornis (de Blainville)	+					+			+			+	
Thamnopora polyforata (Scholtheim)	+	+			+		+		+		+	+	
Thamnopora reticulata (de Blainville)						+		+	+	+	+	+	+
Thamnopora reticulata legibilis Sokolow		+							+	+		+	

Thamnopora tumefacta Lecompte				+		+		+	+		+	+	
Cladopora gracilis Lecompte							+	+		+			+
Alveolites cavernosus Lecompte						+						+	
Alveolites complanatus Lecompte			+							+			+
Alveolites duponti Lecompte			+				+						+
Alveolites maillieuxi Salée *in* Lecompte		+		+		+			+	+		+	
Alveolites multiperforatus Salée	+			+			+			+			+
Alveolites parvus Lecompte			+						+	+			+
Alveolites straeleni Lecompte						+					+		
Alveolites suborbicularis Lamarck	+		+				+		+	+			+
Alveolites suborbicularis lamellosa Lecompte			+		+								+
Alveolites taenioformis Schlüter						+			+	+	+		
Crassialveolites crassus (Lecompte)				+		+			+	+		+	
Alvolitella fecunda (Lecompte)							+		+	+		+	+
Alveolitella subaequalis (Milne-Edwars & Haime)							+						+
Caliapora battersbyi (Milne-Edwars & Haime)						+			+			+	
Syringopora eifeliensis Schlüter						+						+	

Crassialveolites crassus, Placocoenites escharoides and *Scoliopora denticulata.* 5. An overlying series of limestones and dolomites with coelenterates (1711—1554 m) yields numerous stromatoporoids. tabulates and tetracorals. Tabulata are represented by three species: *Thamnopora cervicornis, T. alta* and *Alveolitella fecunda.*

Frasnian (1462—1598 m). Corals (Tetracoralla and Tabulata) are very common only in limestones of the lower part of that stage, completely disappearing in the top part which is represented by marly limestones and claystones with brachiopods, crinoids, and fragments of vertebrates.

According to Pajchlowa (1975) there are 16 complexes with biostromes built by coelenterates (Stromatoporoidea, Tabulata, Tetracoralla). Biostromes are separated one from another by claystones with brachiopods, crinoids, innumerous branching Tabulata, and solitary Tetracoralla. Distinction of the assemblages of guide species of corals from each biostrome may markedly contribute to a correlation of the coral faunas with those from the Devonian of other regions.

Although the borehole Bąkowa IG-1 is situated in proximity to the Holy Cross Mts there are only two species known from both regions. The remaining species, except for *Alveolites parvus*, hitherto known from the Frasnian of Poland, were recorded in the Givetian of Belgium. The stratigraphic ranges of the majority of the species are confined to the Givetian (Tables 1-2). *Coenites laminosa* has been hitherto known from the Givetian of Poland only. *Thamnopora cervicornis* is known in Poland as well as in Belgium (Table 2) throughout the whole of Givetian. In Belgium *Crassialveolites crassus* is known from the Givetian, whereas in Poland it has been known from the Frasnian of the Holy Cross Mts only. Some species appeared as early as the Eifelian (Table 2) and entered the beds from the Fromelennes in Belgium (Table 2) yielding coral fauna of a mixed, Givetian-Frasnian character.

The borehole Płusy IG-1 (1310—1500 m). The Givetian pierced by this borehole is represented by (A. Miłaczewski, unpublished report, 1974) alternating limestones, claystones, marls and marly limestones black to grayblack in colour and rich in organic remains including numerous fragments of corals. Some corals derived from core material are typical of the Givetian of Poland and Belgium (Tables 1-2). Tabulate fauna from that borehole is closer to Givetian fauna from the northern part of the Holy Cross Mts than to that from the borehole Bąkowa IG-1 as in the latter occur such species as *Chaetetes* (?) *lonsdalei, Favosites goldfussi* and *Coenites laminosa* typical of the Givetian of the northern part; up to the present they have not been recorded from the southern part of the Holy Cross Mts. All the species derived from the Givetian of Płusy IG-1 are known from the Givetian of Poland and Belgium, with the exception of

Alveolites mailleuxi known also from the Frasnian. *Favosites goldfussi* is known in the Ardennes, from the Fromelennes beds. *Coenites laminosa* was recorded from the Givetian of both Bąkowa IG-1 and Płusy IG-1 boreholes.

The borehole Korczmin IG-1 (1314—2476.1 m). Coral-bearing Devonian strata are represented by knobby dark-brown limestones from the depth intervals 1313.2—1314.4 m, 1942—2020 m, 2025—2037 and 2465.7—2476.1 m. The species recorded from the core material are typical of the Givetian of Poland and the Ardennes. *Alveolitella fecunda* is present in the beds from Fromelennes in the latter region (Table 2).

Lublin IG-1 borehole penetrated coral-bearing limestones series at the depths 3835—4200 m (A. Miłaczewski, unpublished report, 1974). The series comprises dark organogenic limestones with stromatoporoids and corals. Limestones from the depths 3837.7—3891 m yielded Tabulata represented only by a single species *Scoliopora denticulata*. The colonies belonging to this species are excellently preserved. The species is known from the Givetian of the north-western Poland (Miastko-1 borehole) and the Cracow-Silesian region (Dubie and Siedlec) and the Dinant basin of Belgium (Gib, Gic, Gid). It is also known from the Fromelennes beds in Belgium, not from the Frasnian F2 (see Tables 1-2).

Kock IG-2 borehole penetrated carbonate series comprising dark-brown limestones with branching corals (depths 3101—3212 m). A single representative of Tabulata, *Scoliopora denticulata*, typical of the Givetian of Poland and Belgium (Tables 1-2) was found at the depths 3101—3121 m.

CORRELATION OF CORAL-BEARING GIVETIAN STRATA OF POLAND BELGIUM AND EAST EUROPEAN PLATFORM

Tabulata seem to be as numerous in the Givetian of the Lublin area as in contemporaneous strata from the Holy Cross Mts and, presumably, the north-western Poland (Table 2) wherefrom only those derived from core material from one borehole (Miastko 1) were studied up to the present (Stasińska, 1969). The majority of species reported from the Givetian of Poland is known from the contemporaneous strata of Belgium (Table 2).

In Belgium (Dinant basin and Vesdre massif) some Givetian species are known in so called Fromelennes (F1). The beds from Fromelennes are considered as transitional between the Givetian and Frasnian as they yield a mixed, Givetian-Frasnian fauna. From the lithological point of view these beds seem closer to the Givetian than to Frasnian. Moreover, the majority of Tabulata recorded here are known from the Givetian (Coen-Aubert, 1973, pp. 138—139). There is only one species known from both the Givetian and Frasnian (F2), *Thamnopora dubia*, whereas all the other

species of Tabulata and Tetracoralla known from the Givetian, do not enter the Frasnian (F2) and only some of them are recorded from the Fromelennes horizon. Therefore, it appears that the Fromelennes horizon is closer to the Givetian than to Frasnian from both palaeontological and lithological viewpoints. It is possible, therefore, to assign that horizon to the uppermost Givetian and to draw the Givetian-Frasnian boundary at the base of the zone F2. In such an interpretation the Frasnian would be limited to F2a-j. This seems to be justified by the fact that F2 deposits essentially differ from Givetian and those assigned to F1 in lithology and faunal (Tabulata and Tetracoralla) composition. Only some species of Frasnian Tabulata first appear in the Fromelennes horizon. Of 23 species recorded from the Frasnian of Belgium only 6 first appear in the lowermost F1 horizon in the Dinant basin and none in the area of the Vesdre massif.

The Devonian basin of Poland, although fairly distant and partly isolated, was connected with the basins of the Main and Central Devonian Fields, nort-eastern part of the East European Platform and western Urals.

Tabulata assemblage of Poland (not taking into account Auloporida) appears to be more numerous and more generically differentiated than that recorded from the Main Devonian Field wherefrom Tabulata are known from the Frasnian only (Sokolov, 1952). There are only 4 species known from both regions, including *Thamnopora cervicornis* and *T. polyforata* known in Poland from the Givetian only and *Alveolites suborbicularis* known from both Givetian and Frasnian (Table 3).

The Polish Tabulata assemblage markedly differ in specific composition from that known from the Central Devonian Field. The assemblages reported from the Givetian and Frasnian of the latter region comprise 4 and 15 species of Tabulata, respectively (Auloporida not taken into account; Sokolov, op.c). These assemblages markedly differ from the Polish ones in specific composition as only 3 Givetian and 3 Frasnian species are known from both regions (Table 2).

The Polish Tabulata assemblage (with the exception of the representatives of *Favosites*) shows greater specific differentiation than that from the south-eastern part of the East European Platform. Of 15 species known from the Platform areas 5 were also reported from Poland in the case of the Givetian; whereas, in the case of the Frasnian only one species out of 7 known from the Platform areas appears common to both regions (Table 2).

The Polish Tabulata assemblage appears specifically and generically similar to that known from the western Urals basin which comprises 70 species of the Eifelian, Givetian and Frasnian age (Sokolov, op.c.). Representatives of the genus *Favosites* are the exception here as they are very scarce in Poland. About 15 species are reported from both regions (Table 2).

SYSTEMATIC PART

Order **Favositida** Sokolov, 1962
Suborder **Favositina** Sokolov, 1950
Family **Favositidae** Dana, 1846
Genus *Favosites* Lamarck, 1816
Favosites goldfussi d'Orbigny, 1850
(pl. XXXI, figs 1a-c)

1958. *Favosites goldfussi* d'Orbigny; Stasińska, p. 189, pl. 1, fig. 3; pl. 5, figs 1-3.
1959. *Favosites goldfussi* d'Orbigny; Dubatolov, p. 30, pl. 8, figs 1a-b, 2a-w.
1967. *Favosites goldfussi* d'Orbigny; Tong-Dzuy Thanh, p. 10, pl. 1, fig. 1.

Material. — Five fragments of colonies (ZPAL T. XI/1-5) from the Płusy IG-1 borehole.

Remarks. — The colonies from Płusy show all features typical of the species and do not differ from the Givetian specimens of the Holy Cross Mts (Skały, Miłoszów) and from the Givetian of Belgium (Ardennes).

Occurrence. — Poland: Givetian — Holy Cross Mts (Grzegorzowice — Skały), Lublin region (Płusy IG-1 borehole). Belgium: Givetian — Ardennes. USRR: Eifelian — east-European Platform, Western Urals, Middle Asia, Kuznetsk Basin, Altai. Viet-Nam: Eifelian.

Family **Pachyporidae** Gerth, 1921
Genus *Thamnopora* Steininger, 1831
Thamnopora alta (Tchernychev, 1951)
(pl. XXXI, fig. 2; pl. XXXII, fig. 1)

1951. *Pachypora cervicornis* var. *alta* Tchernychev; Tchernychev, p. 47, pl. 11, fig. 13.
1959. *Thamnopora alta* (Tchernychev); Dubatolov, p. 24, pl. 2, figs 1-2 (*cum synonimica*).

Diagnosis. — See Dubatolov, 1959.

Material. — Four colonies (ZPAL T. XI/6-9) from the Bąkowa IG-1 borehole.

Description. — Colonies 20—30 mm in diameter. Calices polygonal rounded in cross-section. In axial part of colony the corallites thin-walled and polygonal in cross-sections. In peripheral region polygonal and rounded corallites open at right angles to the surface. In axial part corallites ranging 0.5—0.8 mm in diameter, in peripheral zone 1.0—1.4 mm. Thickness of walls varies 0.15—0.8 mm; microstructure radial-fibrous, median line weakly developed. Mural pores 0.2—0.25 mm in diameter, spaced 1.2—1.5 mm apart. Septal spines small, not always discernible. Tabulae thin, horizontal or inclined, concave, unequally spaced 0.4—1.0 mm apart. In peripheral zone tabulae more crowded and mostly horizontal.

Remarks. — The colonies from the Givetian of the Lublin region resemble specimens of the same age from the Kuznetsk Basin. From *T. barroisi* Lecompte, *T. alta* differs in having greater diameters of both corallites and mural pores and conspicuously thicker walls.

Occurrence. — Poland: Givetian — Lublin region (Bąkowa IG-1 borehole). USSR: Eifelian — Kuznetsk Basin; Devonian — Urals, Altai, Middle Asia. China: Devonian.

Thamnopora boloniensis (Gosselet, 1877)

1939. *Thamnopora boloniensis* (Gosselet); Lecompte, p. 122, pl. 17, fig. 1.
1976. *Thamnopora boloniensis* (Gosselet); Nowiński, pl. 5, figs 3-8 (*cum synonimica*).

Diagnosis. — See Dubatolov, 1959.

Material. — Two large fragments of colonies (ZPAL T. XI/10, 11) from the Płusy IG-1 borehole.

Remarks. — The colonies from the Givetian of the Lublin region possess all characters typical of the species including the great variability in wall thickness and corallite diameters. In many points they resemble *T. boloniensis* from the Frasnian of the Holy Cross Mts and Belgium.

Occurrence. — Poland: Givetian — Lublin region (Płusy IG-1 borehole), Cracow region (Dębnik); Frasnian — Holy Cross Mts, Sudetes, north-western Poland (Miastko-1 borehole). Belgium: Frasnian — Ardennes. USRR: Frasnian — Kuznetsk Basin.

Thamnopora cervicornis (de Blainville, 1830)

1958. *Thamnopora cervicornis* (de Blainville); Stasińska, p. 200, pl. 12, figs 1-3.
1959. *Thamnopora cervicornis* (de Blainville); Dubatolov, p. 104, pl. 32, figs 1-3, 4a-w; pl. 33, figs 1a-w (*cum synonimica*).

Diagnosis. — See Dubatolov, 1959.

Material. — Nineteen large fragments of colonies (ZPAL T. XI/12—30) from Bąkowa IG-1 and two fragments (ZPAL T. XI/31, 32) from Korczmin IG-1 boreholes.

Remarks. — The colonies from the Givetian of the Lublin region are typical for the species in all their characters. They differ from the Givetian material of the Holy Cross Mts in having larger colony dimensions ranging up to 14 mm in diameter. Similar dimensions have been recorded in colonies from the Kuznetsk Basin.

Occurrence. — Poland: Givetian — Lublin region (Bąkowa IG-1 and Korczmin IG-1 boreholes), Holy Cross Mts (Sitkówka). Belgium: Givetian — Ardennes. USSR: Givetian to Frasnian — east-European Platform, Western Urals, Middle Asia. North America: Givetian and Frasnian.

Thamnopora reticulata reticulata (de Blainville, 1830)

1958. *Thamnopora reticulata* (de Blainville); Stasińska, p. 203, pl. 14, figs 1-4; pl. 15, figs 1-3. (*cum synonimica*).
1958. *Thamnopora reticulata* (de Blainville); Tchudinova, p. 72, pl. 10, figs 1-4; pl. 11, figs 1-4; pl. 12, figs 1-3; pl. 13, figs 1-4; pl. 14, figs 1a-b.

Diagnosis. — See Tchudinova, 1958.

Material. — Seven large fragments of colonies (ZPAL T. XI/33—39) from the Płusy IG-1 borehole.

Remarks. — The colonies from the Lublin region possess all characters typical of *T. reticulata* from the Givetian of Belgium. They resemble the specimens from the Holy Cross Mts (Skały). At this locality, besides the colonies of typical dimensions, also larger ones were found, resembling those from the Eifelian and Givetian of the USSR (Tchudinova, 1958).

Occurrence. — Poland: Givetian — Lublin region (Płusy IG-1 borehole), Holy Cross Mts (Skały). Belgium: Eifelian through Frasnian — Ardennes. France: Devonian. Great Britain: Devonian. Spain: Devonian. USSR: Eifelian and Givetian.

Thamnopora reticulata legibilis Sokolov, 1952

(pl. XXXII, fig. 2a-c; pl. XXXIII, fig. 1a, b)

1952. *Thamnopora reticulata* (de Blainville) var. *legibilis* Sokolov: p. 64, pl. 12, figs 8-9.

Diagnosis. — See Sokolov, 1952.

Material. — Fragments of two colonies (ZPAL T. XI/40—41) from the Płusy IG-1 borehole.

Description. — Ramose colonies up to 9 mm in diameter. Corallites open at low angles to the surface and reaching up to 0.7 mm in diameter. In axial part of colony the corallites polygonal, about 1.4 mm in diameter, in peripheral region becoming polygonal rounded, up to 0.7 mm in diameter. Corallite walls with stereoplasmatic thickening, range 0.15—0.2 mm in thickness; on the surface of colony they are up to 0.6 mm thick. Stereoplasmatic tissue does not fill completely the lumina, so the corallites in cross-sections remain distinctly polygonal almost on their whole lenght. Mural pores 0.2—0.22 mm in diameter, spaced about 1 mm apart. Tabulae thin, horizontal, rarely oblique, convex and distant. No septal spines have been found.

Remarks. — The colonies from the Lublin region are almost identical to those from the Main Field of Devonian. This subspecies differs from *T. reticulata* in more strong and more regular stereoplasmatic thickening of walls, slightly irregular position of corallites to the colony surface and in more spaced mural pores. Polish material closely resembles that from the Givetian (Gid) of Dinant (Belgium) which probably should be assigned to this subspecies.

Occurrence. — Poland: Givetian — Lublin region (Płusy IG-1 borehole). Belgium: Givetian — Dinant Basin. USSR: Givetian — Main Field of Devonian.

Suborder **Alveolitina** Sokolov, 1959
Family **Alveolitidae** Duncan, 1872
Genus *Alveolites* Lamarck, 1801
Alveolites maillieuxi Salée *in* Lecompte, 1933

(pl. XXXIII, fig. 2a, b)

1933. *Alveolites maillieuxi* Salée; Lecompte, p. 36, pl. 3, figs 2-3.

1959. *Alveolites maillieuxi* Salée; Dubatolov, p. 146, pl. 77, figs 2a-b (*cum synonimica*).

Diagnosis. — See Dubatolov, 1959.

Material. — Four large fragments of colonies (ZPAL T. XI/42—45) from the Płusy IG-1 borehole.

Remarks. — *A. maillieuxi* is characteristic for the Givetian. The colonies from the Lublin region are almost identical to those from Belgium (Ardennes, Dinant). They slightly differ from the Kowala (Holy Cross Mts) specimens in having greater dimensions of corallites.

Occurrence. — Poland: Givetian — Lublin region (Płusy IG-1 borehole), Holy Cross Mts (Kowala). Belgium: Givetian — Ardennes, Dinant. USSR: Givetian — east-European Platform, the Western Urals, Kuznetsk Basin.

Alveolites parvus Lecompte, 1939

1939. *Alveolites parvus* Lecompte: Lecompte, p. 43, pl. 6, figs 1-3.

1958. *Alveolites parvus* Lecompte; Stasińska, p. 212, pl. 23, fig. 2 (*cum synonimica*).

Diagnosis. — See Lecompte, 1939.

Material. — Five large fragments of colnies (ZPAL T. XI/46—50) from the Bąkowa IG-1 and three colonies (ZPAL T. XI/51—53) from the Płusy IG-1 boreholes.

Remarks. — In Poland *A. parvus* is found mainly in the Givetian; in Belgium, so far, it was described from the Frasnian. This species resembles *A. suborbicularis* Lamarck, from which it differs in much smaller diameters of corallites.

Occurrence. — Poland: Givetian — Lublin region (Bąkowa IG-1, Płusy IG-1 boreholes), Holy Cross Mts (Pokrzywianka, Skały); Frasnian — Holy Cross Mts (Wietrznia, Psie Górki). Belgium: Frasnian — Ardennes. USSR: Frasnian — east-European Platform.

Alveolites suborbicularis Lamarck, 1801

1976. *Alveolites suborbicularis* Lamarck; Nowiński, pl. 9, figs 1a, b, 2 (*cum synonimica*).

Diagnosis. — See Dubatolov, 1959.

Material. — Four colonies (ZPAL T. XI/54—57) from the Bąkowa IG-1 borehole.

Remarks. — *A. suborbicularis* has the wide geographical distribution. The colonies from the Lublin region are in all features typical and they closely resemble the Givetian specimens from other regions of Poland.

Occurrence. — Poland: Givetian — Lublin region (Bąkowa IG-1 borehole), Cracow region (Dębnik); Frasnian — Holy Cross Mts (Wietrznia, Kadzielnia); Upper Devonian — Sudetes. Belgium: Frasnian — Ardennes. France: Givetian and Frasnian. Germany: Eifelian and Frasnian. USSR: Frasnian — east-European Platform, Western Urals. China: Middle Devonian. India: Upper Devonian. USA: Middle Devonian. Australia: Middle Devonian.

Genus *Alveolitella* Sokolov, 1952

Alveolitella fecunda (Salée *in* Lecompte) 1933

(pl. XXXIV, figs 1-3)

1933. *Alveolitella fecunda* (Salée); Lecompte, p. 57, pl. 9, figs 2-3.
1976. *Alveolitella fecunda* (Salée); Nowiński, pl. 7, figs 1a, c (*cum synonimica*).

Diagnosis. — See Dubatolov, 1959.

Material. — Eight fragments of colonies (ZPAL T. XI/58—65) from the Bąkowa IG-1 and two colonies (ZPAL T. XI/66, 67) from the Korczmin IG-1 boreholes.

Remarks. — The colonies of *A. fecunda* from the Polish Devonian most closely resemble those described by Lecompte (1933) from the Givetian of Belgium the only difference being in the dimensions: Polish colonies are much smaller, ranging from 10 mm (Holy Cross Mts, Cracow region) to 25 mm in diameter (Lublin region) — those from Belgium attain 40 mm in diameter. Polish colonies are also similar to those from the Kuznetsk Basin. Some regional differences are, however, present in Polish specimens: in axial part of colonies from the Lublin region the corallite diameters are slightly larger than those from the Cracow region.

Occurrence. — Poland: Givetian — Lublin region, Bąkowa IG-1, Korczmin IG-1 boreholes; Frasnian — Cracow region (Dębnik), Holy Cross Mts (Wietrznia). Belgium: Givetian and Frasnian — Ardennes. USSR: Givetian — Western Urals, Kuznetsk Basin, Kazakhstan.

Genus *Crassialveolites* Sokolov, 1955
Crassialveolites crassus (Lecompte) 1939

1939. *Alveolites crassus* Lecompte: Lecompte, p. 46, pl. 8, figs 1-2.

Diagnosis. — See Lecompte, 1939.

Material. — Eight colonies (ZPAL T. XI/68—75) from the Bąkowa IG-1 borehole.

Remarks. — This species is distinguished by a considerable thickness of the corallite walls. In this feature it approaches *C. domrachevi* (Sokolov) but in *C. crassus* the corallite diameters are greater and septal spines stronger. The Givetian specimens from the Lublin region are structurally less typical than those of the Polish Frasnian. Their corallite walls are thinner and calices are more polygonal in cross-sections. These minor differences, however, are not sufficient to erect a new species. The colonies from the Polish Frasnian are most similar to those from the Givetian of Belgium. The colonies from the Givetian of USSR, very typical in their general structure, are distinguished in having plate-like form of colonies.

Occurrence. — Poland: Givetian — Lublin region (Bąkowa IG-1 borehole), Frasnian — Holy Cross Mts (Kadzielnia, Wietrznia, Psie Górki), nort-western Poland (Miasto 1 borehole). Belgium: Givetian — Ardennes. USSR: Eifelian — east-European Platform; Eifelian -Givetian — the Western Urals, Kuznetsk Basin.

Genus *Caliapora* Schlüter, 1889
Caliapora battersbyi (Milne-Edwards & Haime, 1851)
(pl. XXIV, fig. 4)

1851. *Alveolites battersbyi* Milne-Edwards & Haime: p. 257.
1939. *Caliapora battersbyi* (Milne-Edwards & Haime); Lecompte, p. 136, pl. 19, figs 1-7.
1976. *Caliapora battersbyi* (Milne-Edwards & Haime); Nowiński, pl. 11, figs 1a, b, 2-3 (*cum synonimica*).

Diagnosis. — See Lecompte, 1939.

Material. — Three large fragments of colonies (ZPAL T. XI/76—78) from the Płusy IG-1 borehole.

Remarks. — *C. battersbyi* from the Givetian of the Lublin region is identical to that from the Givetian of the Ardennes (Lecompte, 1939). This species, in many points, is similar to representatives of the genera *Favosites* and *Squameofavosites*; radial pattern of corallites in colony resembles the genus *Favosites*, septal arrangement is similar to that of *Squameofavosites*. On these grounds the assignement of *Caliapora* to the Alveolitidae seems to be unjustified.

Occurrence. — Poland: Givetian — Lublin region (Płusy IG-1 borehole), Cracow region (Dębnik), north-eastern Poland (Miastko 1 borehole). Belgium: Givetian — Ardennes.

Genus *Coenites* Eichwald, 1829
Coenites laminosa Gürich, 1896

1896. *Coenites laminosa* Gürich: p. 146, pl. 5, figs 1a-d.
1909. *Coenites laminosa* Gürich; Sobolev, p. 519.
1958. *Coenites laminosa* Gürich; Stasińska, p. 219, pl. 29, figs 1-2, pl. 30, figs 1-3 (*cum synonimica*).

Diagnosis. — See Gürich, 1896.

Material. — Two colonies (ZPAL T. XI/79, 80) from the Bąkowa IG-1, four colonies (ZPAL T. XI/81—84) from the Płusy IG-1, and one colony (ZPAL T. XI/85) from the Korczmin IG-1 boreholes.

Remarks. — The Givetian specimens from the Lublin region show all typical features of colonies from the Holy Cross Mts of the same age.

Occurrence. — Poland: Givetian — Lublin region (Bąkowa IG-1, Płusy IG-1, Korczmin IG-1 boreholes), Holy Cross Mts (Skały, Pokrzywianka, Miłoszów).

Genus *Scoliopora* Lang, Smith & Thomas, 1940
Scoliopora denticulata (Milne-Edwards & Haime), 1851

1851. *Alveolites denticulata* Milne-Edwards & Haime: p. 258, pl. 16, figs 4, 4a.
1976. *Scoliopora denticulata* (Milne-Edwards & Haime); Nowiński, pl. 12, figs 1-5 (*cum synonimica*).

Diagnosis. — See Dubatolov, 1959.

Material. — Ten colonies (ZPAL T. XI/86—95) from the Bąkowa IG-1, eight colonies (ZPAL T. XI/96—103) from the Płusy IG-1, four colonies (ZPAL T. XI/104—107) from the Kock IG-1, four colonies (ZPAL T. XI/108—111) from the Korczmin IG-1, eleven colonies (ZPAL T. XI/112—122) from the Tyszowce IG-1 and six colonies (ZPAL T. XI/123—128) from the Lublin IG-1 boreholes.

Remarks. — *S. denticulata* from the Givetian of the Lublin region shows all typical features of the species from the Givetian of Belgium (Lecompte, 1939). The colonies are also almost identical to specimens from north-eastern Poland, described by Stasińska (1969). From the Givetian colonies of the Cracow region (Nowiński, 1976) they differ in having slightly smaller diameters both of branches and corallites.

Occurrence. — Poland: Givetian — Lublin region (Bąkowa IG-1, Kock IG-1, Korczmin IG-1, Lublin IG-1 and Tyszowce IG-2 boreholes), Cracow region (Dębnik), north-western Poland (Miastko 1 borehole). Belgium: Givetian — Ardennes. USSR: Lower Frasnian — Kuznetsk Basin.

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ANNA STASIŃSKA & ALEKSANDER NOWIŃSKI

TABULATA Z ŻYWETU POŁUDNIOWO-WSCHODNIEJ POLSKI

Streszczenie

W pracy podano wyniki badań dotyczące koralowców Tabulata z dewonu SE Polski. Materiały do badań pochodzą z obszaru lubelskiego i z Gór Świętokrzyskich. Ogółem opisano 13 gatunków. Korelacja osadów koralowych żywetu Polski wykazała,

że Tabulata w żywecie obszaru lubelskiego są równie liczne jak w żywecie Gór Świętokrzyskich (Stasińska, 1958), w żywecie obszaru Śląsko-Krakowskiego (Nowiński, 1976) i, o ile sądzić można ze szczupłych danych, z Polski północno-zachodniej (wiercenie Miastko 1; Stasińska, 1969).

Większość gatunków występujących w żywecie Polski jest znana również w żywecie Belgii (Ardeny). Na obszarze dewonu Belgii (basen Dinant, masyw Vesdre) niektóre gatunki żyweckie przechodzą do najniższego franu, do tzw. poziomu Fromelennes (F_1). Warstwy z Fromelennes są uważane za przejściowe pomiędzy żywetem i franem. Jednakże pod względem litologicznym i faunistycznym (Tabulata i Tetracoralla) poziom z Fromelennes jest bliższy żywetowi, wobec czego poziom ten należałoby zaliczyć do najwyższego żywetu i granicę pomiędzy żywetem i franem przesunąć wyżej, uznając dopiero poziom F_{2a} za podstawę franu.

Liczne gatunki Tabulata z żywetu Polski występują również w osadach tego piętra na platformie wschodnio-europejskiej, zwłaszcza w zachodnim Uralu. Charakteryzują się one znaczną liczbą gatunków wspólnych z Polską i Belgią.

АННА СТАСИНЬСКА & АЛЕКСАНДЕР НОВИНЬСКИ

ЖИВЕТСКИЕ ТАБУЛЯТЫ ЮГО-ВОСТОЧНОЙ ПОЛЬШИ

Резюме

В работе представлены данные изучения кораллов Tabulata из девона юго-восточной Польши. Материал для исследований был добыт на территории Люблинского региона и в Свентокшиских горах. В общем описано 13 видов. Корреляция кораллоносных отложений живета Польши доказывает, что табуляты распространены в таком же изобилии в живетских осадках Люблинского региона, как и Свентокшиских гор (Стасиньска, 1958), Силезской-Краковского региона (Новиньски, 1976) и, судя по небогатым материалам, северо-западной части Польши (скважина Мястко 1; Стасиньска, 1969).

Большинство видов, распространенных в живете Польши, встречается также в живете Бельгии (Ардены). В девоне Бельгии (Динанский бассейн, массив Вездре) некоторые живетские виды переходят в низы франского яруса, в так называемый горизонт Фромелен (F_1), считающийся переходным звеном между живетским и франским ярусами. Однако, по литологическим и фаунистическим признакам (Tabulata и Tetracoralla) горизонт Фромелен более близок живету, следовательно его нужно отнести к верхам живетского яруса, а границу между этим ярусом и франским ярусом следует проводить выше, по подошве горизонта F_{2a}.

Многочисленные виды Tabulata, известные из живета Польши, распространены также в отложениях этого яруса на Восточно-Европейской платформе, а также в девоне западного склона Урала. Среди них наблюдается много видов общих с территорий Польши и Бельгии.

EXPLANATION OF PLATES

All specimens are from the Givetian of Lublin area, SE Poland

Plate XXXI

Favosites goldfussi d'Orbigny

Fig. 1. *a* Central part of colony in cross-section, × 5; *b* cross section, × 5; *c* longitudinal section, × 5; ZPAL T. XI/1, Płusy IG-1 borehole, depth 1492.2—1496.7 m.

Thamonopora alta (Tchernychev)

Fig. 2. Cross section, × 5; ZPAL T. XI/6, Bąkowa IG-1 borehole, depth 1697.8—1703.0 m.

Plate XXXII

Thamnopora alta (Tchernychev)

Fig. 1. Cross section, × 3; ZPAL T. XI/6, Bąkowa IG-1 borehole, depth 1697.8—1703.0 m.

Thamnopora reticulata legibilis Sokolov

Fig. 2. *a* Cross section, × 10; *b* branching part of colony in longitudinal section, × 10; *c* cross section, × 10; ZPAL T. XI/40, Płusy IG-1 borehole, depth 1488.3—1492.5 m.

Plate XXXIII

Thamnopora reticulata legibilis Sokolov

Fig. 1. *a* Immature, anastomosing branches in cross section, × 10; *b* immature colony in cross section, × 5; ZPAL T. XI/41, Płusy IG-1, borehole, depth 1490.0—1500.6.

Alveolites maillieuxi Salée *sensu* Lecompte

Fig. 2.*a* Cross section, × 5; *b* longitudinal section, × 5; ZPAL T. XI/45, Płusy IG-1 borehole, depth 1492.5—1496.7 m.

Plate XXXIV

Alveolitella fecunda (Lecompte)

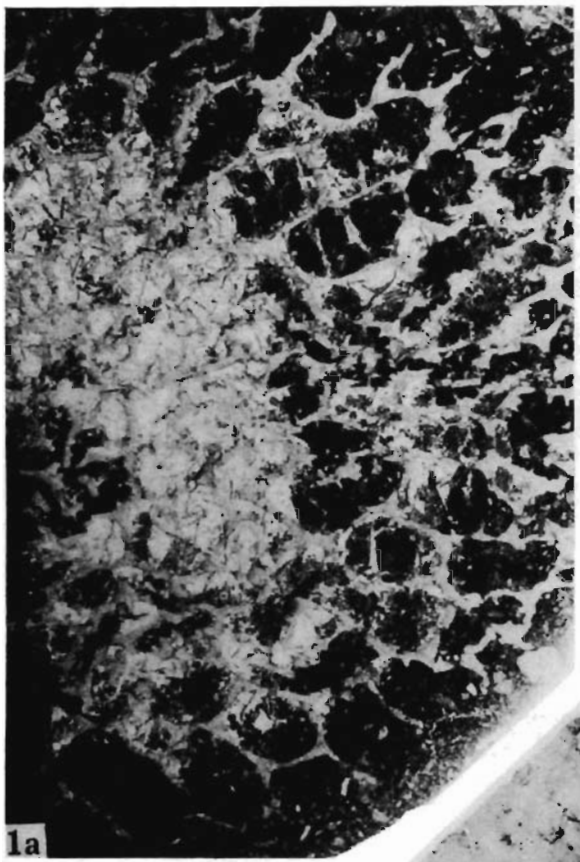
Fig. 1. Cross section, × 5; ZPAL T. XI/58, Bąkowa IG-1 borehole, depth 1697.8—1703.0 m.

Fig. 2. Cross section, × 5; ZPAL T. XI/61, Bąkowa IG-1 borehole, depth 1895.0—1901.0 m.

Fig. 3. Cross section, × 5; ZPAL T. XI/67, Korczmin IG-1 borehole, depth 2009.1—2024.6 m.

Caliapora battersbyi (Milne-Edwards & Haime)

Fig. 4. Cross section, × 10; ZPAL T. XI/76, Płusy IG-1 borehole, depth 1492.5—1496.7 m.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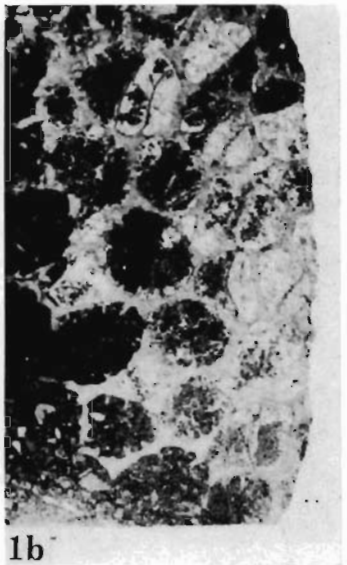
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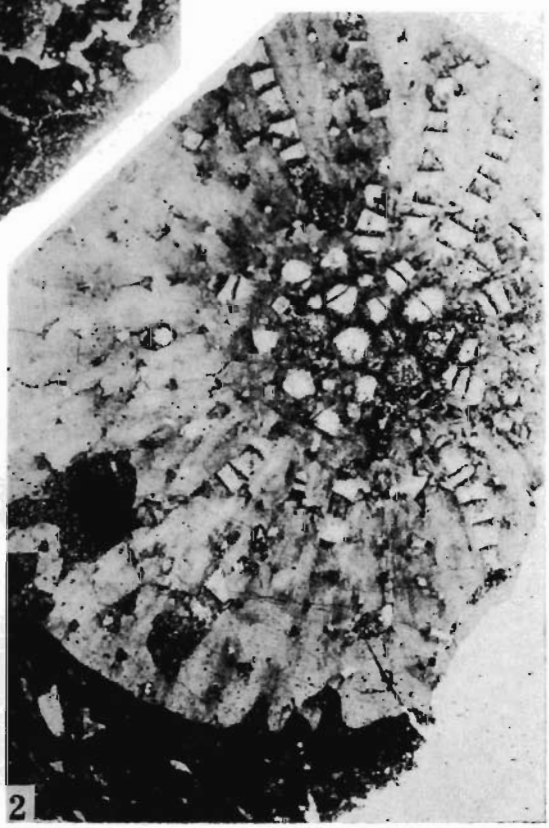
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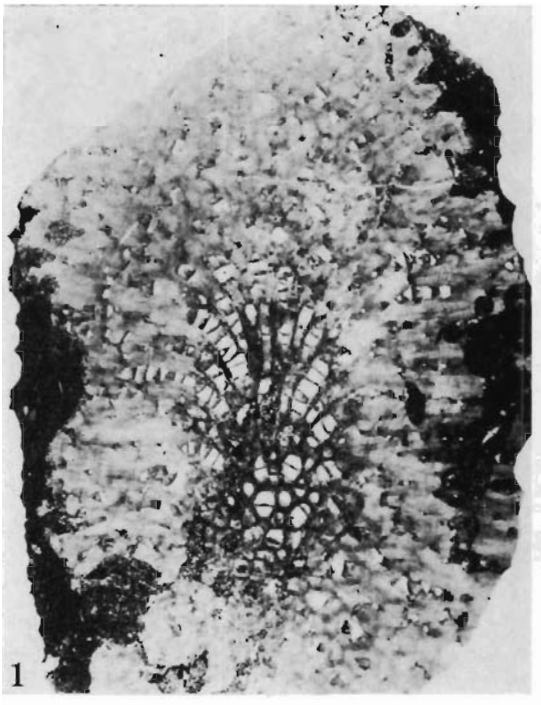
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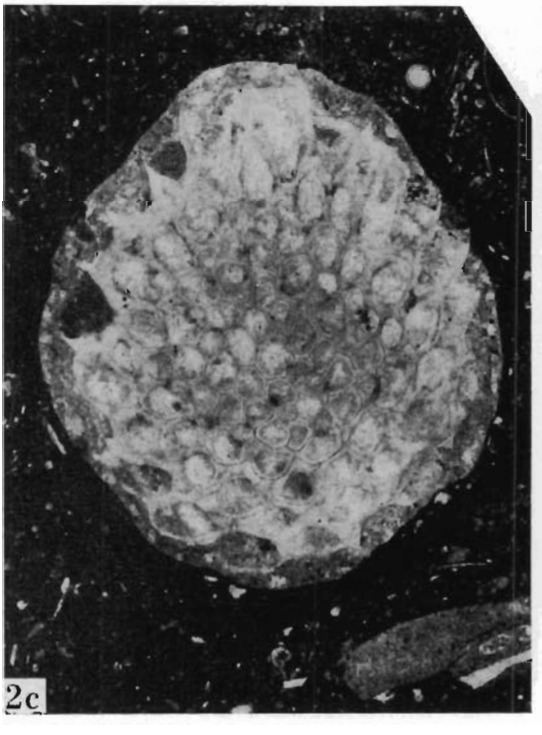
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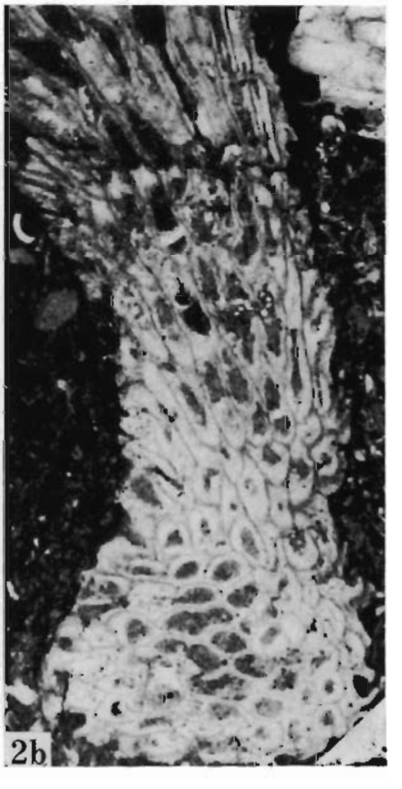
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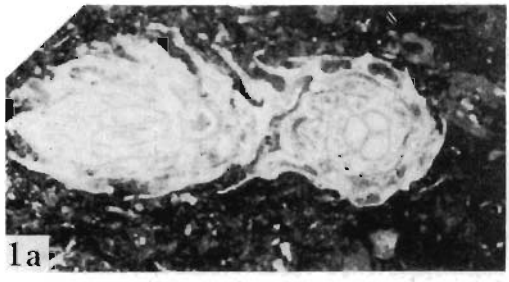
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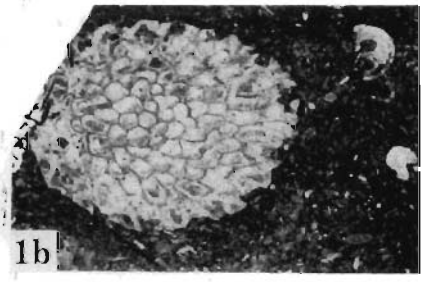
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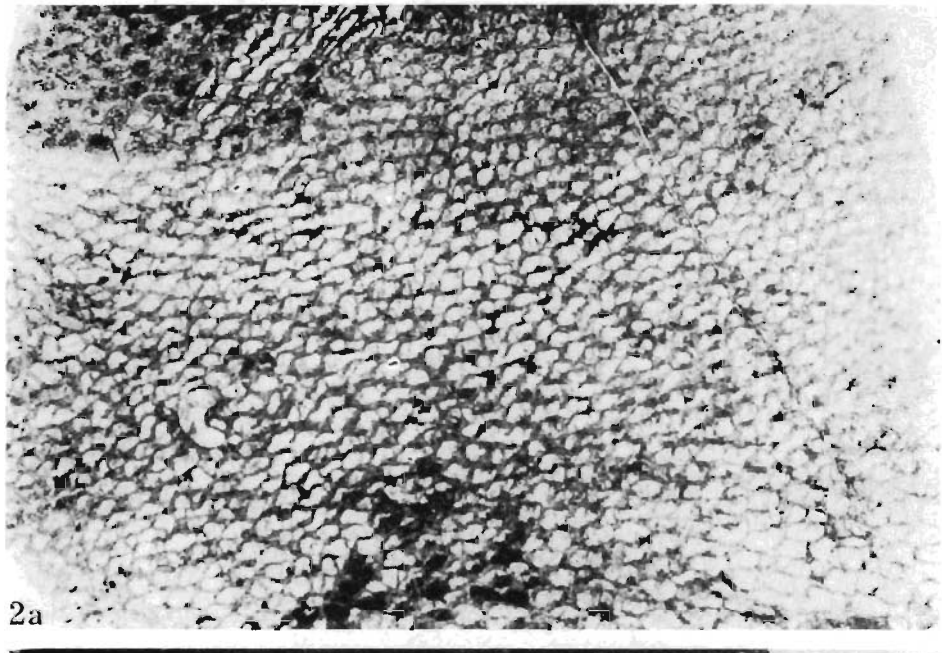
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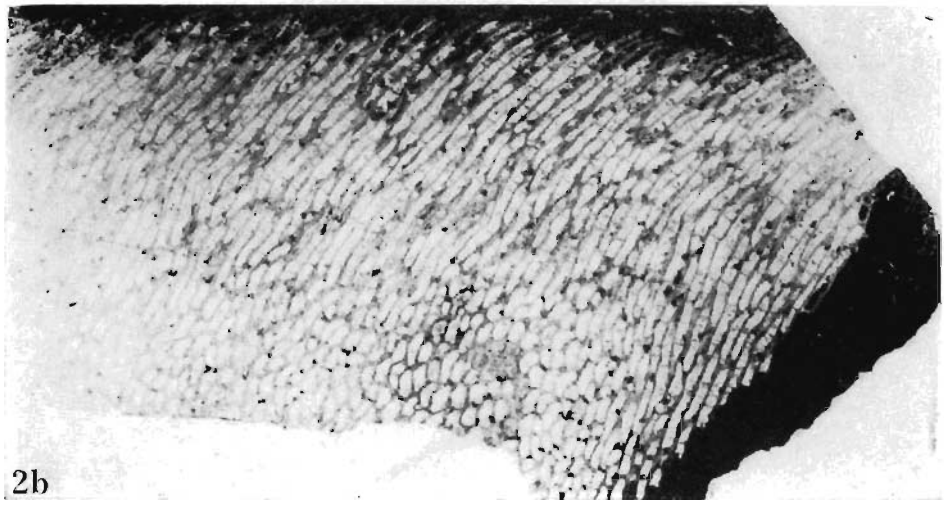
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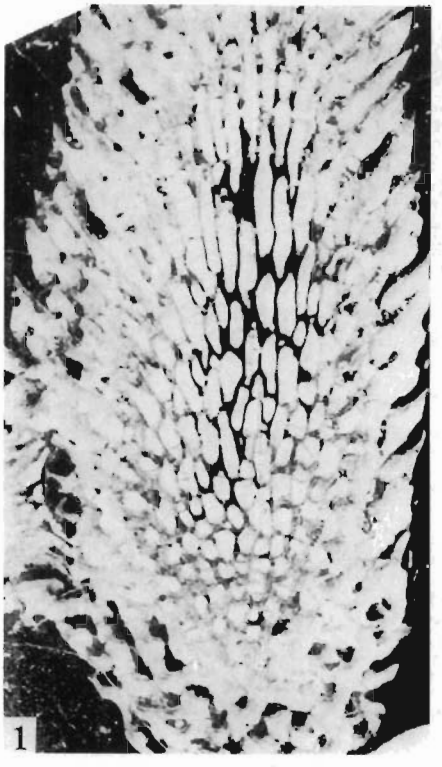
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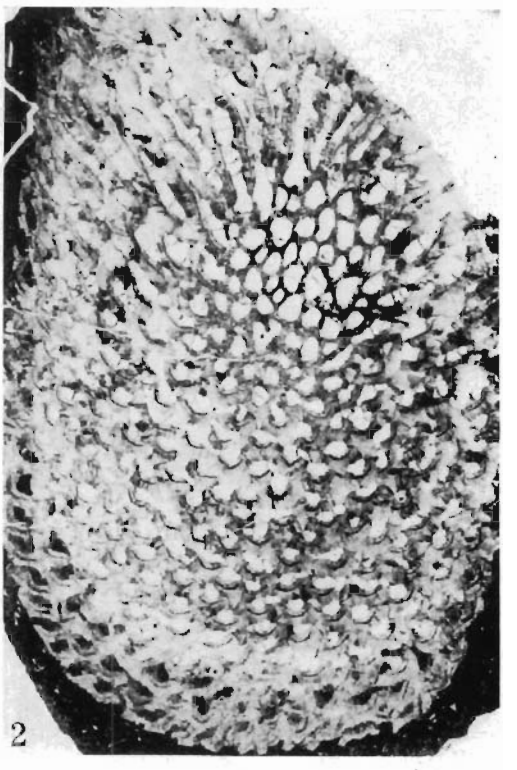
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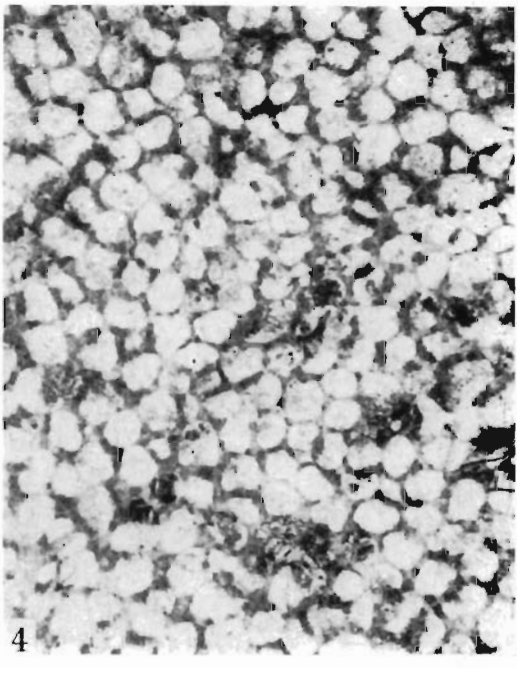
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