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SANTONIAN SILICEOUS SPONGES FROM KORZKIEW NEAR KRAKÓW (POLAND)

(Pl. I — XII and 8 Figs.)

Santońskie gąbki krzemionkowe z Korzkwi koło Krakowa

(Pl. I — XII i 8 fig.)

Abstract. Sixty species of siliceous sponges have been found in glauconitic marls (Santonian) at Korzkiew near Kraków (Poland). Six new species of Triaxonia have been described: *Aphrocallistes coronatus*, *Coscinopora* sp., *C. cylindrica*, *Myrmecioptychium jordanum*, *Becksia ojcoviensis*, *Etheridgea cracoviensis*.

Palaeontologically interesting littoral Cretaceous sediments outcrop at Korzkiew, 12 km North of Kraków (Fig. 1). The stratigraphic profile in the exposure above the castle is as follows (Fig. 2): In the lower part there are cross-bedded, fine grained, white sands, ca. 8 m, thick, with an insignificant admixture of glauconite, assigned by Panow (1934) to the Vraconian. On the even sand surface rests a layer (ca. 0,6—0,8 m. thick) of conglomerate with a great number of Jurassic cherts. This conglomerate is of Lower Cenomanian age according to Panow (1934) and Bukowy (1956). These sediments are overlain by greenish, glauconitic, marls or marly clays (ca. 0,3 m. thick) which contain a rich fauna of sponges, echinoids, pelecypods and gastropods. *Actinocamax granulatus* (Blv.) and *A. verus* Mill. point to the Santonian age of the marls.

Higher up are loesses which attain a thickness of ca. 5 m. The Santonian marls are filled in places with generally poorly preserved sponges. A collection comprising over a thousand specimens is believed to represent the whole assemblage of sponges that once lived in the littoral zone of the Santonian sea. The author has determined 60 species of sponges (Table 1), 52 of which had never been reported from Poland. This assemblage consists of Triaxonia (53 species), Tetraxonia (5 species) and Mo-

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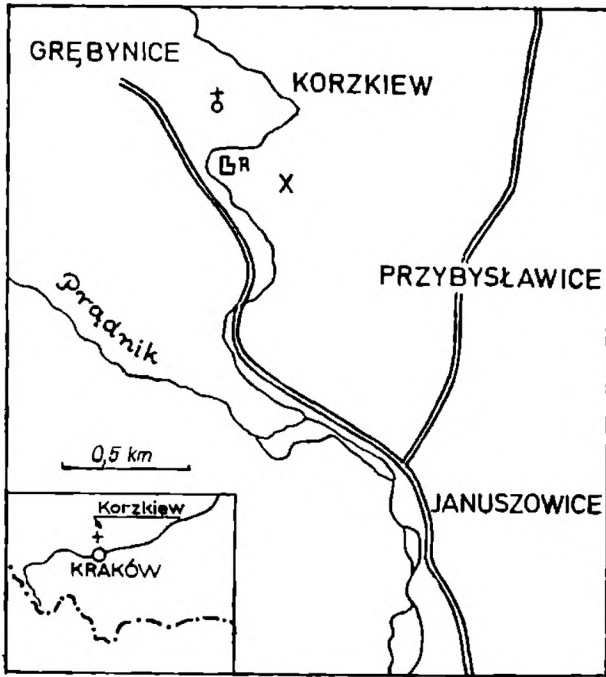
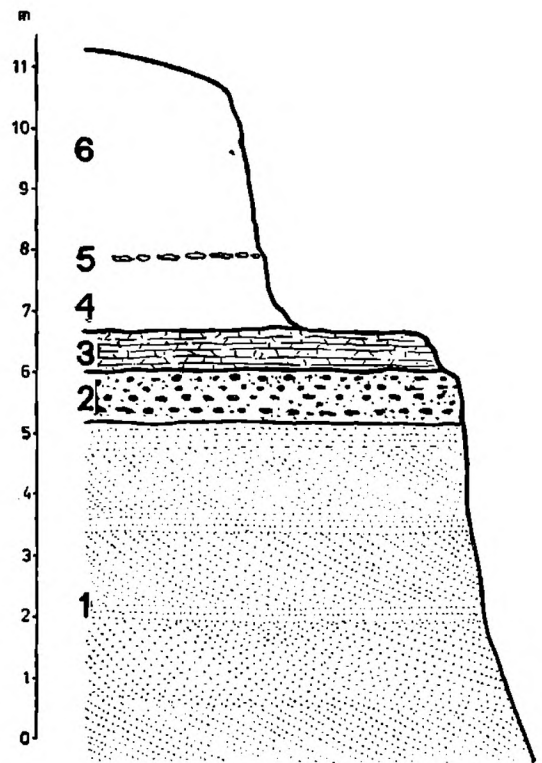


Fig. 1. Sketch map. Mapa schematyczna

Fig. 2. Geological profile. 1 — sands; 2 — conglomerate (Lower Cenomanian); 3 — glauconitic marls with sponges (Santonian); 4 — clayey loess; 5 — loess concretions; 6 — loess. Profil geologiczny. 1 — piaski; 2 — zlepienie (dolny cenoman); 3 — margle glaukonitowe z gąbkami (santon); 4 — less zgliniony; 5 — konkretje lessowe; 6 — less



naxonia (2 species). Predominant is the Lychniscosa superfamily, represented by 39 species of Paracracularia, Ventriculites, Sporadoscina, Plocoscyphia. There are also species of superfamilies Hexactinosa (4), Tetracladina (3), Megacladina (2) and Rhizocladina (2).

A comparison of the sponge assemblage from Korzkiew with that containing 107 species described by Hurcewicz (1956—1968) from the upper Cretaceous of Poland has revealed that the two assemblages have only 8 species in common. The Korzkiew assemblage shows close simi-

Table 1

Stratigraphic and Geographical distribution of the Spongiae from Korzkiew

Genus and species	Distribution								
	A	Ce	T	Co	S	Ca		M	
						l	u	l	u
1	2	3	4	5	6	7	8	9	10
<i>Craticularia radicata</i> Počta		C							
<i>Craticularia relicta</i> Schrammen				F		G			
<i>Craticularia virgatula</i> Schrammen	S	F				P.		PE	
<i>Paracraticularia fittoni</i> (Mantell)		EFG	F	F		F		E	P
<i>Paracraticularia subseriata</i> (Roemer)					E	E	E		
<i>Leptophragma micropora</i> Schrammen					G	G	G		
<i>Strephinia convoluta</i> Hinde					F	F	G	FE	
<i>Hexactinella angustata</i> (Schrammen)						G	G		
<i>Aphrocallistes lobatus</i> Schrammen							G		
<i>Aphrocallistes coronatus</i> sp. nov.					P				
<i>Eurete rauffi</i> Schrammen			F	F			G		
<i>Farrea halli</i> Schrammen						G			
<i>Periphragella johanna</i> Schrammen							G		
<i>Periphragella simplex</i> Schrammen						G			
<i>Ventriculites radiatus</i> Mantell	S	P	G	F	P	P	EPU	P	P
<i>Ventriculites cylindratus</i> Schrammen						G			
<i>Ventriculites mammillaris</i> Smith					E	E	F	EG	E
<i>Ventriculites successor</i> Schrammen							G		P
<i>Rhizopoterion tubiforme</i> Schrammen			F	F	F	F	GU	FU	FU
<i>Rhizopoterionopsis pruvosti</i> DeFr.-Lefr.		F							
<i>Lepidospongia rugosa</i> Schlüter						G	G		
<i>Orthodiscus fragilis</i> Schrammen			F	F	F	F	FGP	P	P
<i>Napaeana striata</i> (Schrammen)						G	G		
<i>Sporadoscinia decheni</i> (Goldfuss)				E	E	EG	EG	E	E
<i>Sporadoscinia teutoniae</i> Schrammen							G		
<i>Sporadoscinia stirps</i> Schrammen						G			
<i>Sporadoscinia capax</i> Hinde					E	EF	EF	E	E
<i>Leiostracosia angustata</i> (Roemer)				E	E	EG	EG	E	E
<i>Coscinopora infundibuliformis</i> Gldf.				E	E	EG	EG	E	E
<i>Coscinopora quincuncialis</i> (Toulm. et Sm.)					E	E	E	E	E
<i>Coscinopora</i> sp.					P				
<i>Coscinopora variabilis</i> sp. nov.					P				
<i>Coscinopora macropora</i> Goldfuss				FG	F	FG	FG	FG	
<i>Cinclidella solitaria</i> Schrammen			G						
<i>Callodictyon angustatum</i> Hinde				E	E	E	E		
<i>Sestrocladia furcata</i> Hinde				E	E	E	E		
<i>Myrmecioptychium subagaricoides</i> (Sincov)					U				
<i>Myrmecioptychium jordanum</i> sp. nov.					P				
<i>Becksia angustae</i> Schrammen						G			
<i>Becksia soekelandi</i> Schlüter						G			
<i>Becksia ojcowiensis</i> sp. nov.					P				
<i>Plocoscyphia fenestrata</i> (Smith)		E		F		G			

1	2	3	4	5	6	7	8	9	10
<i>Plocoscyphia roemeri</i> Leonhardt			G		F	F	F		
<i>Plocoscyphia reticulata</i> Hinde				E	E	E	E	E	E
<i>Plocoscyphia communis</i> Moret	F	F							
<i>Plocoscyphia labrosa</i> (Smith)		E		EF	E	E	E	E	E
<i>Plocoscyphia vagans</i> Hinde				E	E	E	E	E	E
<i>Etheridgea goldfussi</i> (Fischer)						U	U		
<i>Etheridgea cracoviensis</i> sp. nov.					P				
<i>Camerospongia capitata</i> Toulm. et Smith				E	E	E	E	E	E
<i>Tremabolites megastoma</i> (Roemer)		C	G	F				G	G
<i>Toulminia catenifer</i> (Smith)			G	E	EF	EF	EF	EG	EG
<i>Polyptycha becsioides</i> Defr.-Lefr.					F				
<i>Siphonia micropora</i> Schrammen						G			
<i>Ragadinia rimosa</i> (Roemer)								EC	
<i>Prokaliapsis arborescens</i> (Michelin)						F	FP		
<i>Homalodora tuberosa</i> Schrammen						GP	G		
<i>Homalodora pusilla</i> Schrammen						GP			
<i>Bolidium capreoli</i> (Roemer)		C						G	G
<i>Scytalia radiceformis</i> (Phillips)		C				P	G	EFG	

A — Albian, alb

Ce — Cenomanian, cenoman

T — Turonian, turon

Co — Coniacian, koniak

S — Santonian, santon

Ca — Campanian, kampan: l — lower, dolny, u — upper, górny

M — Maastrichtian, mastrycht: l — lower, dolny, u — upper, górny

C — Czechoslovakia, Czechosłowacja

E — England, Anglia

F — France, Francja

G — Germ. Fed. Rep. and Germ. Dem. Rep., RFN i NRD

P — Poland, Polska

S — Spain, Hiszpania

U — USSR, ZSRR

larity to the sponge fauna from the Upper Cretaceous sediments of Powoźe. In the assemblage studied six new species were determined. They are: *Aphrocallistes coronatus* sp. nov., *Coscinopora* sp., *Coscinopora variabilis* sp. nov., *Myrmecioptychium jordanum* sp. nov., *Becksia ojcowiensis* sp. nov., *Etheridgea cracoviensis* sp. nov. Sponges are randomly distributed throughout the 30-cm layer of the Santonian marls (Fig. 3), most of them being sheared along the plane parallel to the bedding. Their skeletal elements are rarely preserved, having as a rule undergone dissolution, and only cavities are left by them. From the random distribution of sponges and other fossils (echinoids, pelecypods, gastropods, belemnites, ammonites) in the sediment it may be concluded that these organisms were transported over short distances. On a whole many fossil encrusting organisms are preserved, such as oysters, annelids or bryozoans. This abundance of fauna indicates that the Santonian sea at Korzkiew was shallow, warm and well aerated.

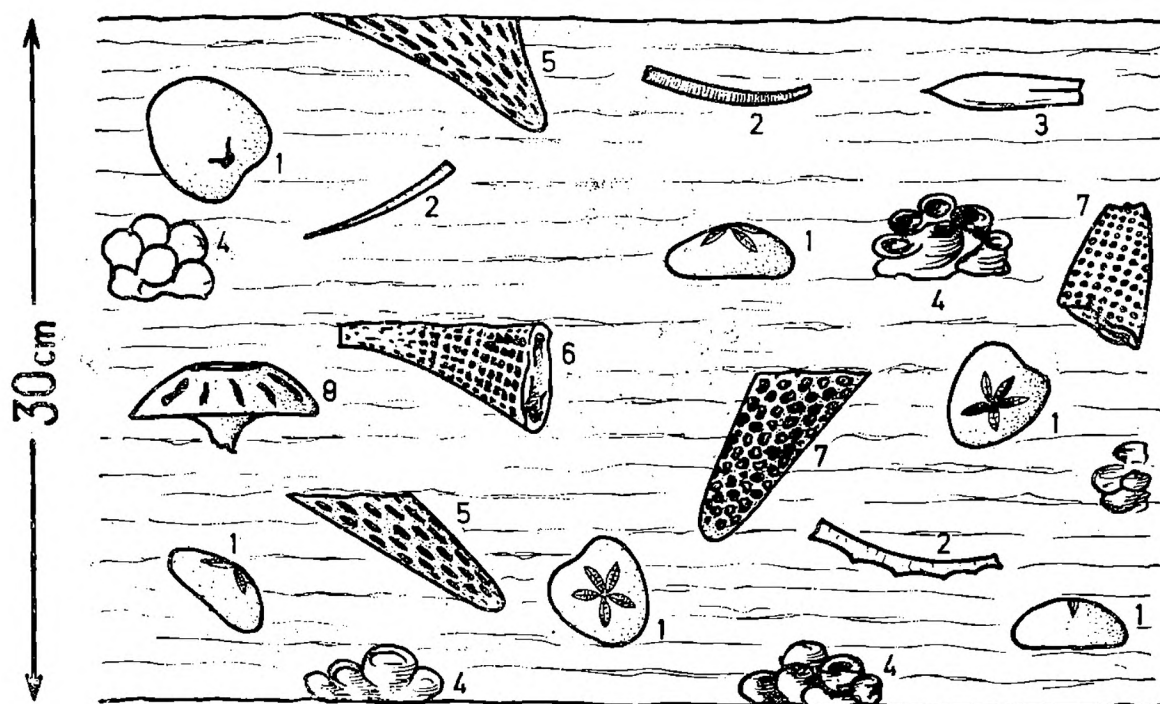


Fig. 3. Distribution of fossils in the Santonian marls.

Rozmieszczenie skamieniałości w warstwie margli santonńskich.

1. *Micraster* sp. 2. *Inoceramus* sp. 3. *Belemnites* sp. 4. *Plocoscyphia* sp. 5. *Ventriculites* sp. 6. *Craticularia* sp. 7. *Sporadoscinia* sp. 8. *Myrmecioptychium* sp.

SYSTEMATIC DESCRIPTION¹

Order: Triaxonia Schulze, 1887 (= Hexactinellida Schmidt, 1872)

Suborder: Dictyonina Zittel, 1877

Superfamily: Hexactinosa Schrammen, 1903

Family: Craticulariidae Rauff, 1893 emend. Schrammen, 1937

Genus: *Craticularia* Zittel, 1878 emend. Schrammen, 1937 (Type species: *Craticularia parallela* Goldfuss, 1833)

Craticularia relictæ Schrammen, 1910—12

(Pl. I, Fig. 5)

1910—12. *Craticularia relictæ* Schrammen; Schrammen A., p. 233, Pl. 31, Fig. 4, 5; Pl. 43, Fig. 4; Text Pl. 10, Fig. 1.

1958—60. *Craticularia relictæ* Schrammen; Defr.-Lefr. S., p. 51, Pl. 1, Fig. 3, 10.

Material: 12 specimens. SK 2

Remarks: This species differs from other *Craticularia* in shape and in having bigger inhalant and exhalant pores.

Occurrence: Germany: Quadraten Kreide; France: Coniacian.

¹ The collection under description is housed in the Institute of Geology and Mineral Deposits of the Academy of Mining and Metallurgy; collection's code SK 1—60.

Craticularia virgatula Schrammen, 1910—12

(Pl. I, Fig. 6)

- 1910—12. *Craticularia virgatula* Schrammen; Schrammen A., p. 234, Pl. 30, Fig. 1; Pl. 43, Fig. 3; Text Pl. 11, Fig. 9.
1968. *Craticularia virgatula* Schrammen; Hurcewicz H., p. 59, Pl. 14, Fig. 3.

Material: 6 specimens. SK 3

Remarks: *Craticularia virgatula* differs from *C. roemeri* and *C. relicta* in having a considerably smaller thickness of walls, a smaller diameter of pores and a larger number of pores per 100 mm².

Genus: *Leptophragma* Zittel, 1877 (Type species: *Scyphia purchisoni* Goldfuss, 1833)

Leptophragma micropora Schrammen, 1910—12

(Pl. II, Fig. 5a, 5b)

- 1910—12. *Leptophragma micropora* Schrammen; Schrammen A., p. 237, Pl. 32, Fig. 4, 5; Pl. 43, Fig. 2; Text Pl. 9, Fig. 1.

Material: 2 specimens. SK 6

Remarks: This species differs from *Leptophragma purchisoni* in having smaller and thicker ostia and postica.

Occurrence: Germany: Granulaten Kreide, Quadraten Kreide, Mucronaten Kreide.

Family: Aphrocallistidae Gray, 1867

Genus: *Aphrocallistes* Gray, 1858

Aphrocallistes coronatus sp. nov.

(Pl. III, Fig. 2a, 2b; Text Fig. 4a, b)

Holotype: Pl. III, Fig. 2a, 2b. SK 10

Derivation of name: After a characteristic shape of the sponge.

Diagnosis: A ramifying *Aphrocallistes* with a short, cylindrical stem and short, lateral, flattened and radially disposed branches. Branches hollow inside and separated from each other by a very thin diaphragm occurring at the joint. Ostia densely concentrated.

Material: 3 specimens.

Dimensions (in mm): Specimen SK 10

Height	Diameter	Diameter of osculum	Thickness of wall	Thickness of radial branches
56	76	48	3—8	8—10

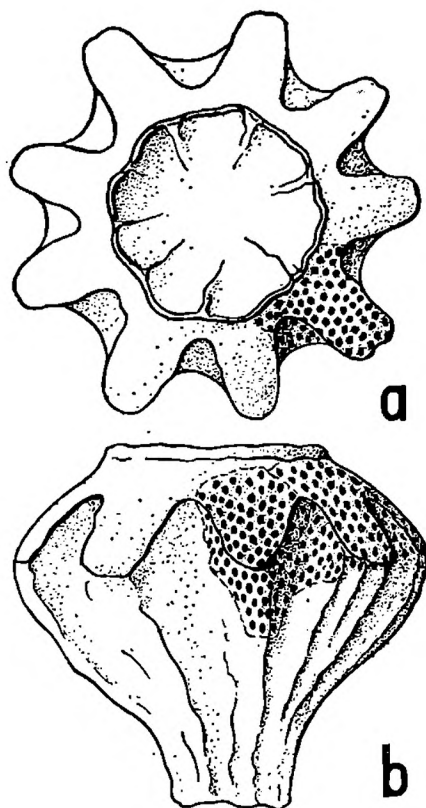


Fig. 4. *Aphrocallistes coronatus* sp. nov.
a. Upper view. Widok z góry
b. Side view. Widok z boku

Description: A funnel-like sponge with a short cylindrical stem. On lateral walls there are radially disposed branches. Branches hollow inside, approx. 10 mm thick. Ostia approx. 0,5 mm in diameter, densely and uniformly distributed. In an area of 1 cm² there are about 80—90 ostia. The surface of gastral walls (diaphragms) is sievelike, covered with polygonal irregularly distributed postica. Parenchymal skeleton dense, consisting of smooth hexactines with beams of diversified length (0.1—1.2 mm), irregularly distributed in the network so that meshes are mostly triangular. Cortical skeleton dependent, formed by superficially situated radia which are swollen, deformed and surround ostia with thick arcuate rings.

Remarks: This species is similar in its morphology to *Aphrocallistes kazimierzensis* Hurc. (1968). However, the latter species has long ramifying outgrowths while *A. coronatus* sp. nov. has radial ribs.

Occurrence: Poland: Korzkiew — Santonian.

Family: *Ventriculitidae* Zittel emend. Schrammen, 1910.

Genus: *Rhizopoterion* Zittel, 1878 (Type species: *Scyphia cericornis* Goldfuss, 1826)

Rhizopoterion tubiforme Schrammen, 1910

(Pl. IV, Fig. 1a, 1b)

1910—12. *Rhizopoterion tubiforme* Schrammen; Schrammen A., p. 213, Pl. 34, Fig. 1.
1968. *Rhizopoterion tubiforme* Schrammen; Hurcewicz H., p. 76, Pl. 21, Fig. 1, 2. (synonymy given)

Material: 16 fragments. SK 19.

Occurrence: Poland: Lower Campanian; France: Turonian and Senonian; Spain: Senonian; USSR: Upper Cretaceous.

Family: Coscinoporidae Zittel, 1877

Genus: *Coscinopora* Goldfuss, 1833 (Type species: *Coscinopora infundibuliformis* Gldf. 1833)

Coscinopora quincuncialis (Toulm. et Smith) Smith, 1848

(Pl. VI, Fig. 1a, 1b)

1847—48. *Ventriculites quincuncialis* Toulm. et Smith; Smith T., p. 207. /

1883. *Coscinopora quincuncialis* Toulm. et Smith; Hinde C., p. 106.

Material: 2 complete specimens. SK 30.

Remarks: This species is readily distinguished from *C. infundibuliformis* due to its narrow elongated form and smaller dimensions of the canal. Our specimens differ from the English forms only in the shape of summit, which is elliptical in the Polish specimens and round in the English ones.

Occurrence: Poland: Korzkiew — Santonian.

Coscinopora sp.

(Pl. VI, Fig. 5a, 5b; Text Fig. 5a)

A small cask-shaped *Coscinopora* with a conical stem and a root-like ending. Outer surface horizontally annulate, covered with ostia arranged in a very regular quincunx.

Material: 3 specimens.

Dimensions (in mm):	Height	Diameter	Thickness of wall
SK 31 a	47	27	1—2
SK 31 b	47	28	1—2

Occurrence: Poland: Korzkiew — Santonian.

Coscinopora variabilis sp. nov.

(Pl. V, Fig. 8; Text Fig. 5b)

Holotype: Pl. V, Fig. 8. SK 32

Derivation of name: After variable shape of the sponge.

Diagnosis: *Coscinopora* cylindrical in shape, with a short, root-like ending. Inner and outer surface covered with ostia and postica disposed in a very regular quincunx. Lateral oscula on small craterlike upswells of the outer surface.

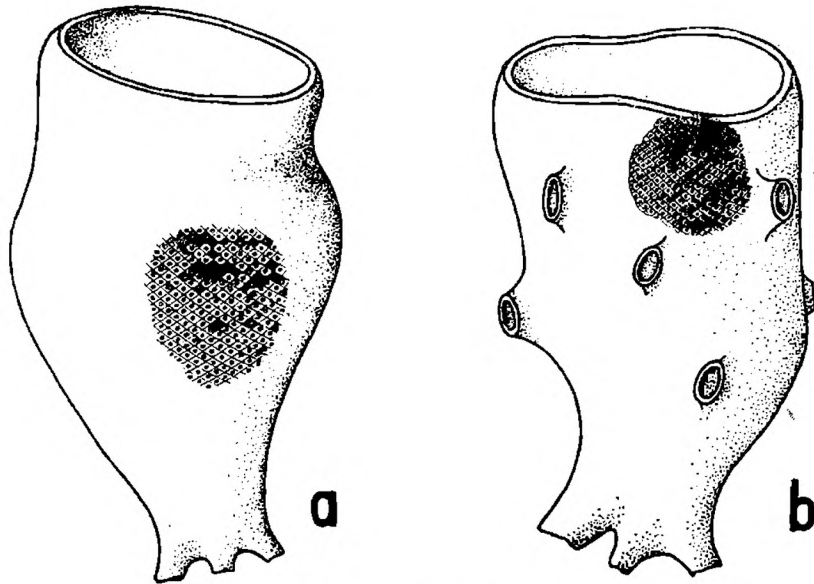


Fig. 5a. *Coscinopora* sp.
5b. *Coscinopora variabilis* sp. nov.

Material: One well-preserved specimen.

Dimensions (in mm):	Height	Diameter	Diameter of lateral osculum
	35	27	1—3

Description: Cylindrical sponge with thin walls and a short conical stem. On the outer surface there are small upswells with lateral oscula measuring 1—3 mm. The whole lateral surface covered with ostia disposed in a very regular quincunx. The number of ostia ranges from 220 to 260 per 1 cm². On the inner surface there are postica, more densely disposed than in other species. Perenchymal skeleton composed of lychnisks.

Remarks: Lateral oscula make this species different from other species of the genus *Coscinopora*.

Family: Coeloptychidae Zittel, 1877

Genus: *Myrmecioptychium* Schrammen, 1910—12 (Type species: *Myrmecioptychium bodei* Schrammen, 1910—12)

Myrmecioptychium subagaricoides (Sincov, 1871)

(Pl. VII, Fig. 3a, 3b, 3c, 4a, 4b)

1962. *Myrmecioptychium subagaricoides* (Sincov); Zhuravlev, Osnovy paleont. ..., p. 40, Fig. 50a, 50b.

Material: 3 complete specimens and many fragments. SK 37

Description: A fungiform sponge, similar to *Coeloptychium*. It has a slightly concave shield attached to a short, thick, cylindrical stem. Shield walls thick round the stem, becoming still thicker towards mar-

gins. Margin of shield obliquely truncated, forming an acute angle with the lower ridge. Upper surface well-marked, regularly ribbed. On the ribs there are big exhalant pores (0.8—1.1 mm in diameter), irregularly distributed. On the lower surface of the shield there are 11—14 regularly arranged dichotomous folds, 4—6 mm wide near the stem and 12—25 mm wide at the margin. On the folds there are inhalant pores, approx. 3 mm in diameter, surrounded with collars. The number of ostia on all folds of a given specimen ranges from 3 to 5. Water canals not developed. Parenchymal network formed by lychnisks, very regularly arranged. Loose cortical skeleton on the upper side. In this network, on the whole surface of the shield octohedral centres of lychnisks and horizontal beams form characteristic, concentrically arranged fibrous strands and fairly regular, quadrangular cortex meshes, sporadically surrounded by slightly modified lychnisks. On the lower and marginal side the cortex is denser, reticulate, without concentric strands. Ostia surrounded by an individualized network of meshes.

Remarks: The specimens from Korzkiew differ from Sincov's form in having fewer ostia on folds.

Occurrence: Poland: Korzkiew — Santonian; USSR: Santonian.

Myrmecioptychium jordanum sp. nov.

(Pl. VIII, Fig. 1a, 1b, 1c; Text — Fig. 6 a, b, c)

Holotype: Pl. VIII, Fig. 1a, 1b, 1c. SK 38

Derivation of name: After the Jordan family of Korzkiew.

Diagnosis: A mushroom-shaped *Myrmecioptychium*, concave at top, attached to a short, thick, cylindrical stem. Lower surface has regular dichotomous folds with inhalant pores surrounded with collars. On the outer surface there are irregularly distributed ostia. Shield margin wide, with radially dispersed ovate slits. Parenchymal network formed by lychnisks, very regularly arranged.

Material: 4 complete specimens and a few fragments.

Dimensions (in mm):	R	r	a	b	c
SK 38 a	80	40	25	1.5	3.0
SK 38 b	66	30	21	1.0	2.5

Description: A mushroom-shaped *Myrmecioptychium*, concave at top, attached to a short, thick, cylindrical stem. Irregularly distributed ostia on the outer surface. On the lower surface of the shield there are 10—12 regularly arranged dichotomous folds. On the folds are inhalant pores, approx. 3 mm in diameter, surrounded with collars. Three inhalant pores are found on one fold. Shield margin obliquely truncated, 2.5—3.0 cm wide, pierced by radially dispersed ovate slits. The slits are 0.5—2 cm long and approx. 0.5 cm wide. Water canals very irregular.

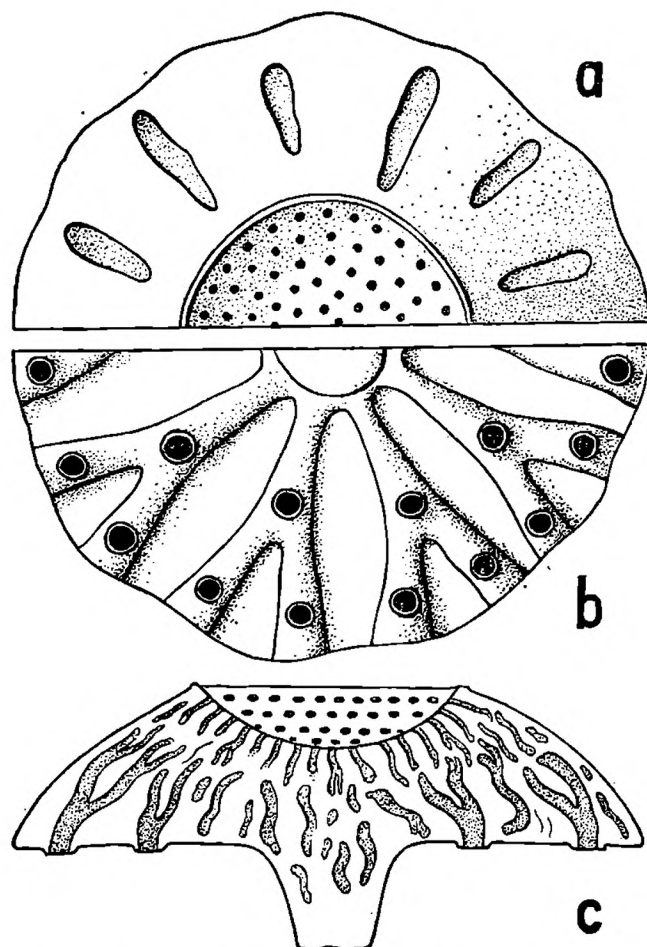


Fig. 6. *Myrmecioptychium jordanum* sp. nov.
a. Upper view. Widok z góry
b. Lower view. Widok z dołu
c. Section. Przekrój

Parenchymal and cortical skeletons formed by lychnisks, very regularly arranged.

Remarks: *M. jordanum* sp. nov. differs from the species *M. aubagarioides* in having a wide margin with radially dispersed ovate slits and a very thick shield.

Family: Becksidae Schrammen, 1910—12

Genus: *Becksia* Schlüter, 1868 (Type species: *Becksia soekelandii* Schlüter, 1868)

Becksia ojcowiensis sp. nov.

(Pl. IX, Fig. 1a, 1b; Text-Fig. 7 a, b, c)

Holotype: Pl. IX, Fig. 1a, 1b. SK 41

Derivation of name: *ojcowiensis* — from the locality of Ojców.

Diagnosis: Cup- or pear-shaped sponge with a thick conical stem, composed of radially disposed and twisted tubes. Oscula of the tubes round and irregularly distributed on the outer surface of sponge. Oscula of the uppermost tubes are on the border of the central concavity. Ostia

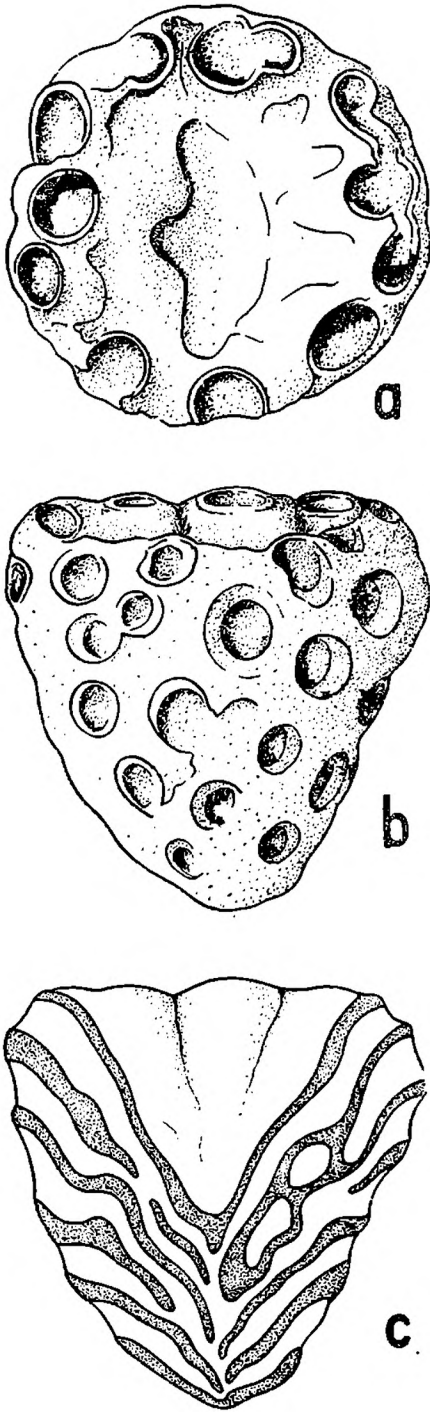


Fig. 7. *Beckisia ojcoviensis* sp. nov.
 a. Upper view. Widok z góry
 b. Side view. Widok z boku
 c. Section. Przekrój

and postica differentiated in size. Cortex and parenchymal skeletons composed of lychnisks.

Material: 6 complete specimens and numerous fragments.

Dimensions (in mm): cup-shaped specimens pear-shaped specimens

diameter of sponge	70—120	30—55
height of sponge	40— 50	40—60
diameter of sponge tubes	8— 12	8—12
thickness of tube walls	1— 3	1— 3
depth of central cavity	35— 60	10—25

Description: Cup- or pear-shaped sponge with a thick conical stem and deep central concavity. Sponge walls built of tubes, 1—3 mm thick and 8—12 mm in diameter. Tubes radially and obliquely arranged. Round oscula irregularly disposed on the outer surface of the sponge. Ostia of the uppermost tubes situated on the border of the central concavity. Round ostia, approx. 0.5 mm in diameter, irregularly disposed on the surface of walls. Cortex and parenchymal skeletons formed by clotty lychnisks.

Family: Camerospongiidae Schrammen, 1910—12

Genus: *Etheridgea* Tate, 1865 (Type species: *Etheridgea mirabilis* Tate, 1865)

This group comprises single sponges, hemispherical in shape. On the whole upper surface of the sponge are big, round or oval pores. The pores form a system of bush-like canals. A big, irregular osculum is located on top of the sponge. The whole upper surface covered with a fine, porous layer. The lower part of the sponge (without cover) has radial folds, usually poorly developed. Between the folds there occur scarce oscula. The sponge accrues from the bottom or is attached to it by means of a short stem. Skeleton built of lychnisks.

Etheridgea goldfussi (Fischer, 1837)

(Pl. X, Fig. 5a, 5b)

1962. *Etheridgea goldfussi* (Fischer et Waldheim); Osnovy paleont. ... p. 44, Fig. 52.

1969. *Etheridgea goldfussi* (Fischer et Waldheim); Kratkij opredelitel iskopajemych bezpozwonocznych; Fig. 80.

Material: 4 complete specimens and several incomplete ones. SK 48

Remarks: This species has been known only from the Santonian of the Wołga and Desna regions in the USSR. Its occurrence in Santonian deposits in the vicinity of Kraków is of great significance.

Occurrence: Santonian — USSR.

Etheridgea cracoviensis sp. nov.

(Pl. XI, Fig. 1a, 1b; Text-Fig. 8 a, b)

Holotype: Pl. XI, Fig. 1a, 1b. SK 49

Derivation of name: After the city of Kraków.

Material: 5 complete specimens.

Diagnosis: Pear-shaped sponge. Its outer convex surface is covered with a shield which has a big irregular osculum and several smaller ones. The lower, conical part of the sponge is composed of anastomosing,

convoluted, tubular canals having 0.5 mm in diameter. On the sponge walls are a few inhalant pores.

Description: Pear-shaped sponge, supported by a very short stem. The upper convex surface of the sponge is covered with a delicate shield.

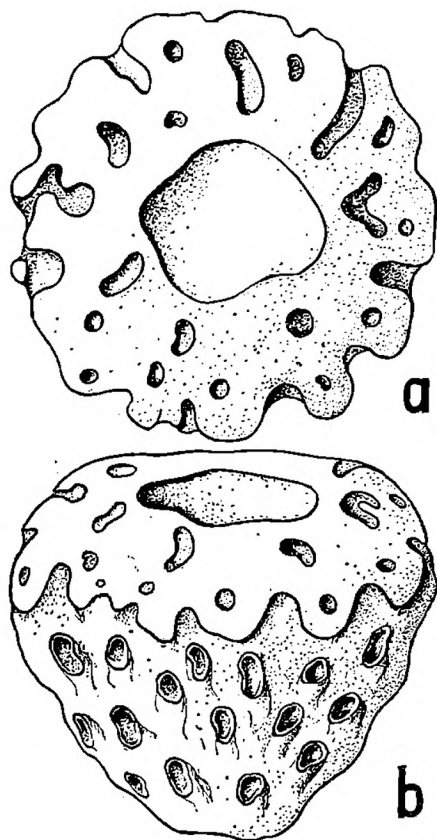


Fig. 8. *Etheridgea cracoviensis* sp. nov.
a. Upper view. Widok z góry
b. Side view. Widok z boku
c. Section. Przekrój

In the middle of it there is a big irregular osculum. Between the osculum and the margin of the upper surface are several (10—15) small, round or oval oscula having 2—4 mm in diameter. The margin of the shield is undulated. The lower conical part of the sponge is composed of anastomosing, convoluted, tubular canals having 0.5 mm in diameter. On the lateral surface of the sponge there are a few round, inhalant pores. Parenchymal network is formed by lychnisks.

Remarks: *E. cracoviensis* sp. nov. has some features in common with *E. goldfussi* (Fischer), from which it differs in having a concave shield and an undulated margin. Its irregular osculum is smaller than in *E. goldfussi*. The lower part of the sponge is almost flat in *E. goldfussi* and conical in *E. cracoviensis*.

Genus: *Camerospongia* d'Orbigny, 1847 (Type species: *Scyphia fungiformis* Goldfuss, 1833)

Camerospongia capitata (Toulm. et Smith, 1848)

(Pl. VIII, Fig. 2a, 2b, 2c)

1848. *Cephalites capitatus* Toulm. et Smith; Smith T., p. 288, Pl. 14, Fig. 11.
1883. *Camerospongia capitata* Toulm. et Smith; Hinde J., p. 140.

Material: 6 specimens. SK 50

Remarks: This species resembles *C. fungiformis* (Gldf.) from which it differs, however, in having a less elevated summit and non-projecting margins (as in the Goldfuss forms).

Occurrence: England: Upper Chalk.

Genus: *Tremabolites* Zittel, 1877 (Type species: *Manon megastoma* Roemer, 1841)

Tremabolites megastoma (Roemer, 1841)

(Pl. X, Fig. 2)

1841. *Manon megastoma* Roemer; Roemer F. A., p. 3, Pl. 1, Fig. 9.
1872. *Camerospongia megastoma* (Roemer); Schlüter C., p. 19, 27.
1877. *Tremabolites megastoma* (Roemer); Zittel K., p. 56.
1958. *Tremabolites megastoma* (Roemer); Défretin-Lefranc S., p. 93, Pl. 14, Fig. 3 (synonymy given)

Material: 5 complete specimens, very well preserved. SK 51

Occurrence: Germany: Turonian, Upper Senonian; France: Emscherian, Aptian; Czechoslovakia: Cenomanian.

Genus: *Toulminia* Zittel, 1878 (Type species: *Cephalites catenifer* Smith, 1848)

Toulminia catenifer (Smith, 1848)

(Pl. XI, Fig. 5)

1848. *Cephalites catenifer* Smith; Smith T., p. 286, Pl. 14, Fig. 14—16.
1848. *Cephalites compressus* Smith; Smith T., p. 287, Pl. 14, Fig. 10.
1958. *Toulminia catenifer* (Smith); Défretin-Lefranc S., p. 95, Pl. 14, Fig. 8 (synonymy given).

Material: 6 specimens. SK 52

Occurrence: England: Upper Chalk; Germany: Turonian, Upper Senonian; France: Santonian, Campanian.

Genus: *Polyptycha* Défretin-Lefranc, 1958

Polyptycha becsioides Défr.-Lehr., 1958

(Pl. XII, Fig. 1a, 1b)

1958. *Polyptycha becsioides* Défr.-Lehr.; Défretin-Lefranc S., p. 98, Pl. 14, Fig. 2, 5; Text Fig. 29.

Material: 2 specimens. SK 53

Remarks: This species resembles in its form and structure the species of the genus *Coeloptychium*. Its upper surface is similar to that of the species belonging to the genera *Becksia* and *Plocoscyphia*. Distinct differences between the three genera mentioned above and the genus *Polyptycha* made distinguishing the latter new genus possible. *P. becsioides* was found in Senonian deposits within the bed with *Micraster cor-testudinarium*, and thus in the same stratigraphic horizon as that in which the described assemblage of sponges was found.

Occurrence: France: Santonian, Campanian; Poland: Korzkiew — Santonian.

Order: Tetraxonia Schultze, 1877

Suborder: Tetralithistida Lagneau-Hérenger, 1962

Superfamily: Tetracladina Zittel, 1878

Family: Phymatellidae Schrammen, 1910

Genus: *Siphonia* Parkinson, 1822 emend. Zittel, 1878 (Type species: *Siphonia koenigi* Mantell, 1822)

Siphonia micropora Schrammen, 1910—12

(Pl. XII, Fig. 6a, 6b)

1910—12. *Siphonia micropora* Schrammen; Schrammen A., p. 94, Pl. 2, Fig. 9, 10; Text Pl. 4, Fig. 10.

Material: 1 specimen. SK 54

Occurrence: Germany: Quadraten Kreide.

Family: Discodermidae Schrammen, 1910—12

Genus: *Ragadinia* Zittel, 1878 (Type species: *Cupulospongia rimosa* Roemer, 1864)

Ragadinia rimosa (Roemer, 1864)

(Pl. XII, Fig. 2a, 2b)

1864. *Cupulospongia rimosa* (Roemer); Roemer A., p. 51, Pl. 17, Fig. 8

1866. *Ragadinia rimosa* (Roemer); Hurcewicz H., p. 63, Pl. 13, Fig. 1a, 1b; Text Fig. 16 (synonymy given).

Material: 16 well preserved specimens. SK 56

Occurrence: Germany; England, France and Czechoslovakia: Cenomanian to Senonian; Poland: Lower and Upper Campanian — Zbyczyce, Bonarka, Miechów, Skrajniwa, Pniaki.

Family: Phymaraphiniidae Schrammen, 1910.

Genus: *Prokaliapsis* Schrammen, 1901

Camerospongia capitata (Toulm. et Smith, 1848)

(Pl. VIII, Fig. 2a, 2b, 2c)

1848. *Cephalites capitatus* Toulm. et Smith; Smith T., p. 288, Pl. 14, Fig. 11.
1883. *Camerospongia capitata* Toulm. et Smith; Hinde J., p. 140.

Material: 6 specimens. SK 50

Remarks: This species resembles *C. fungiformis* (Gldf.) from which it differs, however, in having a less elevated summit and non-projecting margins (as in the Goldfuss forms).

Occurrence: England: Upper Chalk.

Genus: *Tremabolites* Zittel, 1877 (Type species: *Manon megastoma* Roemer, 1841)

Tremabolites megastoma (Roemer, 1841)

(Pl. X, Fig. 2)

1841. *Manon megastoma* Roemer; Roemer F. A., p. 3, Pl. 1, Fig. 9.
1872. *Camerospongia megastoma* (Roemer); Schlüter C., p. 19, 27.
1877. *Tremabolites megastoma* (Roemer); Zittel K., p. 56.
1958. *Tremabolites megastoma* (Roemer); Défretin-Lefranc S., p. 93, Pl. 14, Fig. 3 (synonymy given)

Material: 5 complete specimens, very well preserved. SK 51

Occurrence: Germany: Turonian, Upper Senonian; France: Emschian, Aptian; Czechoslovakia: Cenomanian.

Genus: *Toulminia* Zittel, 1878 (Type species: *Cephalites catenifer* Smith, 1848)

Toulminia catenifer (Smith, 1848)

(Pl. XI, Fig. 5)

8. *Cephalites catenifer* Smith; Smith T., p. 286, Pl. 14, Fig. 14—16.
8. *Cephalites compressus* Smith; Smith T., p. 287, Pl. 14, Fig. 10.
8. *Toulminia catenifer* (Smith); Défretin-Lefranc S., p. 95, Pl. 14, Fig. 8 (synonymy given).

Material: 6 specimens. SK 52

Occurrence: England: Upper Chalk; Germany: Turonian, Upper Senonian; France: Santonian, Campanian.

Genus: *Polyptycha* Défretin-Lefranc, 1958

Polyptycha becsioides Défr.-Lehr., 1958

(Pl. XII, Fig. 1a, 1b)

Polyptycha becsioides Défr.-Lefr.; Défretin-Lefranc S., p. 98, Pl. 14, Fig. 2, 5; Text Fig. 29.

Bolidium capreoli (Roemer, 1864)

(Pl. XII, Fig. 4)

1864. *Amorphospongia capreoli* Roemer; Roemer F., p. 55, Pl. 19, Fig. 7

1884. *Bolidium capreoli* (Roemer); Počta P., p. 10, Pl. I, Fig. 1; Text Pl. 1

Material: 16 specimens. SK 59

Remarks: *Bolidium capreoli* (Roemer) differs from *B. palmata* (Roemer) in having a smaller number of branches. It also differs from *B. arbustrum* Hurcewicz in having an irregular and short ramification.

Occurrence: Germany: Lower Senonian; Czechoslovakia: Cenomanian.

Family: Scytaliidae Laubenfels, 1955 emend. Lagneau-Hérenger, 1962

This family includes more or less cylindrical sponges with a deep, tube-like spongocoel and a well-developed canal system. Rhizoclones are linked together in a compact but non-fibrous skeleton. Numerous inhalant pores, situated on the lateral surface of walls, are connected with the canals. Apopores are disposed on the surface of the spongocoel.

Genus: *Scythalia* Zittel, 1878 (Type species: *Jerea turbinata* Roemer, 1864)

Scythalia radiformis (Phillips, 1835)

1968. *Scythalia radiformis* (Phillips); Hurcewicz H., p. 53, Pl. 12, Fig. 1—3; Text Fig. 12 (synonymy given).

Material: 1 specimen. SK 60

Occurrence: This species is known from the Aptian to Campanian of Germany, France and Poland.

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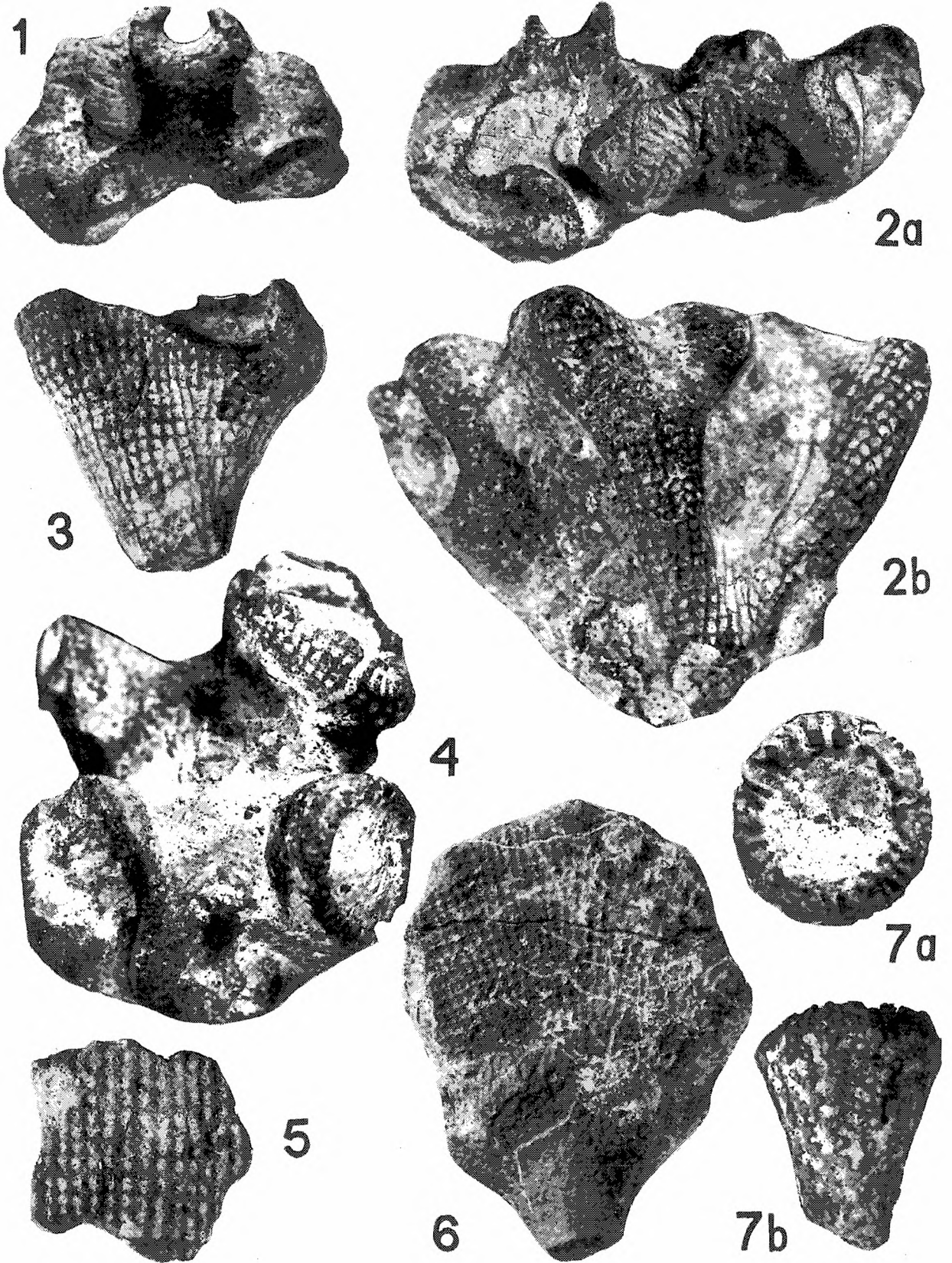
STRESZCZENIE

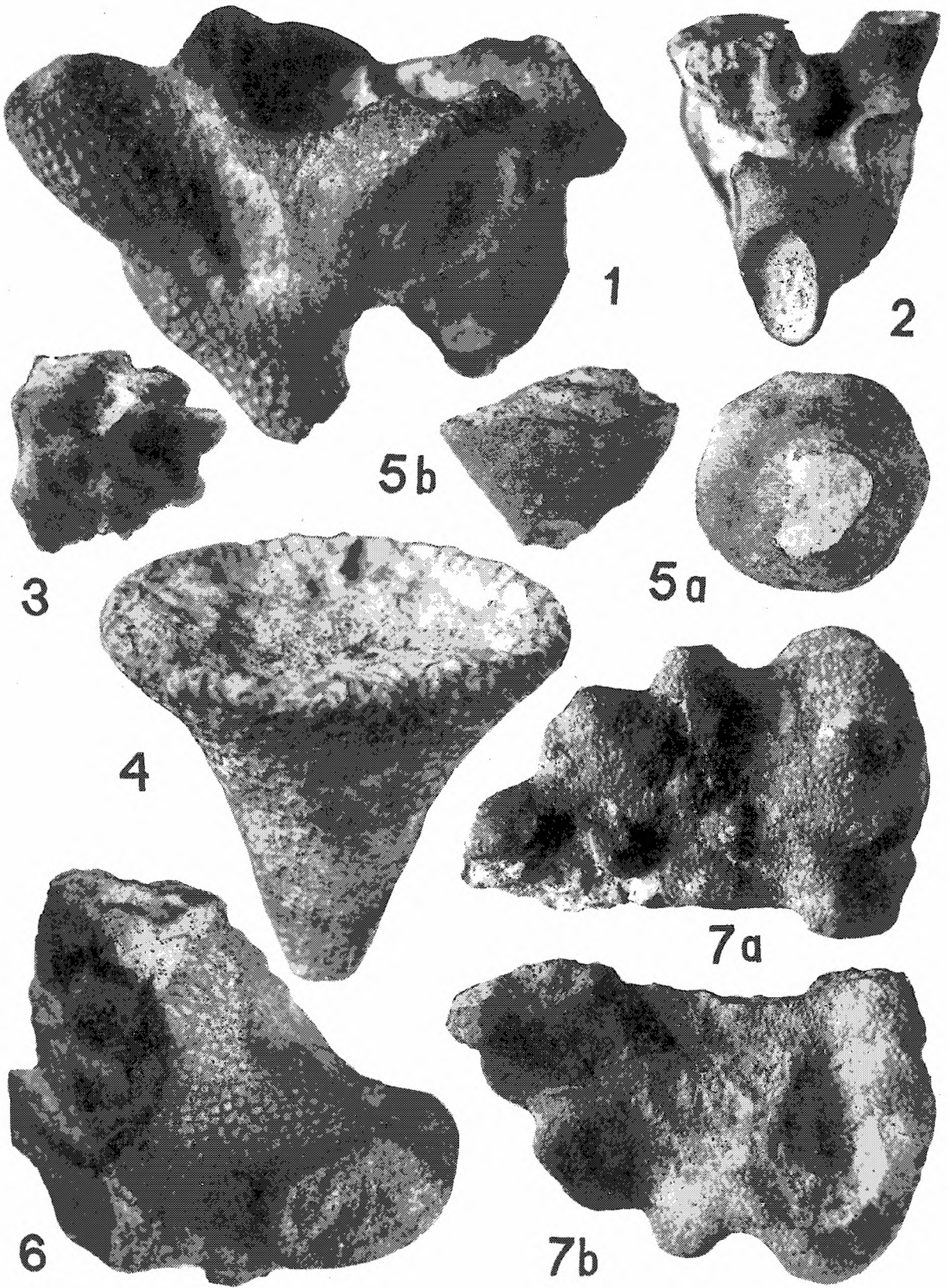
Litoralne osady kredowe okolic Krakowa charakteryzuje bogactwo fauny. Jednym z punktów występowania osadów kredowych interesujących paleontologicznie jest Korzkiew (12 km na N od Krakowa, fig. 1, 2). W tej miejscowości w odkrywce nad zamkiem odsłania się profil utworów kredowych, z których pochodzi opisany w niniejszej pracy zespół gąbek. W odkrywce tej odsłonięte są dużej miąższości (ok. 8 m) serie piasków białych, drobnoziarnistych, przekątnie warstwowanych z nieznaczną domieszką glaukonitu. Piaski te nie zawierają fauny, zostały one zaliczone przez Panowa (1934) do wrakonu. Na wyrównanej powierzchni

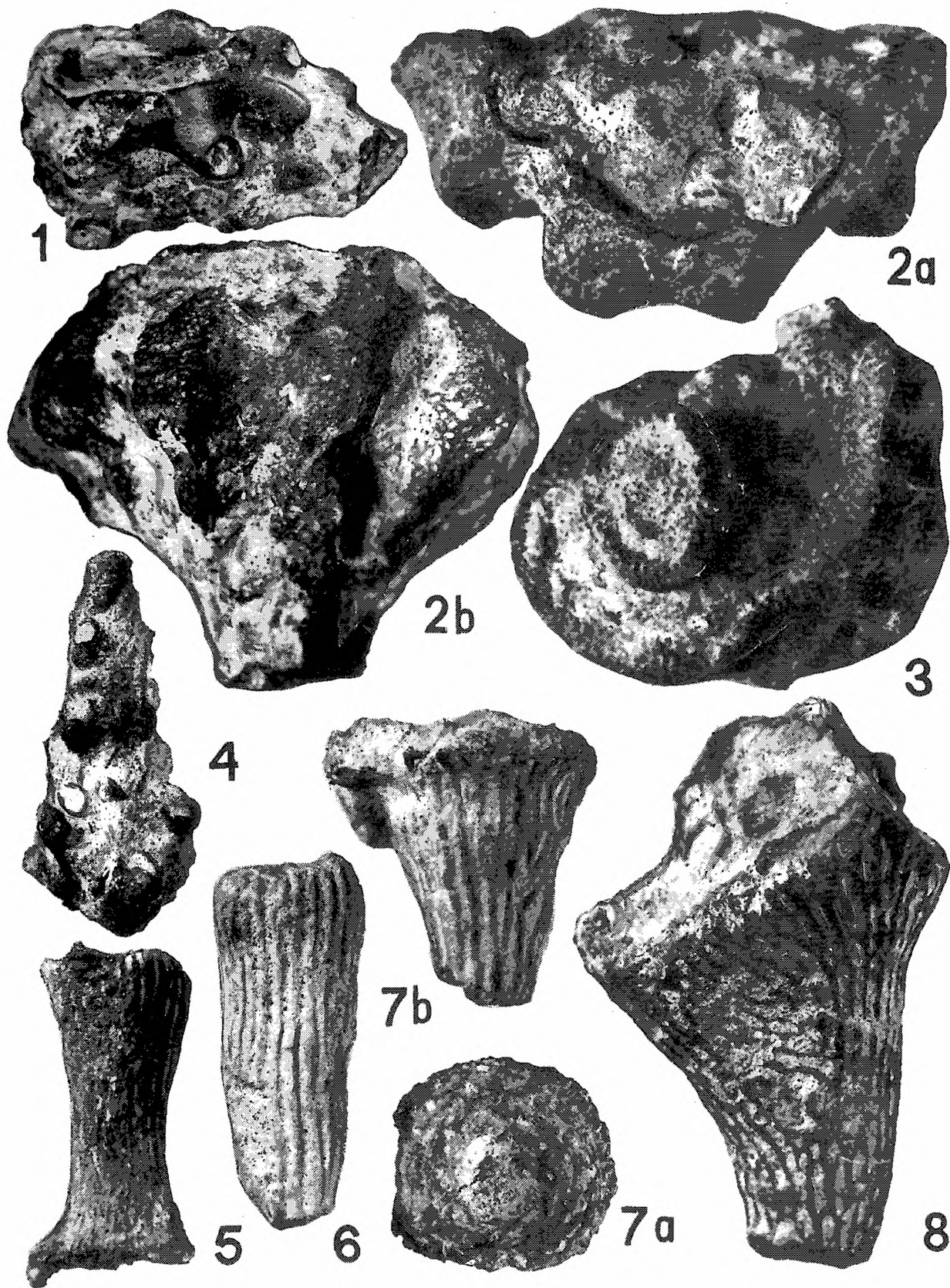
piasków leży warstwa zlepieńca (60—80 cm) z dużą ilością jurajskich buł krzemiennych, w której Panow (1934) znalazł faunę wskazującą na dolny cenoman. Fakt ten potwierdził Bukowy (1956). Na zlepieńcach dolnocenomańskich osadziły się zielonkawe margle lub iły margliste z glaukonitem (30 cm) z bardzo bogatą fauną złożoną z gąbek, jeżowców, małży, ślimaków. Znaleziono w tej warstwie belemnity: *Actinocamax granulatus* (Blv.) i *Actinocamax verus* Mill (Bukowy 1956) wskazują na santoński wiek tych margli. Margle santońskie kończą profil kredy w tej odkrywce, wyżej leżą lessy, których miąższość dochodzi do 5 m.

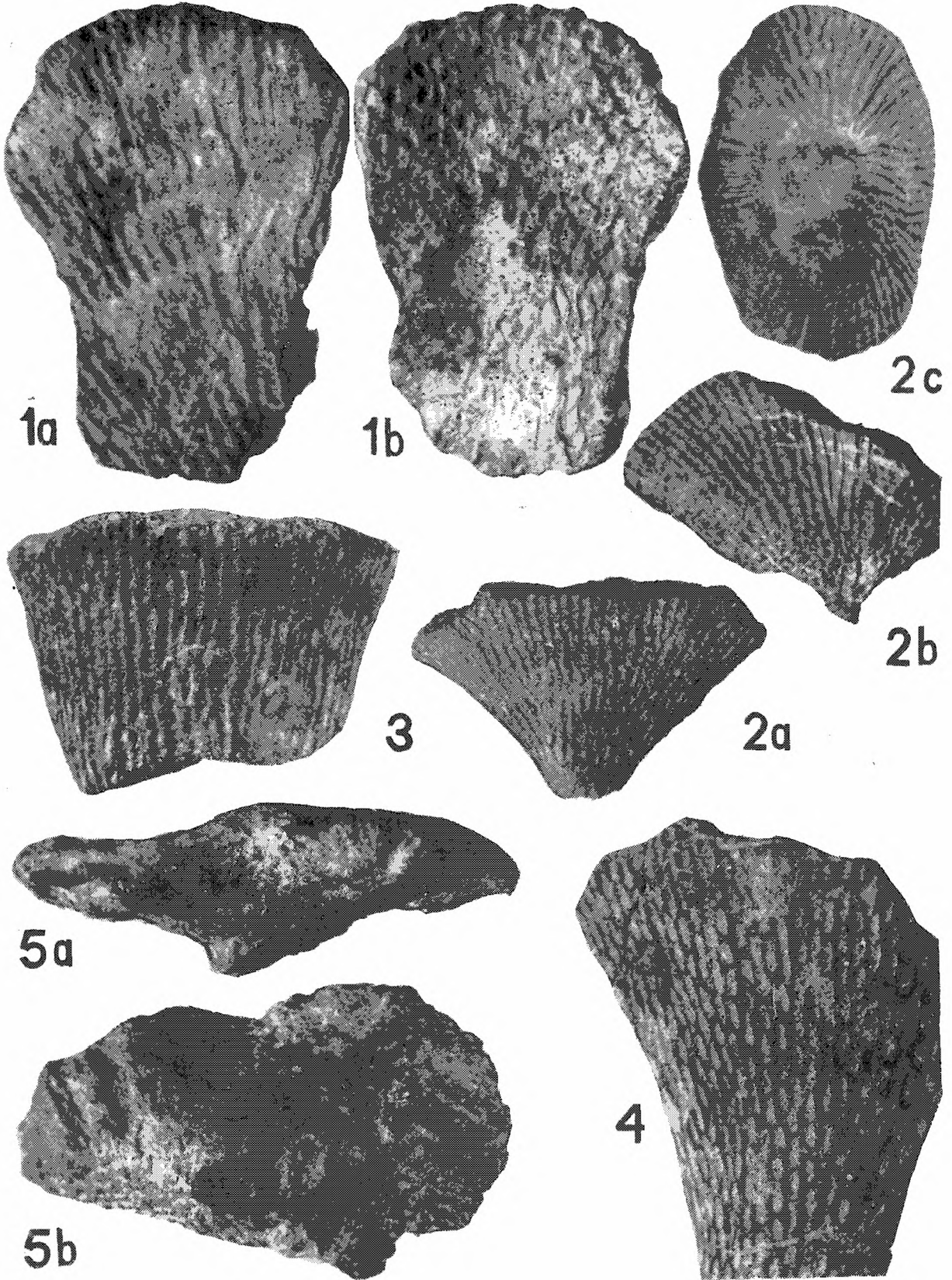
Margle santońskie są miejscami przepelnione gąbkami na ogół źle zachowanymi. Z bogatego zbioru liczącego ponad tysiąc okazów wybrano i opracowano dobrze zachowane okazy, które reprezentują zapewne cały zespół gąbkowy, żyjący w strefie przybrzeżnej morza santońskiego. Autor oznaczył 60 gatunków gąbek (tabela 1), z tego zespołu 52 gatunki nie były znane dotychczas z ziem polskich. W tym bogatym zespole występują gatunki należące do trzech rzędów: Triaxonia (53 gatunki), Tetraaxonia (5 gatunków), Monaxonia (2 gatunki). Przeważają przedstawiciele nadrodziny Lychniscosa (39 gatunków), wśród których masowo występują gatunki z rodzajów: Paracraticularia, Ventriculites, Sporadoscinia, Plocoscyphia. Inne nadrodziny jak Hexactinosa reprezentują 4 gatunki, Tetracladina 3 gatunki, Megacladina 2 gatunki i Rhizocladina 2 gatunki. Zespół gąbek z Korzkwi ma tylko 8 wspólnych gatunków ze 107-gatunkowym zespołem opisanym przez Hurcewicz (1966—68) z górnej kredy Polski. Wykazuje on duże podobieństwo do fauny gąbek znanej z kredy górnej Powoźza. W badanym zespole stwierdzono również 6 nowych gatunków, a to: *Aphrocallistes coronatus* sp. nov., *Coscinopora variabilis* sp. nov., *Coscinopora* sp., *Myrmecioptychium jordanum* sp. nov., *Becksia ojcowiensis* sp. nov., *Etheridgea cracoviensis* sp. nov.

Na podstawie wyżej wymienionych faktów dochodzimy do wniosku, iż w tej części morza santońskiego były specyficzne warunki, dzięki którym rozwinął się tu tak bogaty i zupełnie odrębny zespół gąbek. Gąbki w warstwie (ca 30 cm) margli santońskich rozrzucone są beładnie, większość ich jest ścięta wzdłuż płaszczyzny równoległej do warstwowania, elementy szkieletowe są rzadko zachowane, zwykle ulegały rozpuczczeniu, pozostały po nich jedynie próżnie. Z beładnego układu gąbek i innych skamieniałości w osadzie (jeżowce, małże, ślimaki, belemnity, amonity) wnioskujemy, iż organizmy te nie żyły w tym miejscu, gdzie je dzisiaj znajdujemy. Przenoszone one były do osadu z nieznaczonej jednak odległości. Na wielu skamieniałościach zachowane są organizmy oskorupiające takie jak: ostrygi, pierścienice czy mszywioły. To wielkie bogactwo fauny wskazuje, że zbiornik santoński w Korzkwi był płytki, dobrze przewietrzany i ciepły.









EXPLANATION OF PLATES — OBJAŚNIENIE PLANSZ

Plate — Plansza I

- Fig. 1. *Paracraticularia fittoni* (Mantell), SK 4, $\times 1$.
Fig. 2a. *Paracraticularia subseriata* (Roemer), SK 5, upper view, widok z góry, $\times 1$.
Fig. 2b. *Paracraticularia subseriata* (Roemer), SK 5, lateral view, widok z boku, $\times 1$.
Fig. 3. *Craticularia radicata* Počta, SK 1, $\times 1$.
Fig. 4. *Paracraticularia subseriata* (Roemer), SK 5a, $\times 1$.
Fig. 5. *Craticularia relictata* Schrammen, SK 2, $\times 1$.
Fig. 6. *Craticularia virgatula* Schrammen, SK 3, $\times 1$.
Fig. 7a, b. *Hexactinella* sp., $\times 1$.

Plate — Plansza II

- Fig. 1. *Paracraticularia subseriata* (Roemer), SK 5, $\times 1$.
Fig. 2. *Farrea halli* Schrammen, SK 12, $\times 1$.
Fig. 3. *Periphragella johanna* Schrammen, SK 13, $\times 1$.
Fig. 4. *Hexactinella angustata* (Schrammen), SK 8, $\times 1$.
Fig. 5a. *Leptophrama micropora* Schrammen, SK 6, lower part of the sponge, dolna część gąbki, $\times 1$.
Fig. 5b. The same specimen, lateral view. Ten sam okaz, widok boczny.
Fig. 6. *Strephinia convoluta* Hinde, SK 7, $\times 1$.
Fig. 7a. *Aphrocallistes lobatus* Schrammen, SK 9, lower part of the sponge, dolna część gąbki, $\times 1$.
Fig. 7b. The same specimen, upper part of the sponge. Ten sam okaz, górna część gąbki.

Plate — Plansza III

- Fig. 1. *Eurete rauffi* Schrammen, SK 11, $\times 1$.
Fig. 2a. *Aphrocallistes coronatus* sp. nov., SK 10, upper view. Widok z góry. $\times 1$.
Fig. 2b. The same specimen, lateral view. Ten sam okaz, widok z boku.
Fig. 3. *Rhizopoterionopsis pruvosti* Dfr.-Lefr., SK 20, $\times 1$.
Fig. 4. *Periphragella simplex* Schrammen, SK 14, $\times 1$.
Fig. 5. *Ventriculites radiatus* Mantell, SK 15, fragment of lower part of the sponge, Fragment dolnej części gąbki. $\times 1$.
Fig. 6. *Ventriculites cylindratus* Schrammen, SK 16, $\times 1$.
Fig. 7a. *Ventriculites radiatus* Mantell, SK 15, A view from the lower side. Widok od dołu. $\times 1$.
Fig. 7b. The same specimen, lateral view. Ten sam okaz, widok z boku.
Fig. 8. *Ventriculites radiatus* Mantell, $\times 1$.

Plate — Plansza IV

- Fig. 1a. *Rhizopoterion tubiformae* Schrammen, SK 19, upper view. Widok z góry. $\times 1$.
Fig. 1b. The same specimen, lower view. Ten sam okaz, widok z dołu.
Fig. 2a, 2b. *Lepidospongia rugosa* Schlüter, SK 21, $\times 1$.
Fig. 2c. The same specimen, lower view. Ten sam okaz, widok z dołu.
Fig. 3, 4. *Orthodiscus fragilis* Schrammen, SK 22, $\times 1$.
Fig. 5a. *Ventriculites mamillaris* Smith, SK 17, side view. Widok z boku. $\times 1$.
Fig. 5b. The same specimen, lower view. Ten sam okaz, widok z dołu.

Plate — Plansza V

- Fig. 1. *Sporadoscinia stirps* Schrammen, SK 26, $\times 1$.
Fig. 2, 6. *Sporadoscinia teutoniae* Schrammen, SK 25, $\times 1$.
Fig. 3. *Leiostracosia angustata* (Roemer), SK 28, $\times 1$.
Fig. 4, 5. *Callodictyon angustatum* Hinde, SK 35, $\times 1$.
Fig. 7. *Becksia augustae* Schrammen, SK 39, $\times 1$.
Fig. 8. *Coscinopora variabilis* sp. nov., SK 32, $\times 1$.

Plate — Plansza VI

- Fig. 1a. *Coscinopora quincuncialis* (Toulm., Smith), SK 30, upper view, widok z góry. $\times 1$.
Fig. 1b. The same specimen, side view. Ten sam obraz, widok z boku.
Fig. 2a. *Coscinopora infundibuliformis* Goldfuss, SK 29. side view. Widok z boku. $\times 1$.
Fig. 2b. The same specimen, upper view. Ten sam obraz, widok z góry.
Fig. 3. *Napaeana striata* (Schrammen), SK 23, $\times 1$.
Fig. 4a. *Coscinopora macropora* Goldfuss, SK 33, side view. Widok z boku. $\times 1$.
Fig. 4b. The same specimen, lower part of the sponge. Ten sam okaz, dolna część gąbki.
Fig. 5a. *Coscinopora* sp., SK 31, upper view. Widok z góry. $\times 1$.
Fig. 5b. The same specimen, side view. Ten sam okaz, widok z boku.
Fig. 6. *Cinclidella solitaria* Schrammen, SK 34, $\times 1$.
Fig. 7. *Sporadoscinia capax* Hinde, SK 27, lower view. Widok z dołu. $\times 1$.

Plate — Plansza VII

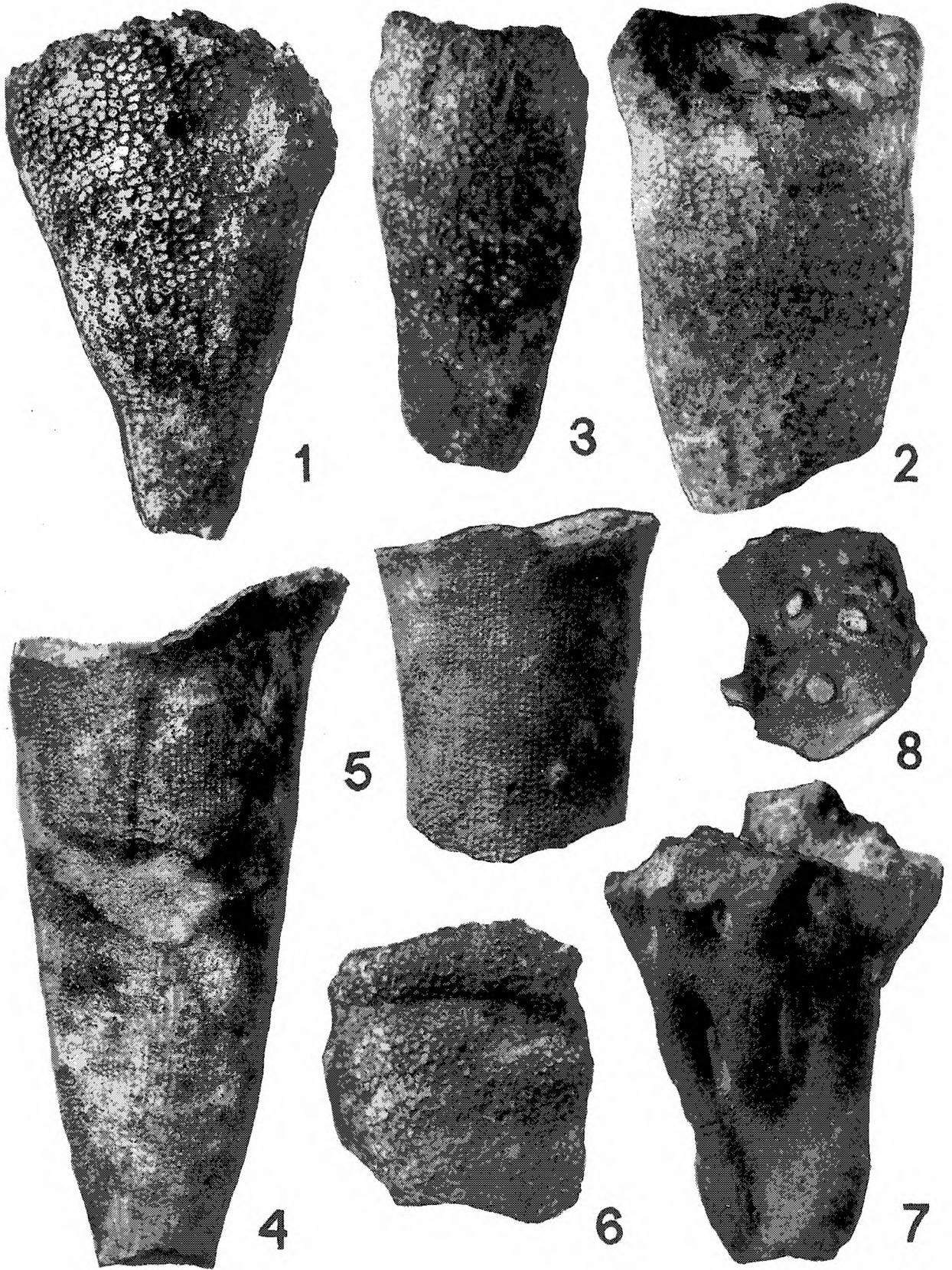
- Fig. 1. *Sestrocladia furcata* Hinde, SK 36, $\times 1$.
Fig. 2. *Leiostracosia angustata* (Roemer), SK 28, $\times 1$.
Fig. 3a. *Myrmecioptychium subagaricoides* (Sincov), SK 37, lower view. Widok z dołu. $\times 1$.
Fig. 3b. The same specimen, upper view. Ten sam okaz, widok z góry. $\times 1$.
Fig. 3c. The same specimen, side view. Ten sam okaz, widok z boku. $\times 1$.
Fig. 4a. *Myrmecioptychium subagaricoides* (Sincov), SK 37, upper view. Widok z góry. $\times 1$.
Fig. 4b. The same specimen, lower view. Ten sam okaz, widok z dołu.

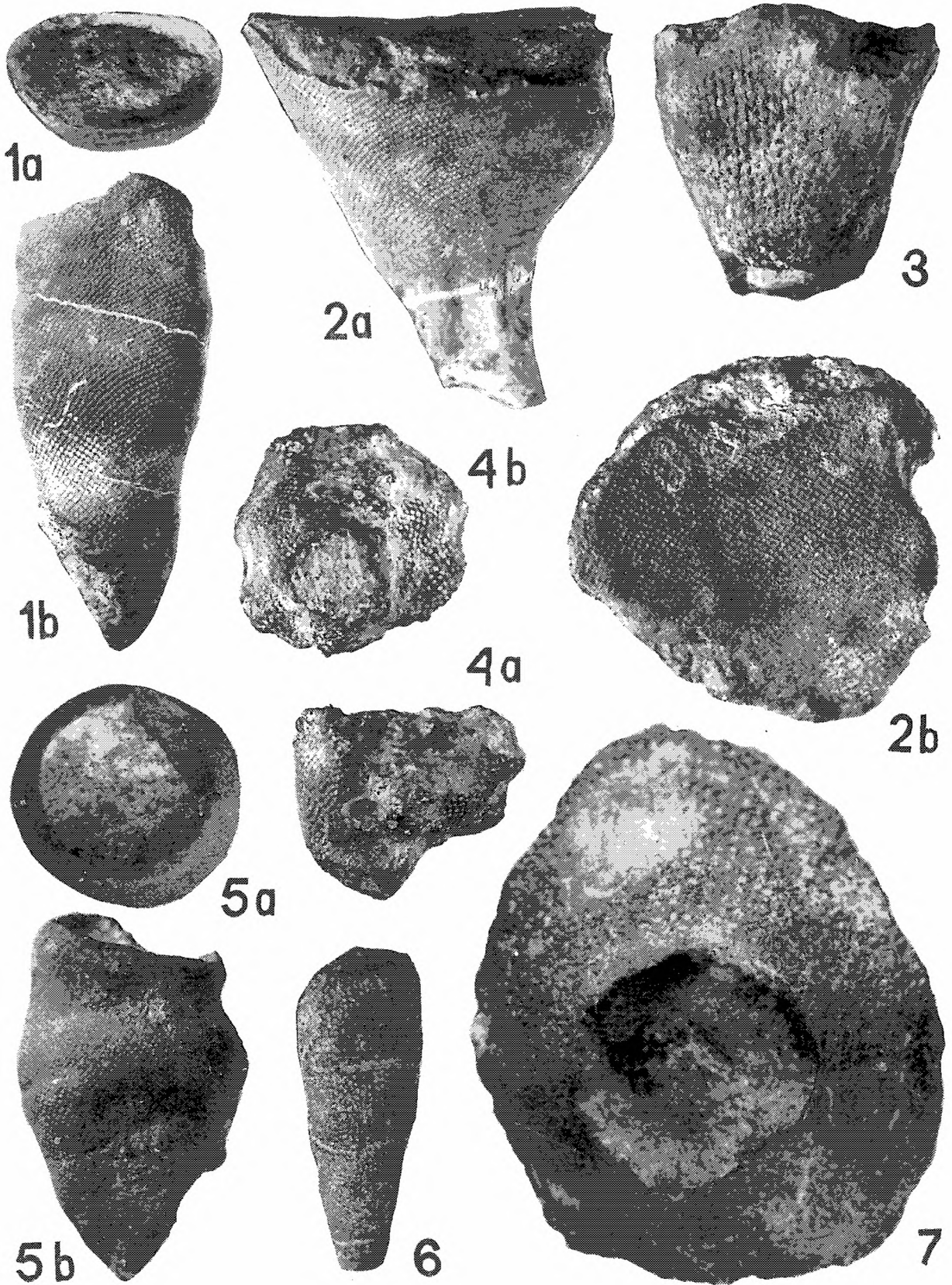
Plate — Plansza VIII

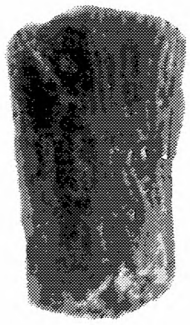
- Fig. 1a. *Myrmecioptychium jordanum* sp. nov., SK 38, lower view. Widok z dołu. $\times 1$.
Fig. 1b. The same specimen, upper view. Ten sam okaz, widok z góry. $\times 1$.
Fig. 1c. The same specimen, side view. Ten sam okaz, widok z boku. $\times 1$.
Fig. 2a. *Camerospongia capitata* Toulm., Smith, SK 50, upper view. Widok z góry. $\times 1$.
Fig. 2b. The same specimen, lower view. Ten sam okaz, widok z dołu. $\times 1$.
Fig. 2c. The same specimen, side view. Ten sam okaz, widok z boku. $\times 1$.

Plate — Plansza IX

- Fig. 1a. *Becksia ojcoviensis* sp. nov., SK 41, side view. Widok z boku. $\times 1$.
Fig. 1b. The same specimen, upper view. Ten sam okaz, widok z góry. $\times 1$.
Fig. 2a. *Becksia soekelandi* Schlüter, SK 40, side view. Widok z boku. $\times 1$.



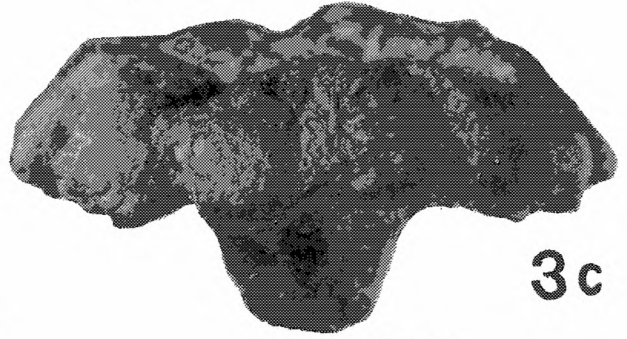




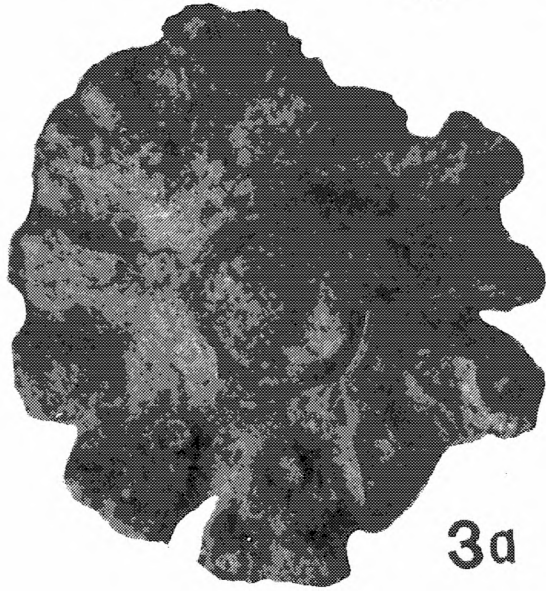
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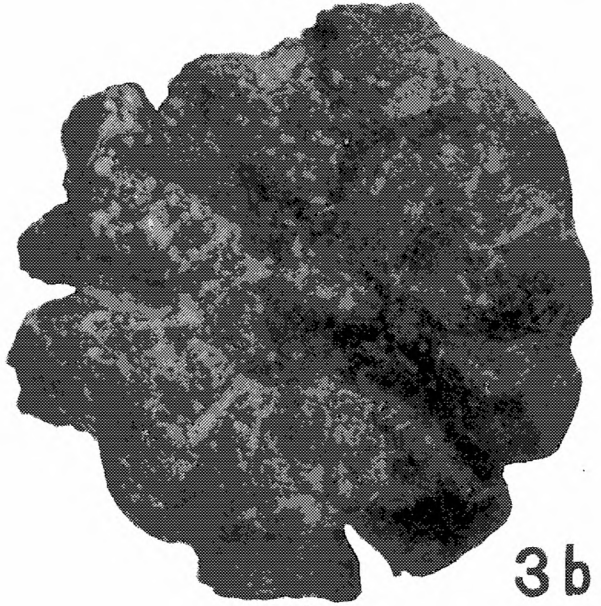
2



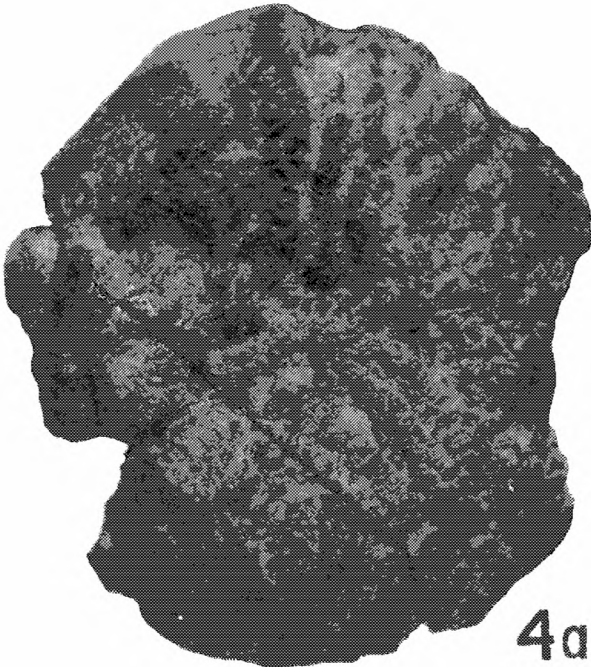
3c



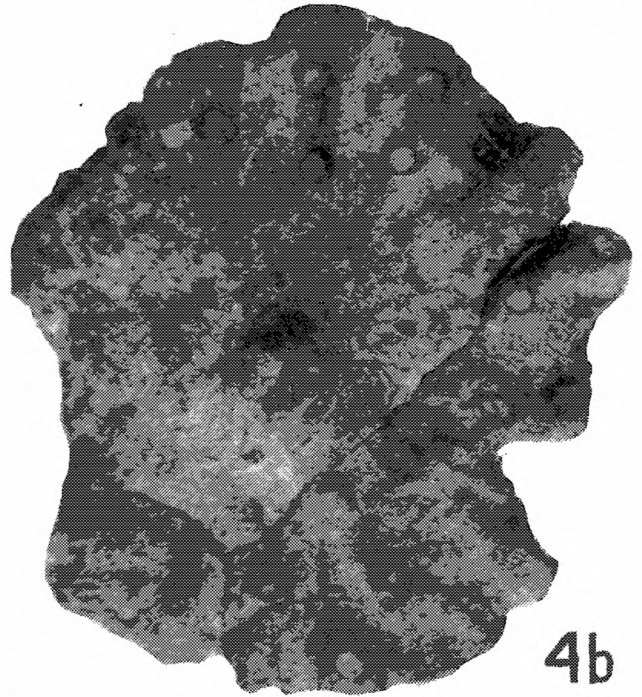
3a



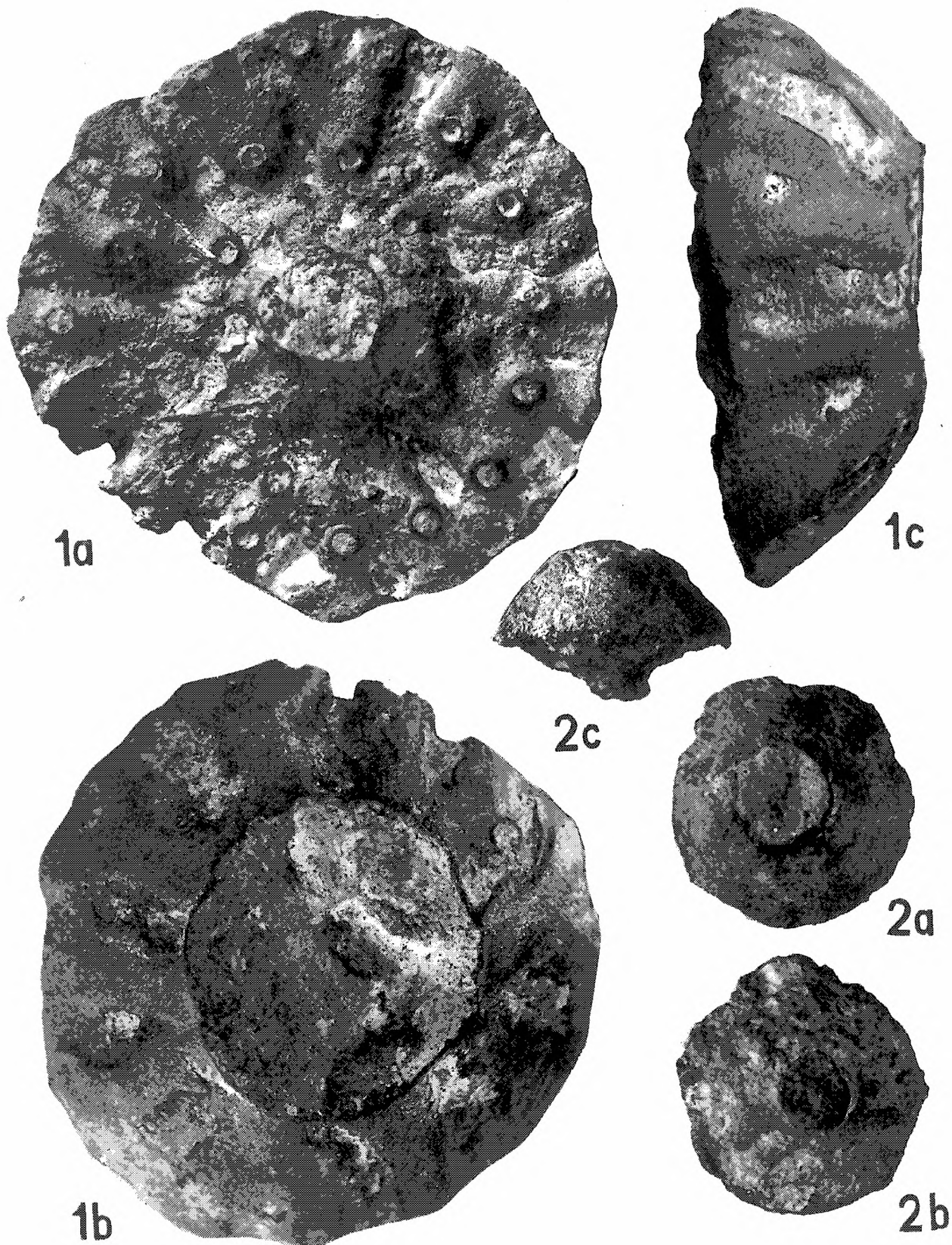
3b



4a



4b



- Fig. 2b. The same specimen, lower view. Ten sam okaz, widok z dołu. $\times 1$.
Fig. 3. *Becksia ojcoviensis* sp. nov., SK 41, specimen B. $\times 1$.
Fig. 4. *Plocoscyphia roemeri* Leonhardt, SK 43, $\times 1$.

Plate — Plansza X

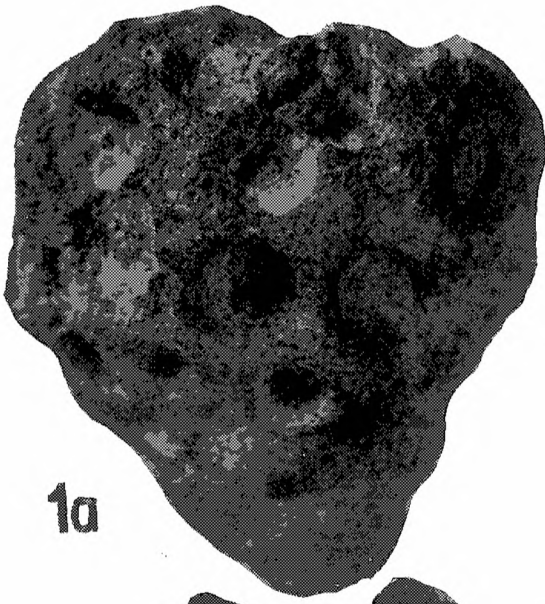
- Fig. 1. *Plocoscyphia communis* Moret, SK 45, $\times 1$.
Fig. 2. *Tremabolites megastoma* (Roemer), SK 51, upper view. Widok z góry. $\times 1$.
Fig. 3. *Plocoscyphia reticulata* Hinde, SK 44, $\times 1$.
Fig. 4. *Plocoscyphia labrosa* (Smith), SK 46, $\times 1$.
Fig. 5a. *Etheridgea goldfussi* (Fischer), SK 48, a little specimen, upper view. Mały okaz, widok z góry. $\times 1$.
Fig. 5b. The same specimen, side view. Ten sam okaz, widok z boku. $\times 1$.
Fig. 6. *Plocoscyphia vagans* Hinde, SK 47, $\times 1$.
Fig. 7a. *Plocoscyphia fenestrata* (Smith), SK 42, side view. Widok z boku.
Fig. 7b. The same specimen, lower view. Ten sam okaz, widok z dołu. $\times 1$.

Plate — Plansza XI

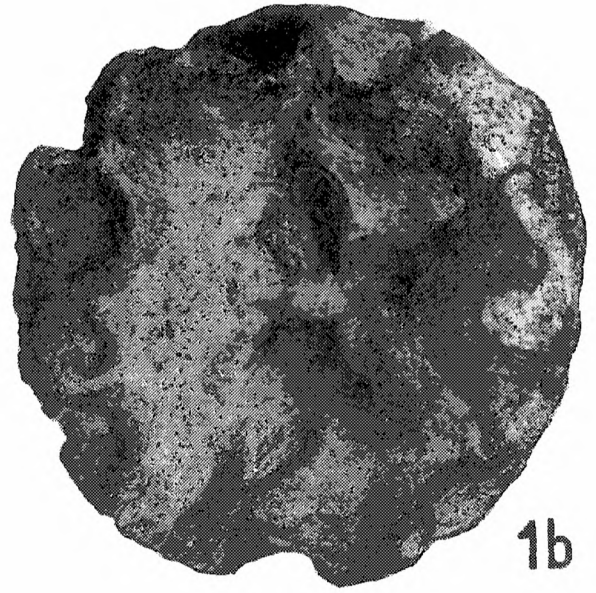
- Fig. 1a. *Etheridgea cracoviensis* sp. nov. SK 49, side view. Widok z boku. $\times 1$.
Fig. 1b. The same specimen, upper view. Ten sam okaz, widok z góry. $\times 1$.
Fig. 2a, 2b. *Etheridgea cracoviensis* sp. nov. SK 49, other specimen. $\times 1$.
Fig. 3a. *Etheridgea goldfussi* (Fischer), SK 48, upper view. Widok z góry. $\times 1$.
Fig. 3b. The same specimen, lower view. Ten sam okaz, widok z dołu. $\times 1$.
Fig. 4. *Plocoscyphia* sp., $\times 1$.
Fig. 5. *Toulminia catenifer* (Smith), SK 52, $\times 1$.

Plate — Plansza XII

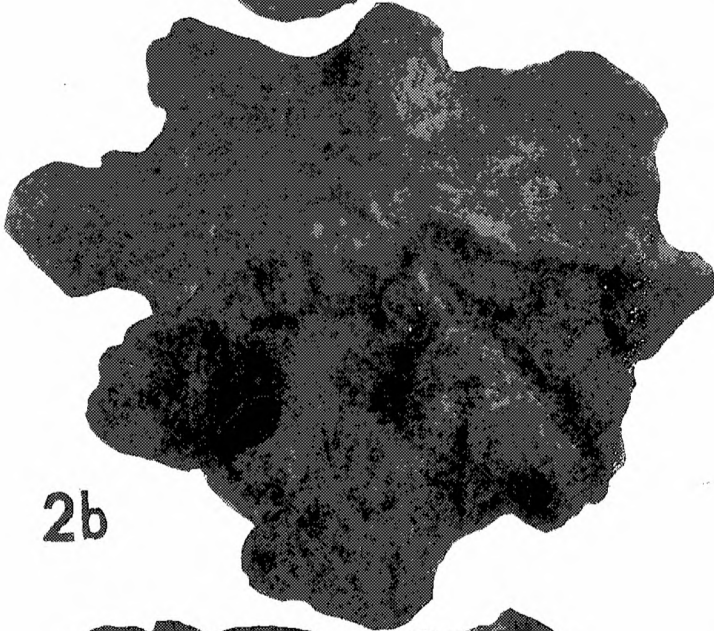
- Fig. 1a. *Polyptycha becsioides* Defr.-Lefr., SK 53, lower view. Widok z dołu. $\times 1$.
Fig. 1b. The same specimen, upper view. Ten sam okaz, widok z góry. $\times 1$.
Fig. 2a. *Ragadinia rimosa* (roemer), SK 55, lower view. Widok z dołu. $\times 1$.
Fig. 2b. The same specimen, side view. Ten sam okaz, widok z boku. $\times 1$.
Fig. 3a, b. *Homalodora pusilla* Schrammen, SK 58, side view. Widok z boku. $\times 1$.
Fig. 4. *Bolidium capreoli* (Roemer), SK 59, $\times 1$.
Fig. 5. *Prokaliapsis arborescens* (Michelin), SK 56, $\times 1$.
Fig. 6a. *Siphonia micropora* Schrammen, SK 54, upper view. Widok z góry. $\times 1$.
Fig. 6b. The same specimen, side view. Ten sam okaz, widok z boku. $\times 1$.



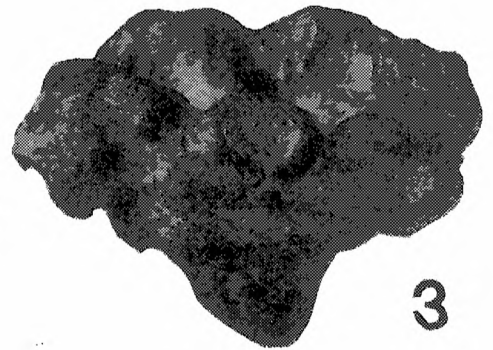
1a



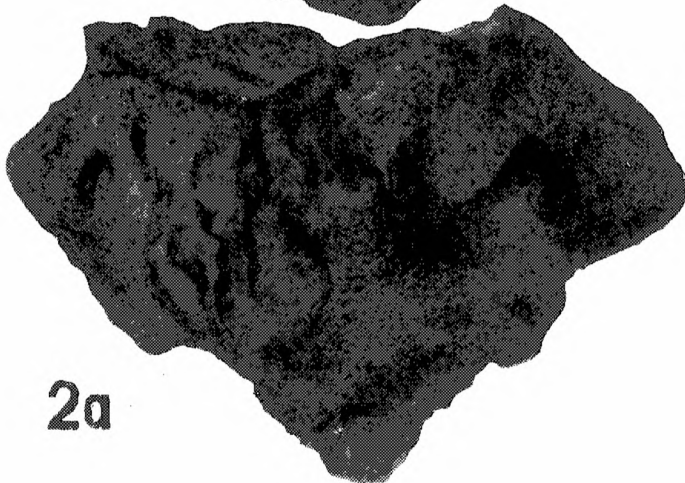
1b



2b



3



2a



4

