

EWA RONIEWICZ

Rhaetian corals of the Tatra Mts

ABSTRACT: The assemblage of Rhaetian Scleractinia from the Tatra Mts contains 15 species, 6 of them being new. In this assemblage two new genera, viz. *Parathecosmilia* and *Rhaetiastraea* were erected. The described fauna bears a close resemblance to that of the northern and central Alps, and of the Pamirs.

INTRODUCTION

Rhaetian corals in the Tatra Mts have not hitherto been examined paleontologically although they are enough common fossils. It was only Goetel (1917) who described from the sub-tatric series of the Tatra Mts the following species: *Thecosmilia clathrata* Emmrich, *Thamnastraea rectilamellosa* Winkler and *Stylophyllum* sp. Recently, Gaździcki (1974, *this volume*) gives a detailed location of the coral-bearing layers in profiles of the lower sub-tatric (Križna) series. The presence of corals in the Rhaetian of the higher sub-tatric (Choč) series was mentioned only from the Slovakian part of the Tatra Mts (Goetel 1917, Zázvorká & Prantl 1936).

In the high-tatric series corals are much rarer. The location of coral-bearing limestones was given by Uhlig (1897), Goetel (1917), Kortański (1959), Wójcik (1959) and Radwański (1968).

The present paper is based on the author's own material and on the coral collection of the Institute of Geology, Warsaw University. The collection was completed in the years 1955—1972, mainly in the Polish Tatra Mts (cf. Fig. 1) both in the high-tatric series (S slope of Mt. Bobrowiec, pass in Mt. Kulawiec), as well as in the sub-tatric Križna series (S part of Lejowa Valley, Mt. Mała Świnica and Mt. Mały Kopieniec) and Choč series (N and NE parts of Chochołowska Valley). Used was also W. Goetel's collection (Institute of Geological Sciences of the Polish

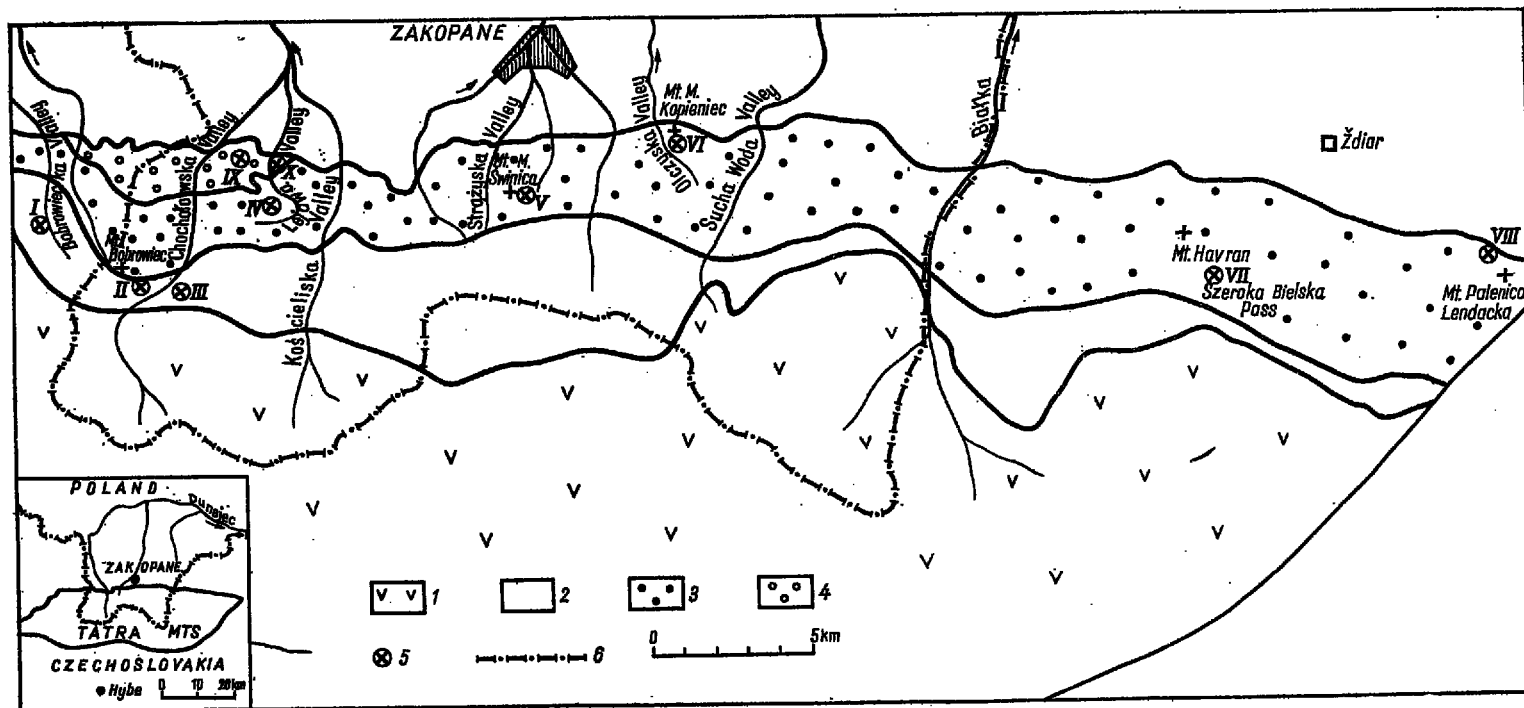


Fig. 1

Distribution of the coral-bearing localities in the Rhaetian of the Tatra Mts

1 crystalline core; 2 high-tatric series; 3 and 4 sub-tatric series (Križna and Choč); 5 main coral-bearing localities: I Bobrowiecka Valley, II S slopes of Mt. Bobrowiec, III Pass in Mt. Kulawiec, IV S part of Lejowa Valley, V Mt. Mała Szwinnica, VI Mt. Mały Kociołek, VII Szeroka Bielska Pass, VIII Mt. Palenica Lendacka, IX NE part of Chochołowska Valley, X NE part of Lejowa Valley; 6 state frontier

Academy of Sciences, in Cracow). Corals from the Slovakian Tatra Mts of the high-tatric series (Bobrowiecka Valley, collection of Docent A. Radwański) and sub-tatric series (Szeroka Bielska Pass, Mt. Palenica Lendacka; collection of Dr. A. Gaździcki) were available as additional material. The scribed coral collection is housed in the Institute of Paleozoology of the Polish Academy of Sciences in Warsaw (*Z.Pal.*).

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OCCURRENCE OF RHAETIAN SCLERACTINIA

The Rhaetian corals in the Tatra Mts occur in dark, compact and well-bedded limestones lithologically belonging to two types. The first, organogenic limestone contains a rich assemblage of corals, various calcareous algae, calcisponges, hydrozoans, encrusting bryozoans, numerous brachiopods, pelecypods, gastropods and foraminifers; the corals are often bored by lithophags here. Such limestones are common in the sub-tatric series (see detailed profiles by Gaździcki, 1974) and also present in the high-tatric series in the Bobrowiecka Valley (see detailed profile by Radwański, 1968, Fig. 2C); and thickness of their layers ranges from 0.5 to 2 m. The second lithological type is represented by pelitic limestones occurring in layers of a similar thickness; they are, however, poor in fauna, corals being predominant. This type is developed only in the sub-tatric series (Mt. Mała Świnica; see detail profiles by Gaździcki, 1974 — section II, layer 7).

The corals from the sub-tatric and high-tatric series differ in species, the sub-tatric assemblage being richer and fairly constant throughout the whole area (cf. Table 1). The largest coral concentrations in the sub-tatric series were observed on Mt. Mała Świnica (Fig. 1, locality V) and NE part of the Chochołowska Valley (locality IX). Eight common species are present here, while only one species being found in the Lejowa Valley (locality X). Phaceloid colonies are here up to 50 cm in height, lamellar colonies up to 10 cm in thickness.

Within the high-tatric series, the richest coral bearing site is located in the Bobrowiecka Valley (Fig. 1, locality I; cf. Radwański 1968, Fig. 2C). Five species were found there, hemispherical colonies (up to 10 cm in diameter) being most common, and smaller phaceloid colonies being subordinate.

The dominant element of the coral-bearing limestones in the Tatra Mts are either corals or algae and corals. The most common in the Tatra

Table 1

Occurrence of corals in the Rhaetian of the Tatra Mts (localities explained in Text-fig. 1)

Species	Locality	High-tatric series			Sub-tatric series						
		I	II	III	IV	V	VI	VII	VIII	IX	X
<i>Pinacophyllum lejowae</i> sp. n.											+
<i>Cyathocenia alpina</i> /Gümbel/											+
<i>Stylophyllum gracile</i> sp. n.		+									
<i>Stylophyllum</i> sp.		+									
<i>Phacelostylophyllum robustum</i> sp. n.											+
<i>Phacelostylophyllum medium</i> sp. n. .			+	+							
? <i>Phacelostylophyllum</i> sp.		+	+								
<i>Retiophyllia clathrata</i> /Emmrich/ . .						+				+	
<i>Retiophyllia paraclathrata</i> sp. n. .					+	+	+			+	
<i>Parathecosmilia sellae</i> /Stoppani/ .						+					
<i>Parathecosmilia</i> sp.						+					
<i>Elysastraea</i> sp.		+									
<i>Rhaetiastraea tatraica</i> sp. n. . . .			+	+							
<i>Astraeomorpha crassisepta</i> Reuss . .					+	+		+			+
<i>Pamiroseris rectilamellosa</i> /Winkler/						+		+	+		+

assemblages are the high growth forms ("hochwüchsige Formen" of Zankl), represented by *Retiophyllia*, *Parathecosmilia*, *Pinacophyllum*, *Phacelostylophyllum*. Low growth forms ("niedrigwüchsige Formen") and encrusting ones are less numerous, represented mainly by *Pamiroseris*, *Astraeomorpha*, *Rhaetiastraea* gen. n. Therefore, from the growth form as well as their predominance in the assemblages, the corals of this region are similar (cf. Zankl 1969) to the Upper Rhaetian ones from the Salzburg Alps (Adnet) and Tyrol (Steinplatte).

In comparison to the classical regions in the Northern Limestone Alps or in the Pamirs (Frech 1890, Melnikova 1967, Zankl 1971), the Rhaetian of the Tatra Mts is poor in coral formations. The thickness of Rhaetian deposits is not over 80 m (Gaździcki 1974) and only a small percent is represented by coral-bearing limestones, much dispersed throughout the profile. Patch reefs, poor in species, were formed in the Rhaetian shallow water basin, but due to the changeable environment they were of short duration. As a result the coral formations are not thick with a range of only one or a few coral generations of overgrowing colonies. As the Tatra basin was in free contact with the Tethys Ocean,

the here occurring coral assemblage is close, on one hand, to that of the Rhaetian Alpine basin (5 common species), and on the other to that of the Asiatic basin (2 common species).

SYSTEMATIC PART

Triassic corals form a very individual group among Scleractinia, but their systematics has been poorly recognized. Paleontological investigation is usually hindered by the bad preservation of these corals. Their skeletal structure roughly resembles that of corals of younger epochs, which is why, up to recent years, these corals were often included into Jurassic genera. As their microstructure is usually not preserved, it is almost impossible to draw conclusions as to their relation to the morphologically similar Jurassic genera. Considerable misunderstanding has arisen by including a lot of phaceloid and solitary species into the genera *Thecosmilia* Milne-Edwards & Haime and *Montivaltia* Lamouroux. Cuif (1966, 1967), on the base of very well preserved material, revised many of them, erecting some new genera. Also Melnikova (1971) included some species previously assigned to *Thamnasteria*, into newly erected genera. Recent studies by Cuif (1972) prove that investigations of microstructure are indispensable to the correct recognition of Triassic corals. An example of the representatives of the family Stylophyllidae clearly shows that even major differences in microstructure may hardly be reflected in the skeletal morphology which is in practice a basis for taxonomic designations.

The present author takes into consideration the fact, that some of the species here described as new may in reality, be synonyms of the Alpine species, as previous descriptions are insufficient for full identification.

The symbols used in descriptions of species are as follows:

- d* — diameter of corallite; *c-c* — distances between centres of corallites;
s — amount of septa; *S1, S2 ...* septa of 1, 2 ... cycle (the term "cycle" is used here according to Vaughan & Wells (1943) for the septa of the same stage of development); *t* — amount of tabulae or tabuloid elements, measured in longitudinal section; *c* — carinae.

Suborder Archaeocoeniina Alloiteau, 1952

Family Pinacophyllidae Vaughan & Wells, 1943; emend. Alloiteau, 1952

Genus PINACOPHYLLUM Frech, 1890

?*Pinacophyllum lejowae* sp.n.

(Text-fig. 2 and Pl. 1, Figs 1—2)

Holotype: the specimen Z. Pal. No. H. VI/121, figured in Pl. 1, Fig. 1.

Type horizon: Rhaetian of the sub-tatric (Choč) series.

Type locality: NE part of the Lejowa Valley, Tatra Mts.

Derivation of the name: after the type locality.

Diagnosis.—Corallites up to 8 mm in diameter, composed of about 16 septa.

Material.—Eight colonies and fragments of colonies.

Dimensions (in mm):

d	s	t
6,5—7(8)	15—17, usually 16	3—10(10)

Description.—Phaceloid colony, corallites long, cylindrical. Septa loose, developed in form of thick septal spines coalesced in wall zone; they vary in size and are rather irregularly distributed. Nevertheless, septa belonging to two cycles, alternately arranged, can generally be differentiated. Spines of *S1* reach the centrum while spines *S2* remain close to the wall. Endotheca very loose, composed of subhorizontal tabuloid elements. Epithecal wall very thin.

Remarks.—The species is very close to the form described by Kristan-Tollmann & Tollmann (1969, p. 15, Pl. 1, Figs 1—3) as *Oppelismilla* n.sp. cf. *zitteli* (Frech), which differs however in diameter of corallites (10 cm being the average). Septa of both species appear to be similarly developed. Another close species, *Pinacophyllum* sp. 2 described by Zankl (1969), has similar diameters of corallites; the septa, as far as one can judge from the illustration, are less developed (Zankl 1969, Pl. 3, Fig. 3). The species is classified to the genus *Pinacophyllum* because of its tabular endotheca. Dissociation of septa into trabeculae resembles that of *Stylophyllum-Stylophyllopsis*. Nevertheless, in *P. lejowae* the subhorizontal tabulae do not show any connection with the radial elements which is to be observed in the former (Cuif 1972).

Occurrence.—In the Tatra Mts—Rhaetian of the sub-tatric series.

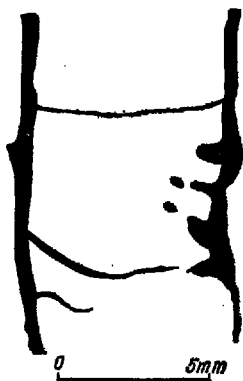


Fig. 2

?*Pinacophyllum lejowae* sp. n.; longitudinal section (Z. Pal. No. H. VI/166)

Genus CYATHOCOENIA Duncan, 1867

The genus is homeomorphic with *Actinastraea* d'Orbigny, and Vaughan & Wells (1943) considered them to be the synonyms. Alloiteau (1957) confirmed the taxonomical validity of the genus *Cyathocoenia* and included it to the family Actinastraeidae on the base of its morphological similarities to *Actinastraea*. The similarity between both genera is indeed considerable: arrangement of septal apparatus in which septa of the third cycle are fused with the faces of the second cycle septa, tabular endotheca, and even a similar axial structure, which was not mentioned by previous authors (Duncan 1867, Alloiteau 1957) describing the genus *Cyathocoenia*. The axial structure of *Cyathocoenia* is composed of one or

more trabeculae, its distinctness depending on the presence of the sclerenchyme (see Melnikova, 1968, Pl. 3, Figs 2, 4; and present paper Text-fig. 3a—b and Pl. 1, Figs 3—4); however it is less developed than in the genus *Actinastraea* (cf. Morycowa 1971, Pls 1—3). The main difference between these genera may be expected in the microstructure. In *Cyathocoenia*, as far as it maybe reckoned from the disponible material, trabeculae in septa are distinctly differentiated into thin — within the calice, and thick, vertical ones — in the periphery and in the peritheca. Such differentiation does not exist in *Actinastraea*. On the base of the septal structure of *Cyathocoenia* which is considered by Melnikova (1968) to be formed by isolated trabeculae joined by sclerenchyme, this author includes the genus to the family Pinacophyllidae.

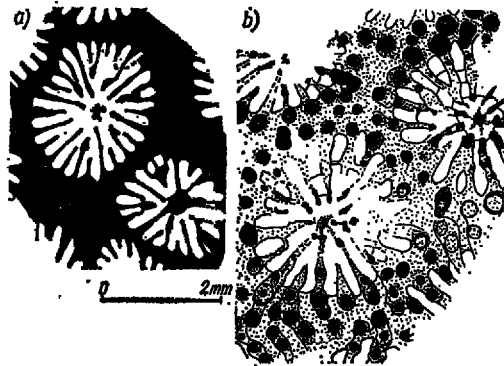
Cyathocoenia alpina (Gümbel, 1861)
(Text-fig. 3 and Pl. 1, Figs 3—4)

1890. *Stephanocoenia alpina* Gümbel; F. Frech, p. 36, Text-fig. in p. 38.

Material. — 10 colonies and fragments of colonies.

Fig. 3

Cyathocoenia alpina (Gümbel);
a cross-section (Z. Pal. No. H. VI/81),
b cross-section showing traces of
microstructure: thick, exothecal
trabeculae visible as dark centers
and axial region with columella
and surrounding axial edges of septa
(Z. Pal. No. H. VI/77)



Dimensions (in mm):

d	c-c	s
(2)2,2—2,5	1,8—2,5	18—22(24)

Description. — Colonies lamellar, often incrusting colonies of other species including branched. Septa nonconfluent and subconfluent. Septal apparatus usually pentameral, every second septum S1 anastomosing with adjacent S2. Anastomosis occurs fairly regularly and takes place close to inner edge. Irregularities in the septal arrangement often occur, as some extra septa S1 appear in the calice. Sometimes also the systems of normal pentameral (rarely hexameral) symmetry are not completely developed. The radial elements in their calicinal part are composed of fairly thin trabeculae inclined to the axis of corallite, as well as very thick trabeculae, arranged almost vertically are present in the peripheral and exothecal parts. Columella small. Endotheca consists of subtabular elements. The wall is composed of the thickened, peripheral parts of septa sometimes bifurcating. Peritheca very narrow, dense, composed of vertical trabeculae situated on the prolongations of septa.

Occurrence.—In the Tatra Mts—Rhaetian of the sub-tatric series (NE part of Chochołowska Valley). Known from the Rhaetian of the Northern Limestone Alps (Frech 1890).

Family **Stylophyllidae** Volz, 1896; emend. Alloiteau, 1952
Genus **STYLOPHYLLUM** Reuss, 1854

Analysis of typical material done by Cuif (1972) has shown that a characteristic microstructure occurs in representatives of genera *Stylophyllum* and *Stylophylopsis* with a histological continuation between all skeletal elements. This author sets it against other type of microstructure observed in the family Stylophyllidae in which no continuation exists and in which occur ornamented trabeculae. With the exception of septal ornamentation there is no major differences in the morphological features of these two types of stylophyllids.

Because of lack of preserved microstructure in the investigated material the present author follows practical although arbitrary distinction as proposed by Melnikova (1972), who distinguished within the *Stylophyllum* s.l. cerioid and phaceloid forms and placed them correspondingly in the genera *Stylophyllum* Reuss and *Phacelostylophyllum* Melnikova.

Stylophyllum gracile sp.n.
(Text-fig. 4 and Pl. 2, Fig. 2)

Holotype: the specimen Z. Pal. No. H. VI/137, figured in Text-fig. 4 and Pl. 2, Fig. 2.

Type horizon: Rhaetian of the high-tatric series.

Type locality: Bobrowiecka Valley, Tatra Mts.

Derivation of the name: Latin *gracilis* — after small dimensions and delicate structure of corallites.

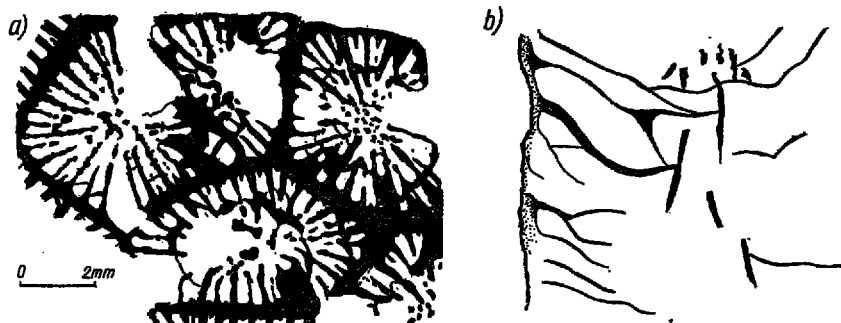


Fig. 4

Stylophyllum gracile sp.n.; a cross-section, b longitudinal section (Z. Pal. No. H. VI/137)
(b × 7)

Diagnosis.—A *Stylophyllum* with calices about 7 mm in diameter and up to 60 septa.

Material.—One colony.

Dimensions (in mm):

d	s
6–8	40–60; 3–5/1

Description.—Colony cerioid, a few cm in diameter, its upper surface almost flat. Corallites polygonal, budding intracalcinal. A narrow dark line is visible in the wall between corallites. Septa of 4–5 cycles, irregularly arranged, dissociating near axial part into trabeculae. Columella loose, papillar, quite large. Endotheca dense, composed of large subtabular dissepiments, concave in the axial part of corallite.

Remarks.—The species is closest to *S. polyacanthum* Reuss, from which it differs mainly in lesser degree of dissociation of septa into trabeculae, and in lesser diameters of the corallites.

Occurrence.—In the Tatra Mts—Rhaetian of the high-tatric series.

?Stylophyllum sp.

(Pl. 2, Fig. 1)

Material.—One colony.

Description.—Colony hemispherical; corallites subpolygonal, 15 mm in diameter. Septa thin, up to 80 or slightly more in number, belonging to 5 cycles. Inner edge of septa dissociating into trabeculae, which form a poorly developed parietal columella. Endotheca dense. Budding intracalcinal.

Remarks.—The classification of that form to the genus *Stylophyllum* is doubtful as the septa are thin and relatively continuous, and the integration of corallites in a colony is much close than in the other representatives of the genus.

Occurrence.—In the Tatra Mts—Rhaetian of the high-tatric series (Bobrowiecka Valley).

Genus *PHACELOSTYLOPHYLLUM* Melnikova, 1972

Phacelostylophyllum robustum sp.n.

(Pl. 3, Fig. 1–3)

Holotype: the specimen Z. Pal. No. H. VI/129, figured in Pl. 3, Fig. 1.

Type horizon: Rhaetian of the sub-tatric (Choč) series.

Type locality: NE parts of the Chocholowska Valley, Tatra Mts.

Derivation of the name: Latin *robustum* — after a massive skeleton.

Diagnosis.—Corallites about 20 mm in diameter with about 60 discontinuous septa.

Material.—Over 10 colonies and fragments of colonies.

Dimensions (in mm):

d	s	h of the colony
16–22	50–60	c. 300

Description.—Colonies phaceloid, loose, composed of short and frequently budding corallites. Septal apparatus formed of septa dissociating into trabeculae. Septa belong to 3–4 cycles, these of the last cycle visible only by the wall. Trabeculae very thick, arranged at an acute angle to the septum axis. Columella loose, papillar. Endotheca composed of very thick tabuloid dissepiments, their centrum strongly concave. Wall thick.

Remarks.—The new species differs from the other species of the genus in its very thick trabeculae and septa dissociating at the very wall. In the last feature it resembles the corallites of *Stylophyllum polyacanthum* Reuss, differing from the latter in the form of the colony.

Occurrence.—In the Tatra Mts—Rhaetian of the high-tatric series.

Phacelostylophyllum medium sp.n.
(Text-figs 5—6 and Pl. 3, Fig. 5)

Holotype: the specimen Z. Pal. No. H. VII/1, figured in Pl. 3, Fig. 5.

Type horizon: Rhaetian of the high-tatric series.

Type locality: Pass in Mt. Kulawiec, Tatra Mts.

Derivation of the name: Latin *medium* — after a medium size of the skeletal elements.

Diagnosis. — A *Phacelostylophyllum* with corallites 10 mm in diameter and about 50 septa.

Material. — Seven fragments of colonies.

Dimensions (in mm):

<i>d</i>	<i>s</i>
9—11	40—45 (56)

Description. — Colonies phaceloid, very loose, small. Septa belonging to 3—4 cycles; *S*1 almost reaching the centrum, *S*2 about half the length of *S*1, *S*3 short and well developed in all systems, *S*4 occurring irregularly, short. The inner edge rather compact with a few offsets. Columella parietal, very poorly developed.

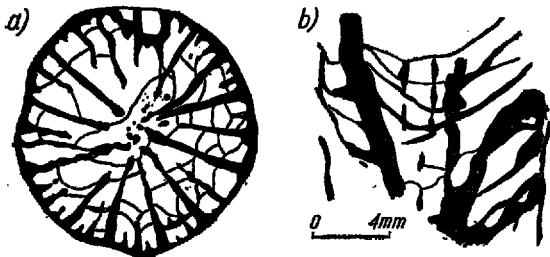


Fig. 5

Phacelostylophyllum medium sp.n.;
a cross-section (Z. Pal. No. H. VI/5),
b longitudinal section (Z. Pal. No. H.
VII/73)

Endotheca composed of large dissepiments intersecting the axial cavity. Budding frequent, intratentacular with trabecular linkages.



Fig. 6

Phacelostylophyllum medium sp.n.; intra-
tentacular budding (Z. Pal. No. H. VI/73)

Remarks. — The species is similar in the dimensions of corallites to *Stylophyllum caespitosum* Frech and *S. pygmaeum* Frech, from which it differs in having much more numerous septa.

Occurrence. — In the Tatra Mts — Rhaetian of the high-tatric series (Pass in Mt. Kulawiec and S slopes of Mt. Bobrowiec).

?Phacelostylophyllum sp.

(Pl. 3, Fig. 4)

Material.—Two colonies.

Description.—Colonies phaceloid; loose, composed of a few corallites. Diameter of corallites in the range of 20—25 mm. Septa, about 80 in number, differentiating in 5 cycles, arranged in quite regular systems. The longest septa reach the centrum, where some may fuse together with their slightly thickened inner edges. Younger septa can dissociated into isolated trabeculae. Trabeculae thick, joined with sclerenchyme, their ornamentation composed of small granules. Endotheca dense, composed of large and abundant dissepiments intersecting the axial cavity.

Remarks.—This species was included in the genus *Phacelostylophyllum* on the base of its septa being composed of thick isolated trabeculae joined by sclerenchyme. Trabeculae become free by the inner edges of the septa of the younger cycles. Doubts as to whether the species belongs to this genus are based on the structure of septa *SI*, which reach the centrum, where they are compact and even slightly thickened with the result that there is a lack of papillar columella.

Occurrence.—In the Tatra Mts—Rhaetian of the high-tatric series (Bobrowiecka Valley).

Suborder *Astraeoina* Alloiteau, 1952

Familia incerta

Genus *Retiophyllia* is difficult to place in the existing systematic scheme as was already indicated by Cuif (1966). The genus *Retiophyllia* and genus *Parathecosmilia* gen.n. have morphological and, probably, microstructural similarities, on the base of which it may be proposed to include them to the same family. The position of this family may cause discussions, as some features of its representatives (cf. Cuif 1966) are very primitive (trabeculae poorly individualized), while others are advanced (radial elements of costoseptal type, synapticulae).

The present author includes those genera tentatively in the suborder *Astraeoina* because of similarity in the structure of endotheca.

Genus *RETIOPHYLLIA* Cuif, 1966

Examining material from the Tatra Mts it was not possible to observe, in any exactitude, the composition of the wall so typical for this genus: septotheca composed of parts of costosepta widened at the axis of divergence, completed with rudimentary septa and rare synapticulae. Since recrystallization has taken place, it is only possible to confirm the thickening of costosepta in the peripheral parts, which form a well developed wall. On the other hand in the Tatra material one can observe the presence of the delicate epicostal element, such as external parathecal wall composed of delicate exothecal dissepiments, which are in continuity with the dissepiments from the inner parts of the corallite. Development of a double wall, septotheca and, independent of it, epicostal paratheca reminds one of Upper Jurassic dermosmilias. This feature, however, rises some doubts in classification of the described forms to the genus *Retiophyllia*.

Retiophyllia clathrata (Emmrich, 1853)
(Text-fig. 7; Pl. 4, Fig. 1 and Pl. 5, Fig. 3)

1891. *Thecosmilia clathrata* Emmrich; F. Frech, p. 15, Pl. 4, Figs 1—5 and 7—11.

1917. *Thecosmilia clathrata*; W. Goetel, p. 86.

1969. *Thecosmilia clathrata* Emmrich, forma B; H. Zankl, p. 29, Text-fig. 18 and Pl. 9, Fig. 1.

Material. — Seven fragments of colonies.

Dimensions (in mm):

$$\begin{array}{cc} d & s \\ 6.5; 6 \times 8-8 \times 12 & 65-85 \end{array}$$

Description. — Colonies phaceloid, corallites cylindrical or laterally flattened. Costosepta fusiform, in septal part very thin, maximum width in the wall area. Septa arranged in systems composed of 2—4 cycles; S1 distinctly thicker than the rest and reaching the centrum, S2 slightly shorter. S4 not always present in all systems, very short and thin. Septal faces ornamented with big, often protruding granules. Granules are usually alternately arranged on both sides of septal blade,

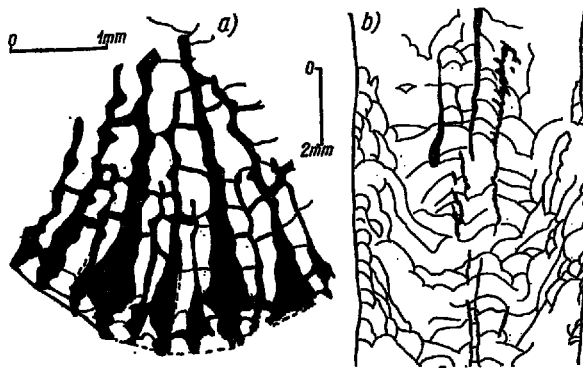


Fig. 7

Retiophyllia clathrata (Emmrich); a cross-section (Z. Pal. No. H. VI/72), b longitudinal section (Z. Pal. No. H. VI/67)

which causes its zigzag cross section. Wall double: the inner — a thick septotheca, the external-epicostal paratheca, delicate and easily damaged. Horizontal elements present as one or two crowns of small dissepiments, forming an external wall and large dissepiments intersecting the axial cavity. Budding intratentacular with trabecular linkages.

Occurrence. — In the Tatra Mts — Rhaetian of the sub-tatric series (Mt. Mała Swinica and Szeroka Bielska Pass). Common in the Rhaetian of the Austrian Alps (Frech 1891, Zankl 1969).

Retiophyllia paraclathrata sp.n.
(Text-fig. 8; Pl. 4, Fig. 2 and Pl. 6, Figs 1—2)

1891. *Thecosmilia clathrata* Emmrich; F. Frech, p. 15 [pars].

1969. *Thecosmilia clathrata* Emmrich, forma A; H. Zankl, p. 28, Text-fig. 17.

Holotype: the specimen Z. Pal. No. H. VI/123, figured in Text-fig. 8; Pl. 4, Fig. 2 and Pl. 5, Fig. 1.

Type horizon: Rhaetian of the sub-tatric (Križna) series.

Type locality: Mt. Malý Kopianec, Tatra Mts.

Derivation of the name: *paraclathrata* — the species close to *R. clathrata* (Emmrich).

Diagnosis.—Corallites 5 mm in diameter and with about 50 septa.

Material.—Ten colonies and fragments of colonies.

Dimensions (in mm):

d	s
4—5	40—50 (80)

Description.—Colonies phaceloid, corallites long, cylindrical, anastomosing. Costosepta fusiform, septal part thin, differentiated in 3—4 cycles. Septa of the first two cycles reach almost the centrum, but distinctly differ in thickness; S3 developed by the wall, reaching 2/3 the distance to the centrum, very thin and irregularly distributed. Inner edge close to the centrum, T-shaped, rhopaloid. Faces ornamented with conspicuous, often protruding granules usually arranged alternately on both faces, what in the case of thin septa, results in a zigzag cross-

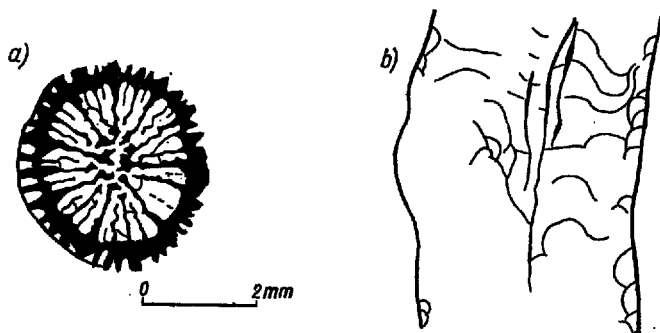


Fig. 8

Reticophyllia paraclathrata sp.n.; a young corallite in cross-section, b longitudinal section of adult corallite (Z. Pal. No. H. VI/123, holotype colony)

-section. Wall double: inner one thick, septothecal, and outer one thin, parathecal. Endotheca formed of one crown of small dissepiments on corallite periphery, their epicostal parts forming a paratheca, and of large dissepiments intersecting the axial cavity.

Remarks.—The occurrence of this form was stated in Alpine literature by Frech (1890) and Zankl (1969). Both authors noted the great difference in dimensions between this form and *R. clathrata* (Emmrich) and it was already Zankl who interpreted it as a different species. Apart from the dimensions of corallites, there are no important differences between this species and *R. clathrata*. The new species, *R. paraclathrata* sp.n., is very common in the Tatra Mts occurring here more often than *R. clathrata*.

Occurrence.—In the Tatra Mts—Rhaetian of the sub-tatric (Choč & Križna) series in S part of Lejowa Valley, Mt. Malá Swinica, Mt. Malý Kopianec and Palenica Lendacka. Known from the Norian-Rhaetian and Rhaetian of the Northern Limestone Alps (Frech 1891, Zankl 1969).

Genus *PARATHECOSMILIA* gen.n.

Type species: Parathecosmilia sellae (Stoppani, 1862)

Diagnosis. — Colonies phaceloid, corallites often anastomosing with each others. Costosepta composed of diverging trabeculae. In dissepimental endotheca, axial and peripheric zones can be differentiated. Wall parathecal, epicostal. Budding intracalicular with trabecular linkages.

Species assigned: Parathecosmilia sellae (Stoppani), and the forms determined herein as *Parathecosmilia* sp.

Remarks. — This genus differs from other Triassic "Thecosmilias", revised by Cuif (1966), both in the development of septa and the wall. Radial elements are composed, as far as one can judge from their fusiform shape and ornamentation, from trabeculae, arranged in a fan-system, giving large granules at the faces, reminding the *Retiophyllia* septa. However a zigzag cross-section of the septa so characteristic for *Retiophyllia* was not observed. The genus *Parathecosmilia* differs from *Retiophyllia* in having only a parathecal wall, the latter bearing some resemblance to the wall of *Margarosmilia* Volz (cf. Cuif 1966, Text-fig. 2 and Pl. 4, Fig. 2) with the difference that it is formed of only one crown of large dissepiments. This genus has nothing in common with the Jurassic genus *Thecosmilia*, differing in microstructure and details of endotheca.

Stratigraphic range — Rhaetian.

Parathecosmilia sellae (Stoppani, 1862)

(Text-figs 9—10; Pl. 6, Figs 1—3 and Pl. 7, Figs 1—2)

1862. *Rhabdophyllia sellae* Stoppani; A. Stoppani, p. 107, Pl. 25.

1891. *Thecosmilia sellae* Stoppani; F. Frech, p. 17, Pl. 4, Fig. 12.

Material. — Seven fragmentary colonies.

Dimensions (in mm):

d	s
4—5.5	35—50

Description. — Colonies phaceloid, corallites subcylindrical, closely arranged, anastomosing. Costosepta thin, slightly fusiform, differentiated in 3 cycles; S1 approach the centrum and are usually the thickest, S2 slightly shorter, S3 ir-

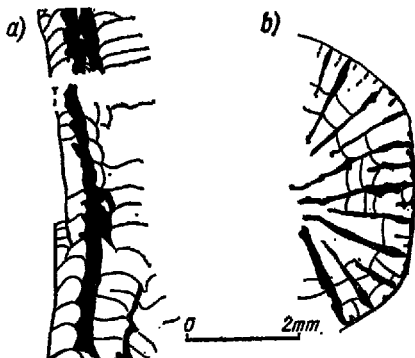


Fig. 9

Parathecosmilia sellae (Stoppani);
a longitudinal section, b cross-
section showing relations between
septa and wall (Z. Pal. No. H. VI/46)

regularly arranged, varying in length, some equal 1/3 of the radius, others rudimentary, developed at the wall. Faces granulated. Inner edge usually not thickened. Endotheca dissepimental, composed of one crown of small, peripheral dissepiments, and large ones intersecting the axial cavity. Wall parathecal, thin,

usually present. Anastomosis between corallites frequent, occurring as a result of fusion of particular protrusions resulting from prolongation of peripheral parts of corallite with its septa and dissepiments. In places of anastomosis the corallites

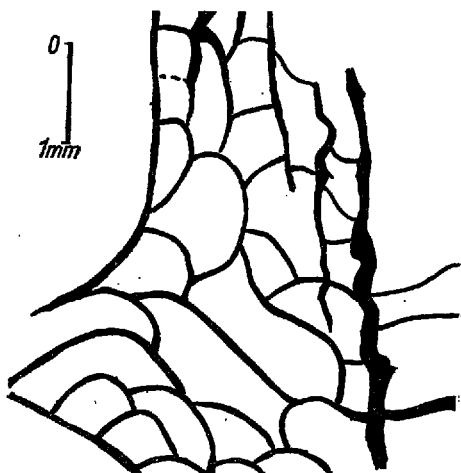


Fig. 10

Parathecosmilia sellae (Stoppani), longitudinal section of the anastomosing peripheral part of corallite with its dissepiments expanding outwards (Z. Pal. No. H. VI/46)

remain still separated by their walls (cf. Pl. 6, Fig. 3). Budding intratentacular, simple, with trabecular linkages, dividing parent corallites into practically equal descendants.

Occurrence.—In the Tatra Mts—Rhaetian of the sub-tatric (Križna) series (Mt. Mała Świnica). Known from the Rhaetian of the Austrian Alps (Frech 1891).

Parathecosmilia sp.

(Pl. 6, Fig. 4)

Material.—Six fragments of colonies.

Dimensions (in mm):

d	s
6-8	40-50

Remarks.—This form has similar structure of corallites as *P. sellae* (Stoppani). No important differences between them, besides dimensions, were possible to observe, as the material is poor and badly preserved. Both forms occur together.

Occurrence.—In the Tatra Mts—Rhaetian of the sub-tatric (Križna) series (Mt. Mała Świnica).

Family *Montlivaltiidae* Dietrich, 1926; emend. Alloiteau, 1952

Genus *ELYSASTRAEA* Laube, 1864

?*Elysastraea* sp.

(Text-fig. 11 and Pl. 8, Figs 1-2)

Material.—Four strongly recrystallized colonies.

Dimensions (in mm):

d	s
7-9	40-50; 2-3/1 in the wall

Description. — Colonies cerioid, about 10 mm in diameter. Corallites polygonal. Wall incomplete, septo-parathecal. Radial elements nonconfluent or subconfluent, slightly fusiform. Of the septa, S1 approaches close to the centrum, S2 slightly shorter, S3 reach half way to the centrum, S4 sporadic and very short. Inner edge of septa of 1—3 cycles with irregular, paliform lobes, which may form a rudimentary parietal columella. Faces ornamented with abundant granules. Endotheca composed of large dissepiments intersecting the axial cavity.

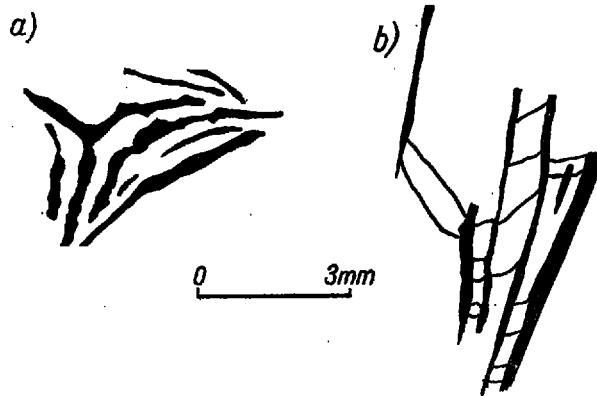


Fig. 11

?*Elysastraea* sp.; a mural zone between two corallites in cross-section, with subconfluent septa visible (Z. Pal. No. H. VI/142), b longitudinal section exposing large dissepiments (Z. Pal. No. H. VI/140)

Remarks. — This species is included to the genus *Elysastraea* because of cerioid colony and continuous, trabecular septa. Presence of parietal columella is atypical, however, in this genus.

Occurrence. — In the Tatra Mts — Rhaetian of the high-tatric series (Bobrowiecka Valley).

Suborder Fungiina Duncan, 1884

Family Procyclotitidae Vaughan & Wells, 1943; emend. Alloiteau, 1952

Genus *RHAETIASTRAEA* gen.n.

Type species: *Rhaetiastraea tatrca* sp. n.

Diagnosis. — Colonies cerioid. Radial elements lamellar with the exception of the inner edge. Septal faces with delicate granulation. Columella parietal, loose. Endotheca composed of subhorizontal elements. Wall septothecal. ?Synapticulae in the wall area. Budding intracalicular. Trabeculae well differentiated. This is a monotype genus.

Remarks. — The genus differs from *Tropiastraea* Cuif, a Triassic cerioid genus, in ornamentation, septal structure and type of columella. It resembles the Jurassic genus *Latiastrea* Beauvais, differing from the latter in the development of inner septal edge (probably main differences are in microstructure) and in the presence of subtabuloid elements in endotheca, the Jurassic genus having vesiculous ones. Systematic position is in doubt.

Stratigraphic range — Rhaetian.

Rhaetiastraea tatrica sp.n.
(Text-fig. 12 and Pl. 9, Figs 1—3)

Holotype: the specimen Z. Pal. No. H. VI/12, figured in Pl. 9, Fig. 3.

Type horizon: Rhaetian of the high-tatric series.

Type locality: Pass in Mt. Kulawiec, Tatra Mts.

Derivation of the name: after the region of finding.

Diagnosis.—Corallites about 3 mm in diameter. Number of septa ranging from 40 to 45.

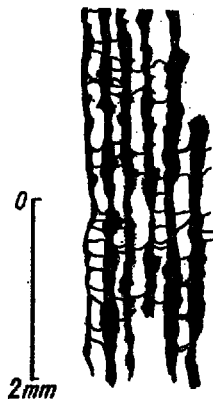
Material.—Seven colonies.

Dimensions (in mm):

d	c-c	s
2.5—3; 2.5×5; 3×4.5	2.5—3	(34)40—45

Description.—Colonies small, convex. Calice nearly flat, separated by a tectiform wall. Septa thin, confluent or nonconfluent, belonging to 2—3 cycles. Septa in the axial area discontinuous, as a result of pores or dissociation of the septa into individual trabeculae. Distal margin dentated, inner edge with thin offsets. Ornamentation of septal faces composed of very small granules. Younger septa most often fused with their inner edge with older septa. Columella composed

Fig. 12



Rhaetiastraea tatrica gen.n., sp.n.; longitudinal section (Z. Pal. No. H. VI/9)

of one or many (then papillar, loose) thin trabecular offsets of the inner edge. Endotheca formed of thin, abundant subhorizontal elements which continue in adjacent corallites. Septothecal wall composed from the widened external edges of septa and ?synapticulae. Budding intratentacular.

Besides stating that the septa are composed of well differentiated trabeculae, nothing else can be added as the skeleton is completely recrystallized.

Occurrence.—In the Tatra Mts—Rhaetian of the high-tatric series (Pass in Mt. Kulawiec, S slopes of Mt. Bobrowiec, Bobrowiecka Valley).

Family *Astraeomorpha* Frech, 1890
Genus *ASTRAEOMORPHA* Reuss, 1854
Astraeomorpha crassisepta Reuss, 1854
(Pl. 9, Figs 4—5)

1854. *Astraeomorpha crassisepta* Reuss; A. E. Reuss, p. 127, Pl. 16, Figs 4—7.

1861. *Thamnastraea confusa* Winkler; G. Winkler, p. 488, Pl. 8, Fig. 10.

1909. *Astraeomorpha crassisepta* Reuss; E. Kristian-Tollmann & A. Tollmann, p. 15, Pl. 2 Figs 3—4.

1909. *Astraeomorpha confusa* Winkler; H. Zankl, p. 26, Text-figs 14—16, Pl. 9, Fig. 2.

1971. *Astraeomorpha crassisepta* Reuss; G. Melnikova, p. 29, Text-fig. 1, Pl. 1, Fig. 2.

Material.—Over 10 fragments of colonies.

Dimensions (in mm):

c-c	s	c
1.5–2 (2.5)	8–12 (16)	3–4½

Remarks.—The species is common in the Alps and Pamirs (cf. synonymy). In the Tatra Mts it bears characteristics typical of the forms described by Winkler (1861) as *Thamnastraea confusa*: their colonies being lamellar, irregular or massive, corallites small, septa thick (6–8 reaching the centrum), columella small, styliform, carinae thick, regular. Melnikova (1971) included these forms into *A. crassisepta* Reuss, as the dimensions and number of septa in *A. confusa* (Winkler) are within the range of variability of *A. crassisepta* observed within individual colonies in her rich collection from the Pamirs.

Occurrence.—In the Tatra Mts, the species is common in the Rhaetian of the sub-tatric series. It is also common in the Alpine and Pamirian Norian-Rhaetian.

Genus *PAMIROSERIS* Melnikova, 1971

Melnikova (1971) erected the genus *Pamiroseris* for Triassic thamnasterioids with trabecular septa ornamented with granulation, similar to Jurassic and Cretaceous *Fungiastraea* Alloiteau. The differences between the two genera enumerated by Melnikova are rather quantitative (simple trabeculae, rare synapticulae, numerous dissepiments in *Pamiroseris* compared with simple and composed trabeculae, numerous synapticulae, rare dissepiments in *Fungiastraea*). Here homeomorphy is greater than between genera *Cyathocoenia* and *Actinastraea*, as *Fungiastraea* and *Pamiroseris* are practically identical. The only difference lie in the development of columella and perhaps in the microstructure. There are no differences in the structure of horizontal elements. Dissepiments and synapticulae are similarly developed in both genera, which was observed while comparing with Jurassic material. As with the differences in microstructure, the presence of composed trabeculae in addition to simple ones in *Fungiastraea* has not, up to now, been confirmed by microscopic examination. It is only a supposition based on the appearance of septal ornamentation (Alloiteau, 1957, p. 217 and 295). The only important difference is in the development of columella: in *Fungiastraea* it is papillar, wide, composed of a few generations of long, inner edge offsets, whereas in *Pamiroseris* it is formed of a small, central 1–3 trabecular nodule, surrounded by a single crown of short paliform offsets, fused with the central part, or free.

Pamiroseris rectilamellosa (Winkler, 1861)

(Pl. 8, Fig. 3 and Pl. 10, Figs 1–3)

1861. *Thamnastraea rectilamellosa* Winkler; G. Winkler, p. 487, Pl. 8, Fig. 7.
 1890. *Thamnastraea rectilamellosa* Winkler; F. Frech, p. 80, Pl. 16; Pl. 17, Figs 7–8.
 1917. *Thamnastraea rectilamellosa* Winkler, W. Goetel, p. 87.
 1967. *Fungiastraea rectilamellosa pamirensis* Melnikova; G. K. Melnikova, p. 24, Pl. 2, Fig. 1.
 1968. *Thamnasteria rectilamellosa rectilamellosa* Winkler; E. Kristan-Tollmann & A. Tollmann, p. 16, Pl. 3, Figs 1–2.
 1969. *Thamnasteria rectilamellosa* Winkler; H. Zankl, p. 86, Fig. 34.
 1974. *Pamiroseris rectilamellosa* (Winkler); A. Gaździcki, Pl. 18, Figs 1–4.

Material.—Over 20 fragmentary colonies.

Dimensions (in mm):

s	c-c
(22) 24–35 (45)	4–7

Remarks.—The species was well described and illustrated by Frech (1890) and the specimens from the Tatra Mts conform to his description. They are also

very similar to the forms examined by Melnikova, and the number of septa in the Pamirian subspecies is similar to that of the large, adult colonies from the Tatra Mts.

The appearance of the columella in specimens from the Tatra Mts varies: in some calices the columella is small and styliform, in others it is surrounded by a crown of paliform offsets. Faces ornamentation is developed in the form of big, flattened granules, approximately parallel to distal edge. Sometimes, by the inner edge they are joined into short subhorizontal carinae.

Occurrence.—In the Tatra Mts, the species is common in the Rhaetian of the sub-tatric series. It is also common in the Norian-Rhaetian of the Alps, Balkan Peninsula, and the Pamirs (*cf.* synonymy).

*Institute of Paleozoology
of the Polish Academy of Sciences
02-089 Warszawa, Al. Zwirki i Wigury 93
Warsaw, August 1973*

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E. RONIEWICZ

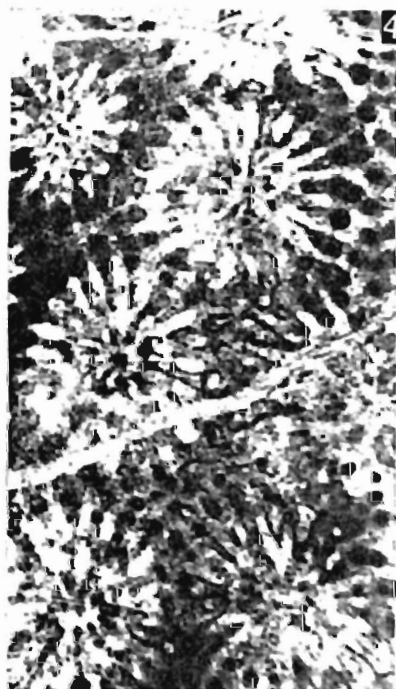
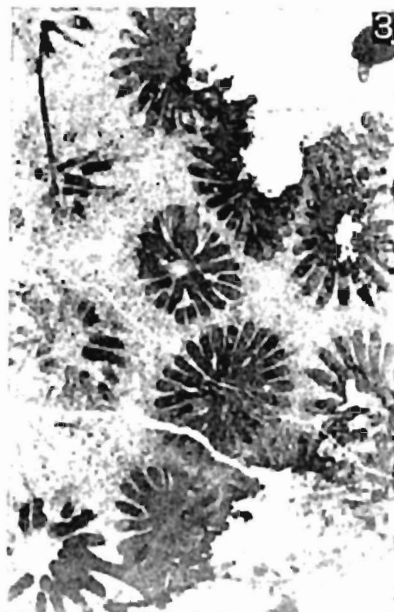
KORALE RETYCKIE Z TATR

(Streszczenie)

W utworach retyku Tatr stwierdzono występowanie 15 gatunków koralii sześciopromiennych, należących do 10 rodzajów (por. fig 2—12 oraz pl. 1—10), w czym 6 gatunków i 2 rodzaje uznano za nowe: *?Pinacophyllum lejowae* sp.n., *Stylophyllum gracile* sp.n., *Phacelostylophyllum robustum* sp.n., *Ph. medium* sp.n., *Retiophyllia paraclathrata* sp.n., *Rhaetiastraea tatrica* gen. n., sp. n., oraz *Parathecosmilia* gen.n., z typowym gatunkiem *Parathecosmilia sellae* (Stoppani).

Korale w retyku Tatr są dość często spotykane w utworach serii reglowych (kriżniańskiej i choczańskiej), rzadziej zaś w serii wierchowej (por. fig. 1). Zespoły koralii z serii reglowych różnią się gatunkowo od zespołów serii wierchowej (por. tab. 1). Fauna koralowa występuje wszędzie tutaj w ciemnych, organogenicznych lub pelitowych wapieniach, przy czym korale tworzą z reguły kolonie rozgałęzione, które występują ławicowo, choć w skupieniach o małej miąższości i rozproszonych w profilu. Składem gatunkowym korale retyckie z Tatr nawiązują do zespołów znanych z retyku i retyko-noryku Alp (mając 6 gatunków wspólnych) oraz do Pamiru, z którym mają 2 gatunki wspólne.

Zakład Paleozoologii
Polskiej Akademii Nauk
02-089 Warszawa, Al. Zwirki i Wigury 93
Warszawa, w sierpniu 1973 r.



- 1 — ?*Pinacophyllum lejowae* sp.n.; cross-section of holotype colony (Z. Pal. No. H. VI/121), NE part of Lejowa Valley, X 3.
 2 — The same species; cross-section (Z. Pal. No. H. VI/120), NE part of Lejowa Valley, X 9.
 3 — *Cyathocenia alpina* (Gürbeil); cross-section of strongly recrystallized colony (Z. Pal. No. H. VI/81), NE part of Chochołowska Valley, X 10.
 4 — The same species; cross-section of a part of colony with trabeculae preserved (Z. Pal. No. H. VI/77), NE part of Chochołowska Valley, X 14.

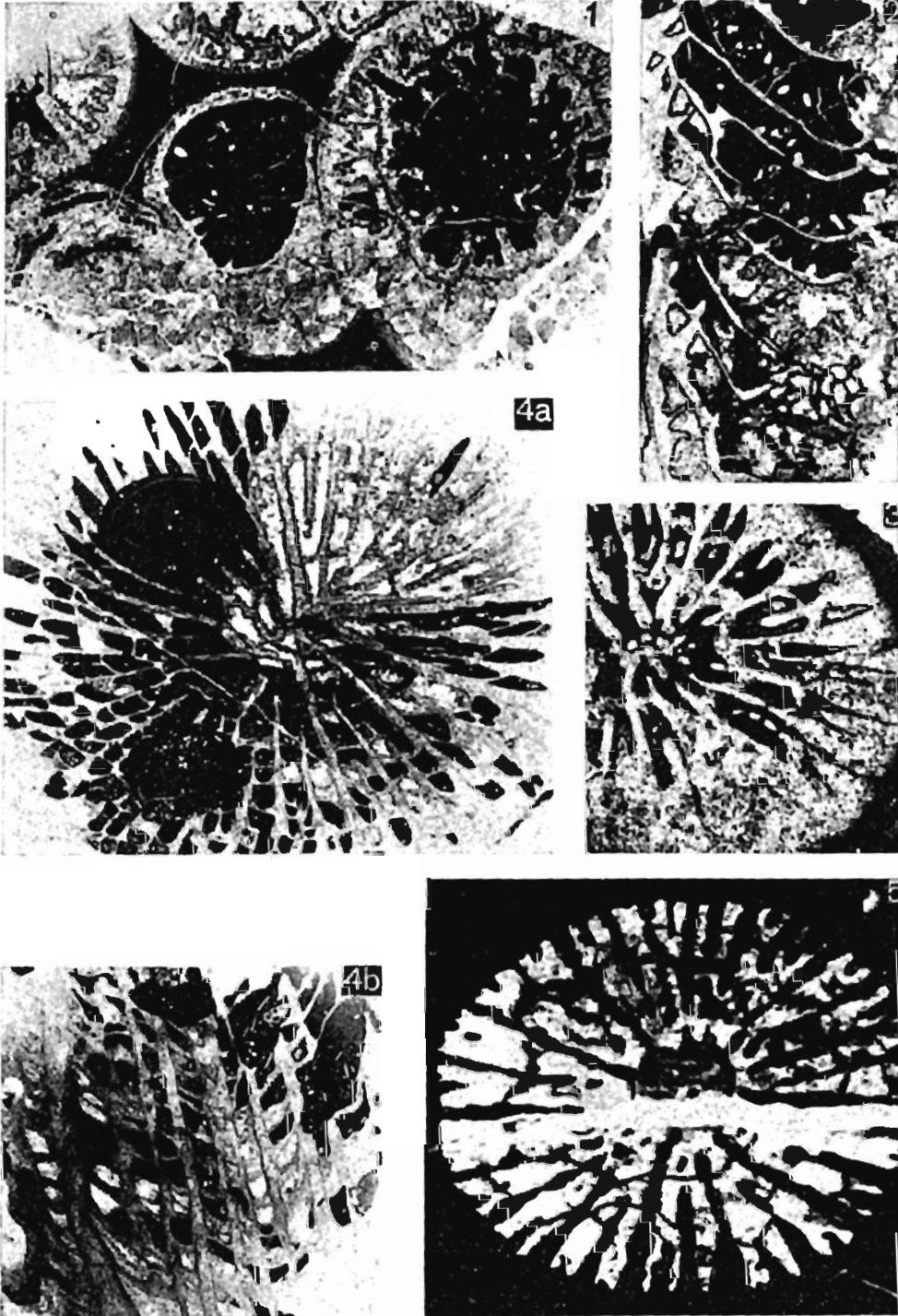
Rhaetian, Tatra Mts



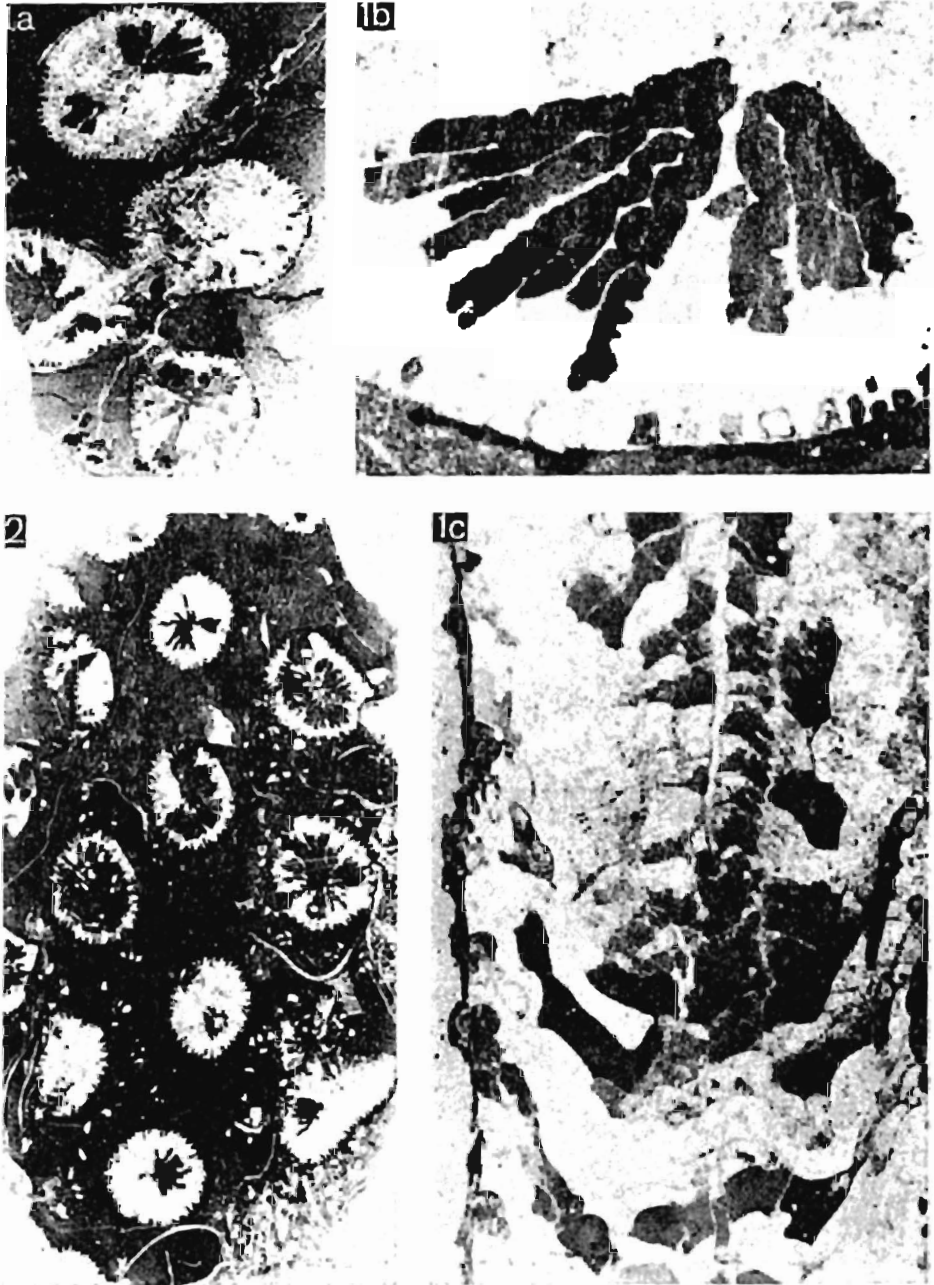
1 — ?*Stylophyllum* sp.; longitudinal (1a) and cross (1b) sections (Z. Pal. No. H. VI/138), Bobrowiecka Valley, $\times 3$.

2 — *Stylophyllum gracile* sp. n.; cross-section of holotype colony (Z. Pal. No. H. VI/137), Borowiecka Valley, $\times 5$.

Rhaetian, Tatra Mts

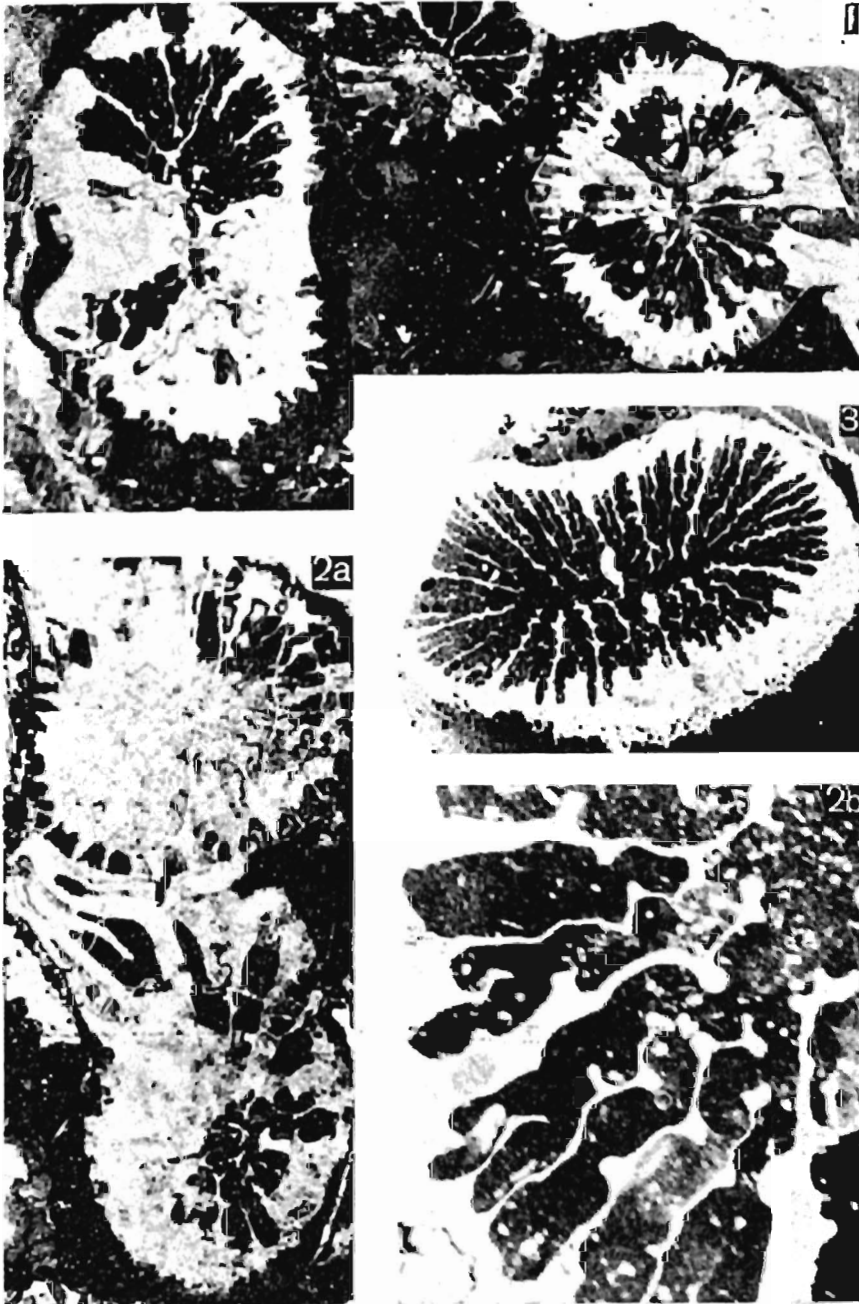


1 — *Phacelostylophyllum robustum* sp.n.; cross-section of a fragment of holotype colony (Z. Pal. No. H. VI/129), NE part of Chochołowska Valley, X 3.
 2 — The same species; longitudinal section (Z. Pal. No. H. VI/86), NE part of Chochołowska Valley, X 3.
 3 — The same species; cross-section of corallite with well developed septa (Z. Pal. N. II. VII/30), NE part of Chochołowska Valley, X 4.
 4 — *Phacelostylophyllum* sp.; cross (4a) and longitudinal (4b) sections (Z. Pal. No. H. VII/15), Bobrowiecka Valley, X 3.
 5 — *Phacelostylophyllum medium* sp.n.; cross-section of a fragment of holotype colony (Z. Pal. No. H. VII/1), Pass in Mt. Kulawiec, X 1.
 Rhaetian, Tatra Mts



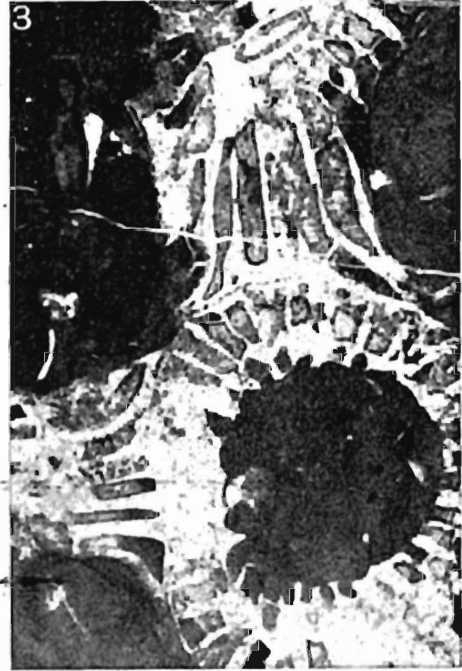
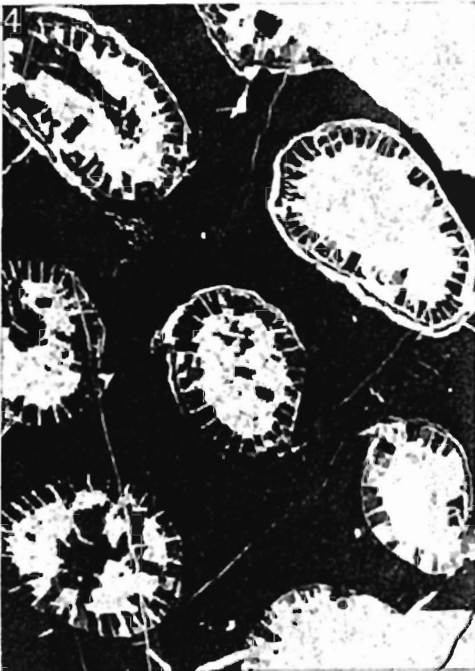
- 1 -- *Retiophyllia clathrata* (Emmrich): 1a cross-section, $\times 3$, and 1b its fragment exposing zigzag septa, $\times 16$, 1c longitudinal section, $\times 10$ (Z. Pal. No. H. VI/67), Szeroka Bielska Pass.
- 2 -- *Retiophyllia paraclathrata* sp.n.; cross-section of a fragment of holotype colony (Z. Pal. No. H. VI/123 -- cf. also Pl. 5, Fig. 1), Mt. Mały Kopieniec, $\times 3$.

Rhaetian, Tatra Mts

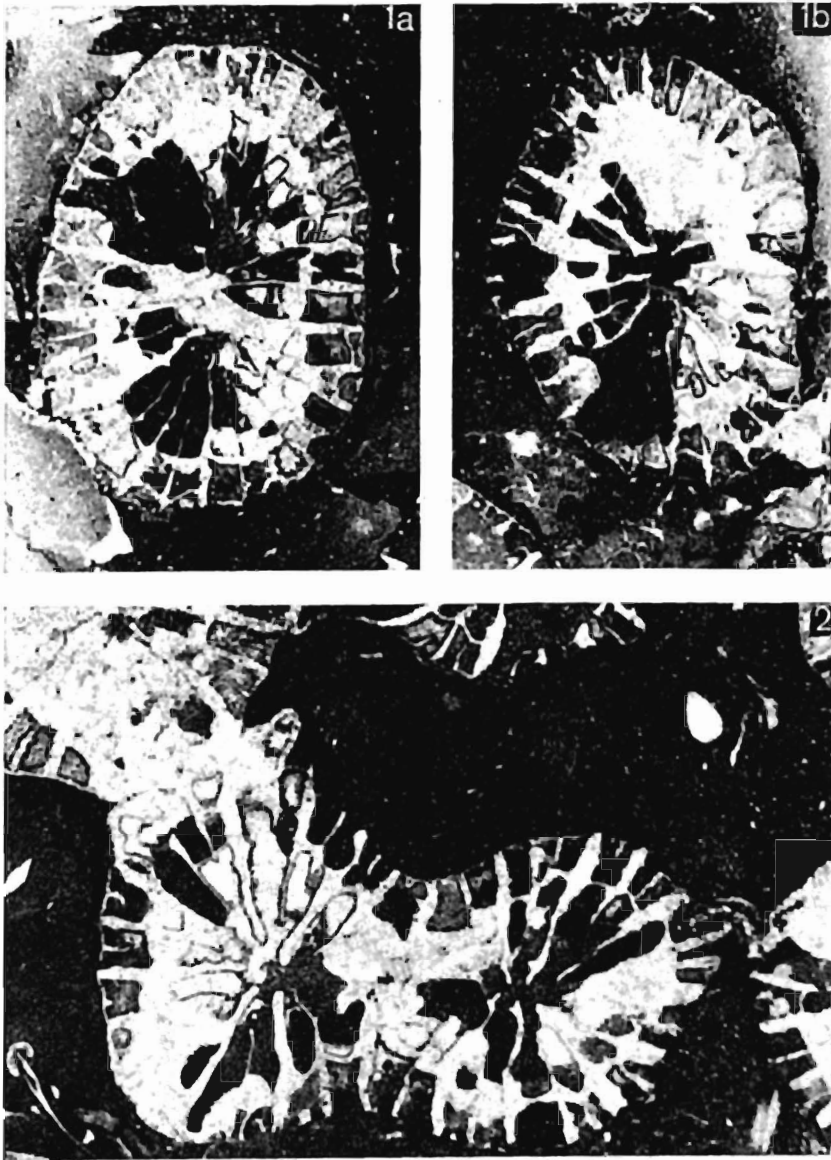


- 1 — *Retiophyllia paracathrata* sp.n.; cross-section of a fragment of holotype colony (Z. Pal. No. H. VI/123 — cf. also Pl. 4, Fig. 2), Mt. Maly Koptenec, X 10.
- 2 — The same species; 2a cross-section of corallite with its expanding peripheral part which forms an anastomose with the neighboring corallite, X 10, 2b cross-section of corallite fragment exposing zigzag septa formed of thick trabeculae, X 40 (Z. Pal. No. H. VI/119), NE part of Chochołowska Valley.
- 3 — *Retiophyllia clathrata* (Emmrich); cross-section of large corallite exposing septa strongly ornamented (Z. Pal. No. H. VI/21), Mt. Mala Swinica, X 8.

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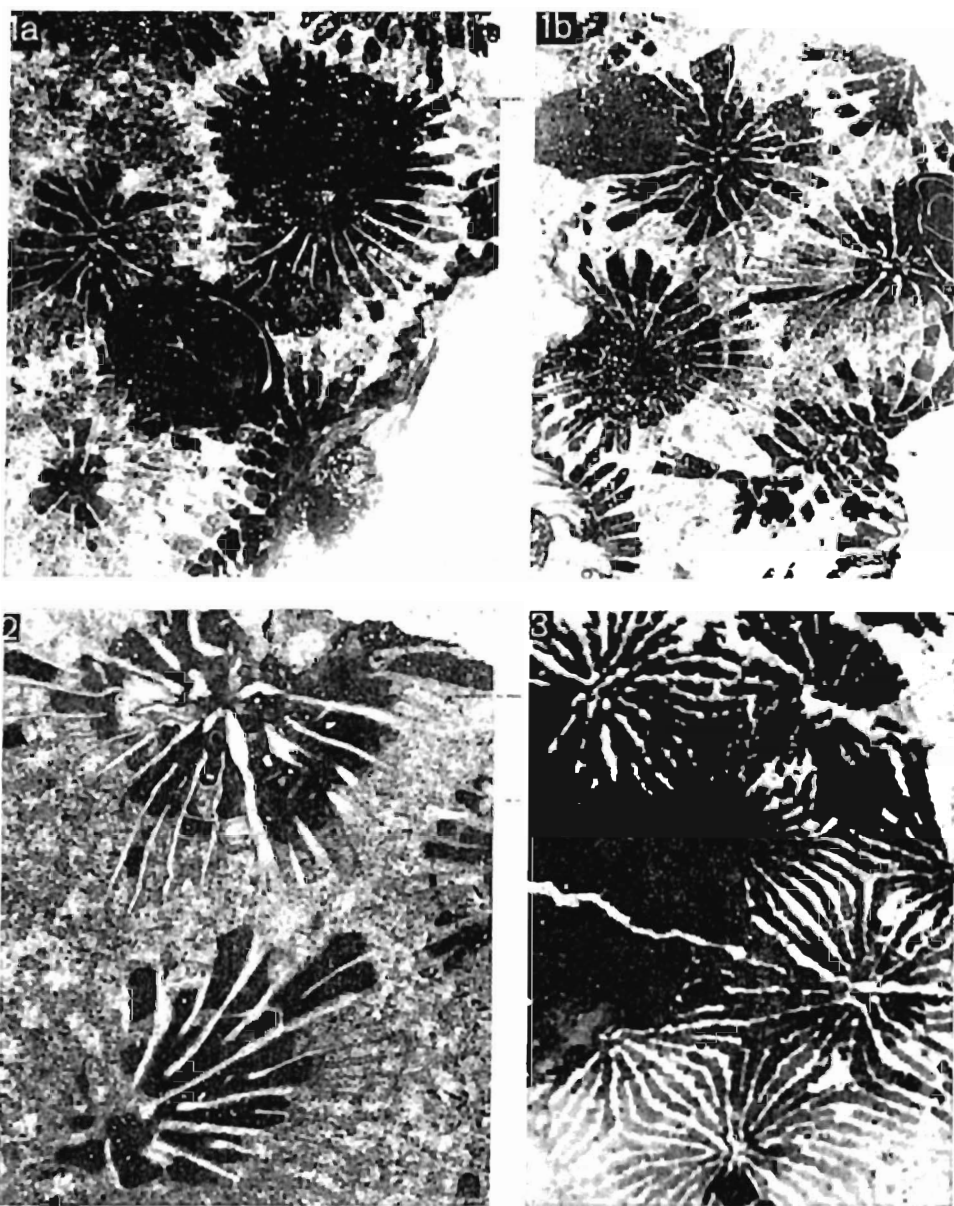
- 1 — *Parathecosmilia sellae* (Stoppant); cross-section exposing budding and anastomosing corallites (Z. Pal. No. H. VI/34 — cf. also Pl. 7, Fig. 2), Mt. Mala Swinica, $\times 3$.
- 2 — The same species; longitudinal section of one corallite (left) and a part of the second one at right (Z. Pal. No. H. VI/46), Mt. Mala Swinica, $\times 10$.
- 3 — The same species; cross-section of anastomosing corallites: the upper corallite expanding on the central one, and the latter on the left one (Z. Pal. No. H. VI/48), Mt. Mala Swinica, $\times 10$.
- 4 — *Parathecosmilia* sp.; cross-section (Z. Pal. No. H. VI/5), Mt. Mala Swinica, $\times 3$.



1a, b — *Parathecosmilia sellae* (Stoppani); two cross-sections (Z. Pal. No. H. VI/46), Mt. Mała Świnica, $\times 10$.

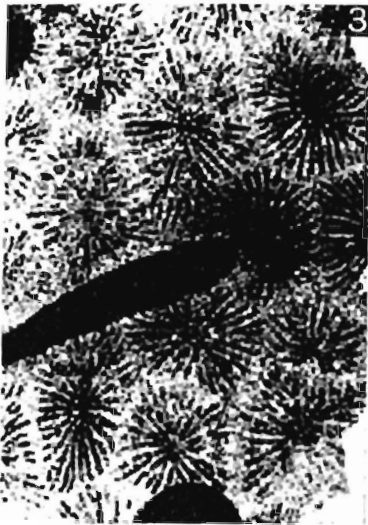
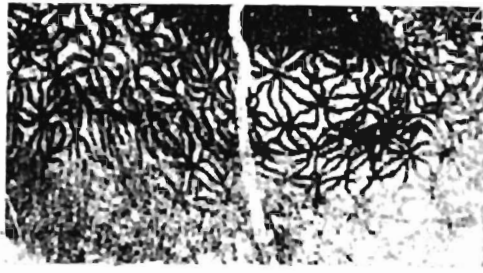
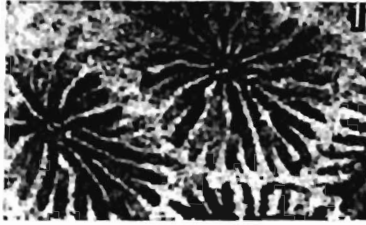
2 — The same species; cross-section of budding (central) and anastomosing (upper left) corallites (Z. Pal. No. H. VI/54 — cf. also in Pl 6, Fig. 1), Mt. Mała Świnica, $\times 10$.

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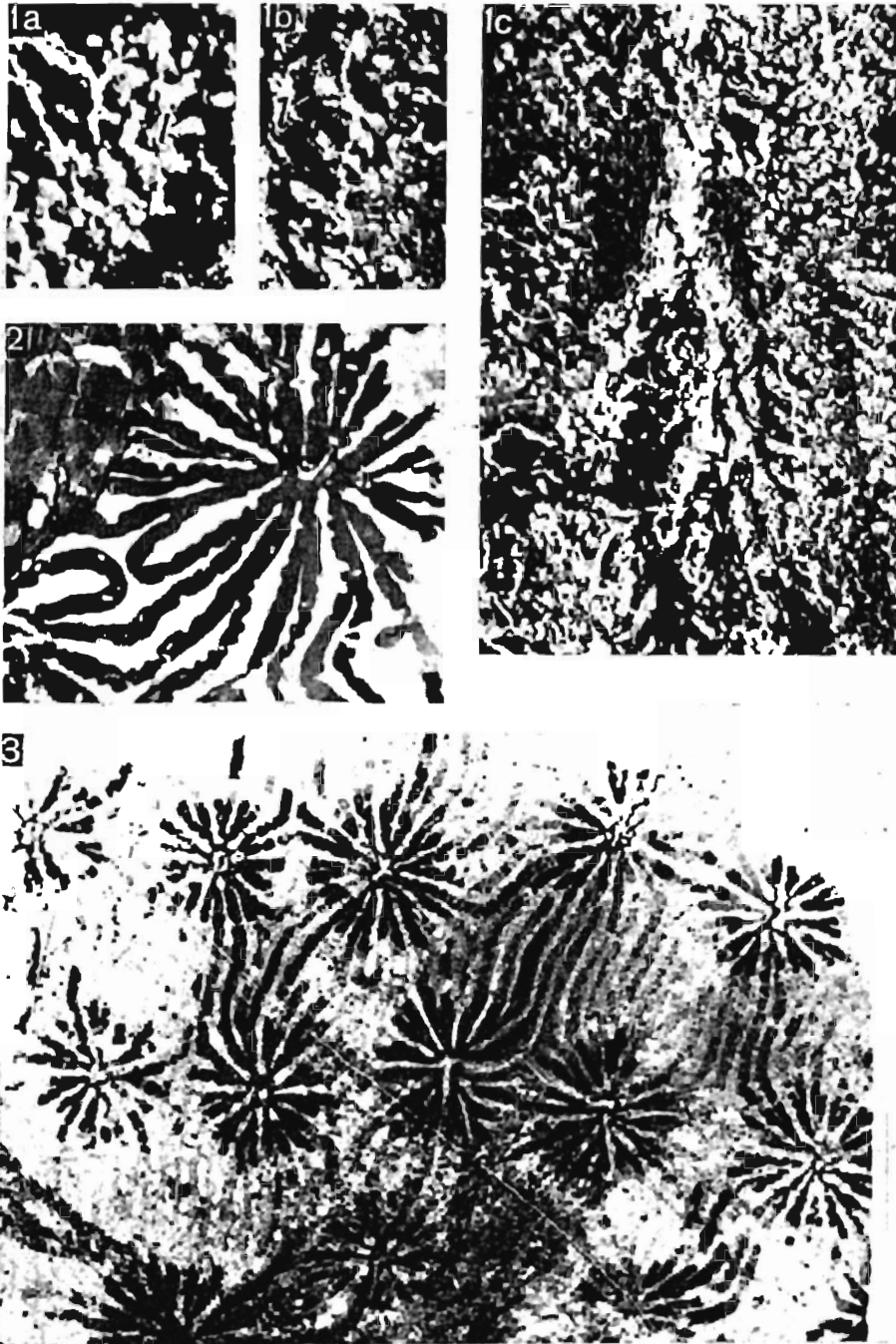
- 1a,b — ?*Elysastraea* sp.; two cross-sections (Z. Pal. No. H. VI/140), Bobrowiecka Valley, $\times 4.5$.
 2 — The same species; cross-section (Z. Pal. No. H. VI/141), Bobrowiecka Valley, $\times 10$.
 3 — *Pamiroseris rectilamellosa* (Winkler); cross-section of corallites with great number of septa (Z. Pal. No. H. VI/47), Mt. Mała Świnica, $\times 5$.

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- 1 -- *Rhaetiastraea tatraca* gen.n., sp.n.; cross-section of calices with columella strongly reduced (Z. Pal. No. H. VI/136), Bobrowiecka Valley, $\times 10$.
- 2 -- The same species; cross-section of calices with well developed columella (Z. Pal. No. H. VI/10), Pass in Mt. Kulawiec, $\times 10$.
- 3 -- The same species, cross-section of holotype colony (Z. Pal. No. H. VI/12), Pass in Mt. Kulawiec, $\times 5$.
- 4 -- *Astraeomorpha crassisepta* Reuss; cross-section (Z. Pal. No. H. VI/96), NE part of Chochołowska Valley, $\times 5$.
- 5 -- The same species; longitudinal (5a) and cross (5b) sections (Z. Pal. No. H. VI/98), NE part of Chochołowska Valley, $\times 10$.

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- 1 -- *Pambroserts rectilamellosa* (Winkler); 1a, 1b inner margin with paliform lobes (l) of the first cycle septum (in 1b) and higher cycle septum (in 1a), X 20, 1c fragment of colony exposing the septal faces ornamented with granules, X 10 (Z. Pal. No. H. VI/126), Mt. Palenica Lendacka.
- 2 -- The same species; cross-section (Z. Pal. No. H. VI/75), NE part of Chochołowska Valley, X 10.
- 3 -- The same species; cross-section of corallites with variable aspect of columella (Z. Pal. No. H. VI/65), NE part of Chochołowska Valley, X 5.

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