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PACHYPHYLLINAE FROM THE MIDDLE DEVONIAN  
OF THE HOLY CROSS MTS.

## PART I

*Abstract.* — *Protomacgeea dobruchnensis* n. gen. & n. sp. is described, being the most ancient representative of the subfamily of Pachyphyllinae recorded in Poland from the Middle Couvinian beds of Grzegorzowice and Wydryszów. New species *Thamnophyllum skalense* and subspecies *Thamnophyllum trigemme pajchela* have been described from the Givetian besides the already known species *Th. caespitosum* (Goldfuss) and *Th. trigemme* (Quenstedt). The writer has referred to *Macgeea bathycalyx bathycalyx* (Frech) all the representatives of the genus *Macgeea* from the Givetian of Skąły, establishing, however, the following new subspecies: *M. bathycalyx kasimiri*, *M. bathycalyx josephi*, *M. bathycalyx regularis*, *M. bathycalyx longiseptata*, as well as one new mutation *M. bathycalyx amabilis*. These subspecies and the mentioned mutation are considered congeneric on their common ontogeny and essentially similar morphology. A new species of colonial form, displaying horse-shoe dissepiments and symmetrical fans in trabeculae, has been recorded from the Middle Givetian coral reef and described under the name of *Pachyphyllum sobolewi*.

## INTRODUCTION

This paper is a contribution to the team research study undertaken to investigate the Devonian fauna from the „Grzegorzowice-Skąły-Włochy“ section of the Holy Cross Mts. The writer has been allotted the task of working out the tetracoral fauna, with special reference to the subfamily of Pachyphyllinae.

A part of my study, dealing with Pachyphyllinae from the Upper Devonian of the Kielce region, was published in 1953. The present paper is concerned with the description of forms belonging to subfamily Pachyphyllinae, recorded from Middle Devonian beds. Forms from the Givetian stage were collected in 1946 and during 1953-54 at the locality of Skąły, while the Couvinian specimens were recovered at the localities of Grzegorzowice and Wydryszów in the years 1953 and 1954 in the course of geologic field work done by Mrs. M. Pajchel.

In Poland, the oldest representatives of the subfamily Pachyphyllinae are recorded from Middle Couvinian, the youngest — from the Upper Frasnian. None of this group pass into the Famennian — as has thus far been ascertained by the writer. All the evolutionary stages of Pachyphyllinae, therefore, fit into the Middle Couvinian up to the Upper Frasnian.

Besides a description of the lithology of the investigated formations the present paper in the first place describes species and varieties occurring in the Middle Devonian of the Holy Cross Mts. All the more general problems which follow the study on the Pachyphyllinae, such as their variability, phylogeny, palaeogeography, palaeoecology etc., will be dealt with in the second part of this work.

The present work has been performed at the Palaeozoological Institute of the Polish Academy of Sciences (Poznań Branch). Thanks are due to all those who have helped collecting the material and cutting the thin sections.

The writer also most sincerely thanks Professor R. Kozłowski for his critical remarks on the manuscript, Mrs. M. Pajchel for her stratigraphic suggestions and her geological sketch, Mrs. J. Gruszczyńska for the drawings done from photograph pictures of the thin sections. Thanks are also due to Mrs. J. Humnicka for the pains taken in translating the present paper into English.

#### LITHOLOGICAL AND FAUNAL CHARACTERS

*Protomacgeea dobruchnensis* n. gen. & n. sp., the oldest representative of the Pachyphyllinae, is recorded in Poland from the Middle Couvinian of Grzegorzowice and Wydryszów. From the strongly detrital marls of Grzegorzowice (beds No. 2)\* the writer has collected 35 specimens of this most interesting form. The rock there is crowded with shell fragments of Brachiopoda, twigs of Tabulata and colonies of Bryozoa. Of the tetracorals are present: *Pseudozonophyllum excentricum* Rózk. (49 specimens), *Breviphrentis multiseptatus* (Gürich) (104 specimens), and the index form *Rhopalophyllum heterophyllum* (E. & H.) (29 specimens). On this latter form, the Middle Couvinian age — the K horizon of R. Wedekind's (1924) stratigraphic column — is assigned to these beds. Since specimens of *P. dobruchnensis* are not abraded and have occasionally been preserved complete, it is inferred that they are parautochthonic.

Bituminous limestones make up the slightly higher horizon of beds No. 3. Marls grade into limestones. Scarcity of detritus is characteristic of less marly limestones. Corallites of *P. dobruchnensis* (147 specimens)

\* For numbers of beds — see fig. 1, p. 273.

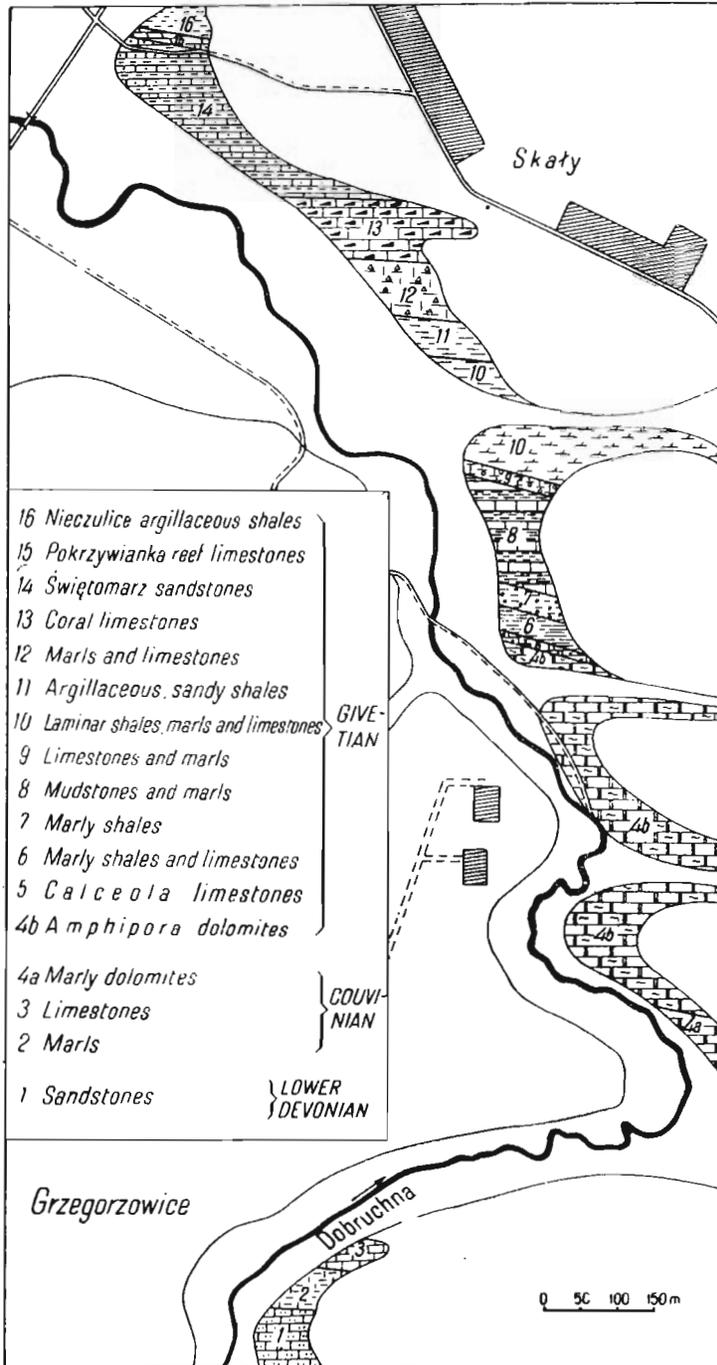


Fig. 1. — Geological sketch-map of the Grzegorzowice-Skały region (after M. Pajchel).

are here beautifully preserved with calice and proximal end, consequently suggesting preservation in their original biotope. The associated fauna consists of rare cephalopods, trilobites, ostracods, branchy Tabulata and brachiopods. Crinoidal fragments are common. *Blothrophyllum irregulare brevisseptata* Rózk., with 99 specimens, and *Pseudozonophyllum excentricum* Rózk., with 253 specimens, predominate among the tetracorals.

The „Couvinian“ stage from Wydryszów was worked out in detail by J. Czarnocki (1950) including the stratigraphical and lithological sections; also a description of the faunal assemblage. Nine groups of layers were differentiated by this author, of which No. 6 is noteworthy and is defined as „marly, brittle, yellowish shales containing *Fenestella*, approx. 6 m in thickness“. Excavating work carried out at that site in 1955 yielded a beautifully preserved fauna with great quantities of tetracorals and Tabulata. Genus *Heliolites* is also represented. Trilobites are very abundant (*Phacops* sp., *Scutellum* sp., *Proetus* sp.). Ostracods show a satisfactory state of preservation. These beds are characteristic by the copiousness of Bryozoa belonging to family Fenestellidae. Molluscs, as is the rule in Devonian deposits, are less common (*Loxonema* sp., *Pleurotomaria* sp., *Aviculopten* sp., *Cyrtoceras* sp.). Brachiopods are also less plentiful. Among the tetracorals, frequent occurrence is noted of minute and completely preserved corallites: *Metriophyllum gracile* Schlüter, with 30 specimens, of which the largest 7 mm in length; also *Protomacgeea dobruchnensis* n. sp., with 30 specimens. The larger tetracorals are mostly damaged, they are: *Breviphrentis multiseptatus* (Gürich), with 53 specimens, *Pseudozonophyllum excentricum* Rózk., with 10 specimens; *Rhopalophyllum heterophyllum* (E. & H.), with 6 specimens; *Pseudozonophyllum halli* Wedekind, with 1 specimen. The coral assemblage very closely approaches the Middle Couvinian fauna from the marls and limestones of Grzegorzowice. An element new to it is represented by *Metriophyllum gracile*, a species characteristic of the marly facies and widespread in the Givetian from Skały. According to C. Schlüter (1889) and F. Frech (1886), it is yielded already by the higher horizon from the Couvinian of the Eifel Mts. The corals *P. dobruchnensis* and *M. gracile*, found in a good and complete state of preservation, have probably been preserved in their original biotope within the detrital marls of Wydryszów, while corals of larger dimensions, always damaged, have possibly been transported here.

Opposite the Grzegorzowice mill and overlying the limestone described by G. Gürich (1896) is an unfossiliferous dolomite complex, several hundred meters in thickness (beds No. 4a). It has been assigned to the „Eifelian“ by J. Czarnocki (1950).

The overlying dolomite complex contains numerous banks with *Amphipora ramosa*; its central portion shows a limy bank crowded with shells of the brachiopod *Bornhardtina skalensis* Biernat (1953). These strata have by J. Czarnocki (1950) been referred to the Lower Givetian (beds No. 4b).

*Calceola* limestones (beds No. 5) with an extremely copious coral fauna occur in the top of the dolomites at Skały. These limestones are grey with a cherry hue, strongly organogenic. According to A. Stańska (personal communication) globose colonies of *Alveolites taeniformis* Schlüter predominate among the Tabulata. Laminar *Coenites escharoides* (Steininger) are also common. Tetracorals occur as solitary forms only. The predominant species is *Calceola sandalina* L., with 285 specimens, while *Thamnophyllum skalense*, with 155 specimens, is also fairly frequent. Other forms are represented rather sporadically, e. g. *Macgeea bathycalyx josephi*, by 3 specimens; *M. bathycalyx longiseptata*, by 1 specimen; *Neostrophophyllum* sp., by 6 specimens; *Campophyllum soetenicum* Schlüter, by 20 specimens; *Metriophyllum gracile*, by 5 specimens. The *Calceola* limestones are strongly detrital, with abundant fragments of minute shells and skeletons of corals. The occurrence of a reef in that site is attested by great quantities of complete globose Tabulata. This was not, however, a compound reef, but a carpet-like reef. The extreme rarity of stromatoporoid colonies suggests that the coral fauna there had subsisted either in a somewhat deeper sea or in waters less pure than those natural to the recent reef-building hexacorals (M. Lecompte, 1954).

Brachiopod shales have already been described (beds No. 6) by L. Zeuschner (1869), G. Gürich (1896), D. Sobolew (1904), M. Pajchel (paper in press). On *Calceola* limestones rest muddy, marly shales with thin intercalations of marls. They contain a markedly plentiful assemblage of brachiopods. Plate of crinoids and colonies of Bryozoa are frequent. The following species of trilobites have among others been described by Z. Kielan (1954) from these beds: *Phacops sobolewi* Kielan, *Otarion polonicum polonicum* Kielan, *Dechenella polonica* Gürich. Ostracods are abundant. Corallites are of diversified form but always minute. The writer has identified the following species belonging to that group: *Blothrophyllum skalense* Gürich, with 25 specimens; *Metriophyllum gracile* Schlüter, with 25 specimens; *Depasophyllum intermedium* Gürich, with 9 specimens; *Calceola sandalina* L., with 7 specimens; minute forms from genus *Nardophyllum*, with 30 specimens; *Ceratophyllum typus skalense* Gürich, with 18 specimens; *Heliophyllum halli* E. & H., with 5 specimens; *Diplochone striata* Frech, with 3 specimens. From the subfamily of Pachyphyllinae have been here collected: *Thamnophyllum trigemme*

(Quenstedt), with 14 specimens; *Macgeea bathycalyx kasimiri*, with 23 specimens; *M. bathycalyx josephi*, with 11 specimens. The fauna of tetracorals occurs here in its original biotope, as is suggested by the usually fine preservation of its specimens, with calicular margin and proximal end undamaged. Some specimens, on being cleaned from mud by means of  $H_2O_2$ , give the appearance of recent corallites. Mudstones and argillaceous shales, and the association of minute organisms indicate sedimentation under calm sea conditions. The presence of representatives of *Nardophyllum* suggests Middle Givetian age (after R. Wedekind, 1925).

Higher up occur beds of argillaceous, thinly laminated, detrital shales with thin intercalations of marl crowded with crinoid plates. *Microcyclus eifeliensis* Kayser, with 25 specimens, so characteristic of this facies, together with *Calceola sandalina*, with 1 specimen, and *Metriophyllum gracile*, with 6 specimens, are recorded from these strata.

Almost all of the above mentioned tetracoral species are encountered in beds No. 8 consisting of mudstones and marls. One form not mentioned before is *Aulacophyllum* sp., with 18 specimens. The predominant forms here are: *Nardophyllum tenue* Wdkd., with 28 specimens; *Mesophyllum defectum* (Schlüter), with 30 specimens; *Lithophyllum corneolum* Wdkd., with 200 specimens. *Scoliophyllum lamellosum* Goldf., with 6 specimens, and *Pseudocosmophyllum* aff. *geigeri* Wdkd., with 10 specimens, are more rare. The Pachyphyllinae are represented by the following forms: *Thamnophyllum caespitosum* (Goldf.), with 15 specimens; *M. bathycalyx josephi*, with 53 specimens; *M. bathycalyx kasimiri*, with 10 specimens; *Thamnophyllum trigemme*, with 28 specimens.

Tetracorals are extremely rare in beds No. 9, built up of thickly-bedded limestones and marls crowded with crinoids. The only specimen of tetracorals collected here is that of *Pseudocosmophyllum* aff. *geigeri*.

Overlying these beds are marls, mudstones and limestones, also laminar shales (beds No. 10), markedly poor in corals. Somewhat more abundant are corallites from species *Nardophyllum excentricum* Wdkd., with 29 specimens, and *Sparganophyllum simplex* Wdkd., with 9 specimens. The Pachyphyllinae are represented by *M. bathycalyx josephi*, with 3 specimens, and *Thamnophyllum trigemme*, with 15 specimens.

Marly, argillaceous shales, with strongly sandy lens, occur in the top of this series (beds No. 11). In the midst of the shales a bank is encountered with an abundant fauna of bryozoa (*Fenestella* sp.) and of brachiopods. Quite numerous are Lamellibranchiata and Gastropoda such as *Leda* sp., *Nucula* sp., and *Pleurotomaria* sp. The branched *Thamnopora* sp. predominates in the Tabulata. The tetracorals are mostly small and well preserved, having probably been preserved in their original environment. The following species have here been recorded by the writer: *Calceola*

*sandalina*, with 1 specimen; *Metriophyllum gracile*, with 10 specimens; *Nardophyllum* sp., with 13 specimens; *Lithophyllum* sp., with 4 specimens; *Depasophyllum intermedium*, with 2 specimens. *Thamnophyllum trigemme pajchela* n. subsp., with 120 specimens, and *M. bathycalyx amabilis* n. mut., with 56 specimens, are here among the Pachyphyllinae.

Mauve marls (beds No. 12), containing an abundant fauna of corallites collected mostly from weathered layers, lie in the top of strata with marly shales. In addition to *Heliolites* sp. and the Tabulata *Thamnopora* sp., large corallites have been collected of the following forms: *Breviphrentis multiseptatus*, with 14 specimens; *Nardophyllum* sp., with 5 specimens; the predominant forms here are the enormous, very beautiful, solitary or budding *Heliophyllum halli*, with 100 specimens, and *Scoliophyllum lamellosum*, with 6 specimens. Of the Pachyphyllinae we have here: *Th. trigemme*, with 72 specimens; *M. bathycalyx josephi*, with 5 specimens. To the top the marls grade into thickly bedded crinoidal limestones, overlaid by loamy shales with minute brachiopods.

Thickly bedded, coral bearing limestones (beds No. 13) lie in the top of this highly differentiated lithological series, in association with extensive colonies of *Hexagonaria hexagona* (Goldfuss) (4 specimens) and some of the largest of the hereto known solitary corallites, namely *Pseudocoscophyllum geigeri* (2 specimens), up to 11 cm in diameter, *Nardophyllum* aff. *acutum* Wdkd. (4 specimens), and *Breviphrentis multiseptatus*. The coral colonies indicate the presence of a reef.

The coral limestones are overlaid by thick strata of argillaceous sandy sediments (beds No. 14), which occasionally yield remnants of plants and must therefore have been deposited near a continent. These strata have by J. Czarnocki (1950) been named the „Świętomarz series“.

Outcrops of the so called „Pokrzywianka series“ (beds No. 15) (J. Czarnocki, 1950) are observable along the roadway leading from Włochy to Skały, also on the hill rising to the north of the village of Pokrzywianka Dolna. A reef, called „Kamieniec“, is partly exposed near the roadside on the way to Skały. These Pokrzywianka series consist of thickly-bedded, strongly fissured limestones, with an E — W strike. The numerical predominance here falls to the large, globose stromatoporoids, while tetracorals, brachiopods and Tabulata are less numerous. This reef has probably been formed in pure, agitated waters, at a depth similar to that of recent coral reefs. Devonian reefs showing similar assemblages have been described from Ardennes by M. Lecompte (1954). A number of cuts intersecting the reef has disclosed certain lithological and faunal variations indicating changes in the bottom depth. The nearest horizon is occupied by compact, bituminous limestones, partly exposed, 40 cm in thickness, with an abundant fauna of Tabulata: *Chaetetes regularis* Le-

## Lithology of Givetian beds from Skaly and occurrence of characteristic forms of corals

Lithological facies	No. of beds.	Predominant coral species	Predominant species of Pachyphyllinae
Argillaceous shales of the Nieczulice series	16		
Reef limestones of the Pokrzywianka series	15	<i>Schizophyllum acanthicum</i> Frech, <i>Breviphrentis multiseptatus</i> Gürich	<i>Pachyphyllum sobolewi</i> n. sp.
Świętomarz argillaceous sandstones	14		
Coral limestones	13	<i>Hexagonaria hexagona</i> (Goldfuss), <i>Pseudocosmophyllum geigeri</i> Wdkd.	
Marls and limestones	12	<i>Heliophyllum halli</i> E.&H.	<i>Thamnophyllum trigemme</i> (Quenstedt)
Shales: argillaceous-marly, detrital, with sandy lens	11	<i>Metriophyllum gracile</i> Schlüter	<i>Macgeea bathycalyx amabilis</i> n. mut., <i>Th. trigemme pajchelae</i> n. subsp.
Thinly laminar shales, marls and limestones	10	<i>Nardophyllum excentricum</i> Wdkd., <i>Sparganophyllum simplex</i> Wdkd.	<i>Th. trigemme</i> (Quenstedt)
Limestones and crinoidal marls	9		
Mudstones and calcareous marls	8	<i>Lithophyllum corneolum</i> Wdkd., <i>Nardophyllum tenue</i> Wdkd., <i>Mesophyllum defectum</i> Schlüter	<i>Macgeea bathycalyx josephi</i> n. subsp., <i>Th. caespitosum</i> (Goldf.), <i>Th. trigemme</i> (Quenstedt)
Marly shales	7	<i>Microcyclus eifeliensis</i> Kayser	
Limestones, marls, marly shales	6	<i>Nardophyllum</i> sp., <i>Ceratophyllum typus</i> Gürich, <i>Blothrophyllum skalense</i> Gürich	<i>Macgeea bathycalyx kasimiri</i> n. subsp., <i>Th. trigemme</i> (Quenstedt)
Calceola limestones	5	<i>Calceola sandalina</i> L.	<i>Th. skalense</i> n. sp.
Dolomites and limestones	4	<i>Amphipora ramosa</i>	

compte, *Alveolites tenuissimus* Salée. Overlying these are platy limestones, intercalated with layers of marly limestone containing numerous solitary tetracorals, Tabulata and brachiopods. The overlying compact limestone, 9 m in thickness, contains in its top part rubble limestone of ashy-red colouration. It consists mainly of globose stromatoporoids which make up 90 percent of the fauna here, in association with such forms of the Tabulata as *Chaetetes rotundus* Lecompte, *Alveolites suborbicularis*, *Heliolites* sp., while in the central part sporadic occurrence is noted of enormous colonies of *Pachyphyllum sobolewi*, 60 cm long. Solitary tetracorals are less frequent but extremely large, e. g. *Breviphrentis multiseptatus*, 70 mm in diameter, and big brachiopods from genus *Atrypa* and *Pentamerus*. Similar fauna is yielded by Pokrzywianka reef limestones outcropping on a hill to the north-east of the Miłoszów forest. These limestones are ashy-red, strongly bituminous, clastic, with thick calcite veins. The coral assemblage bears common resemblances in all exposures. To say, most copious are forms of *Schizophyllum acanthicum* Frech (62 specimens); *Sparganophyllum* sp. with axial ends of septa distinctly spiral (23 specimens); huge specimens of *Breviphrentis multiseptatus* (23 specimens). Quite rare, on the other hand, are forms belonging to genera *Lithophyllum* (3 specimens), *Nardophyllum* (1 specimen), *Neostriophyllum* (5 specimens). Plocoid Pachyphyllinae have not before been recorded from Middle Givetian layers (horizon containing *Sparganophyllum* with spirally coiled septa, after R. Wedekind's stratigraphic column, 1925). This form is described here under the name of *Pachyphyllum sobolewi* n. sp. (with 13 platy colonies). Phaceloid Pachyphyllinae are extremely rare, with one specimen only of *Thamnophyllum caespitosum*.

On the Pokrzywianka series rest the so called „Nieczulice shales“ which are barren of corals (beds No. 16).

The whole complex of sedimentary rocks in the above described profile has an E — W strike and a NNE dip from 40° to 45°.

#### SYSTEMATIC DESCRIPTIONS

Owing to paucity of occurrence Pachyphyllinae occupy an exceptional position among the numerous, strongly differentiated forms of tetracorals. In some places only are they present in fair abundance, though displaying monotony. This is the case for instance in the Couvinian marls and limestones from Grzegorzowice (beds Nos. 2, 3) and Wydryszów, where *Protomacgeea dobruchnensis* predominates. In beds No. 5 of the Givetian limestones, *Thamnophyllum skalense* takes the numerical lead. Species *Th. trigemme pajchela* is abundant in the marly-arenaceous shales (beds No. 11), while fairly numerous colonies of *Pachyphyllum*

*sobolewi* are recorded from the reefs of Kamieniec (beds No. 15) and Pokrzywianka. Outside of these occurrences Pachyphyllinae are exceeded in numbers by other tetracorals.

A description of the following forms of Pachyphyllinae is given in the present paper:

<i>Protomacgeea dobruchnensis</i> n. gen. & n. sp.	<i>M. bathycalyx longiseptata</i> n. subsp.
<i>Macgeea bathycalyx bathycalyx</i> (Frech)	<i>M. bathycalyx amabilis</i> n. mut.
<i>M. bathycalyx kasimiri</i> n. subsp.	<i>Thamnophyllum skalense</i> n. sp.
<i>M. bathycalyx josephi</i> n. subsp.	<i>Th. caespitosum</i> (Goldfuss)
<i>M. bathycalyx regularis</i> n. subsp.	<i>Th. trigemme</i> (Quenstedt)
	<i>Th. trigemme pajchelae</i> n. subsp.
	<i>Pachyphyllum sobolewi</i> n. sp.

#### Genus *Protomacgeea* n. gen.

Genotype: *Protomacgeea dobruchnensis* n. sp. (fig. 2-4).

*Diagnosis.* — Small simple corallites, of elongate conical form, entirely covered by epitheca. Calyx profound, attaining more than half the height of the corallite. Major septa usually much dilated by stereome<sup>1</sup>, discontinuous (peripheral parts separated from the axial by conical compact stereozone) and proximally occupying nearly the entire lumen of the corallite, but short distally. The cardinal septum has suffered almost complete reduction being replaced by the fossula. Counter septum long. Minor septa do not extend beyond the area of flat dissepiments. Tabulae complete or incomplete, horizontal or concave, strongly dilated. Pedicel present. The supremacy of the counter septum and abortion of cardinal septum persist throughout the ontogeny. Septal microstructure is trabecular, the arrangement of trabecular granules fan-like on sides of septa.

*Remarks.* — The above form has been established into a new genus, allied with genus *Macgeea*, on its horizontal dissepiments and conical corallite without buds. It has not been possible directly to ascertain the presence of the fan systems of trabeculae, but this is indicated by the fan-like arrangement of trabecular granules on sides of septa. Characters distinguishing *Protomacgeea* from *Macgeea* are presence of pedicel, absence of horse-shoe dissepiments, radial and vertical discontinuity of septa. Moreover, the epitheca does not terminate, as usual, a few millimeters below the calicular margin, but projects over the margin.

<sup>1</sup> „Stereome is a layer of calcareous material of variable thickness laid down secondarily on septa and similar structures“ (R. R. Shrock & W. H. Twenhofel, 1953, p. 139).

*Protomacgeea dobruchnensis* n. sp.

(fig. 2-8)

1954. *Thamnophyllum* aff. *stachei* Penecke; M. Rózkowska, *Badania...*, p. 233-235. fig. 27, 28.

Holotype: fig. 2-4.

**Material.** — 35 specimens, mostly damaged, from the marls of Grzegorzowice; 147 specimens were polished from the bituminous limestones of Grzegorzowice; their light skeletons show off distinctly against the dark rock background. About 30 specimens have been collected from the marly shales of Wydryszów, in some cases it was possible to recover them entire from the surrounding rock. 38 transverse and longitudinal thin sections were prepared.

**Diagnosis.** — Small, simple conical corallites, completely covered by epitheca and provided with a pedicel. Most usual length 15 mm, diameter 4-5 mm, number of septa 32-42. Maximum number of septa — 58, with diameter of 9 mm. A row of horizontal dissepiments between the epitheca and the stereozone<sup>2</sup>. Septa of two orders: 1) Major septa long, the cardinal septum reduced, replaced by fossula. The longest is the counter septum. Discontinuity of major septa within the stereozone. 2) Minor septa short, not extending beyond the horizontal dissepiments. Tabulae occasionally incomplete, concave or flat. Structure of septa trabecular. Trabecular granules with a fan-like arrangement. Strongly developed stereome on septa, dissepiments and tabulae. Horse-shoe dissepiments not detectable.

**Macroscopic description** (fig. 2-4). — Conical corallites slightly bent or straight, with periodical narrowings, covered over their entire length, even beyond the calicular margin, by a consolidated transversely striated epitheca. Between the epitheca and the stereozone is a row of openings with the peripheral ends of

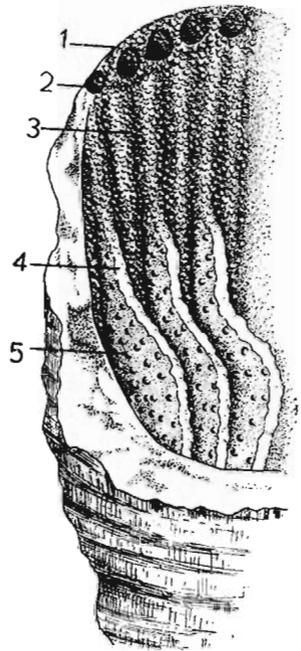


Fig. 2. — *Protomacgeea dobruchnensis* n. sp., holotype. Grzegorzowice beds No. 2. Distal end of calyx, inside view (somewhat schematic); 1 epitheca, 2 zone of flat dissepiments, 3 zone of flattened septal ridges, 4 zone of lamellar septa, 5 trabecular granules;  $\times 8.5$ .

<sup>2</sup> According to D. Hill (1935), *stereozone* is a zone of structural elements strongly dilated by a layer of stereome. In genus *Protomacgeea* the ring of horse-shoe dissepiments is involved in the stereozone.

septa passing in between. Majority of specimens is from 4 to 5 mm in diameter. The largest specimen from Wydryszów is 21 mm in length and 12 mm in diameter. The proximal end carries a needle-like pedicel. The calyx is with a sharp margin, vertically descending inward; it is very deep (fig. 3), bell-shaped. The distal ends of septa, close to the calicular margin (fig. 2), are flat, wide, covered with conspicuous, subcircular trabecular granules, arranged in horizontal rows. Near the floor of the calyx the septa grow lamellar and are pinnately arranged in relation to the reduced cardinal septum, thus forming the fossula. Lateral trabecular granules are seen, arranged fan-like in relation to the zone where the horse-shoe dissepiments would be expected, had not their development been checked by so thick a deposit of stereome as to cause discontinuity of major septa.

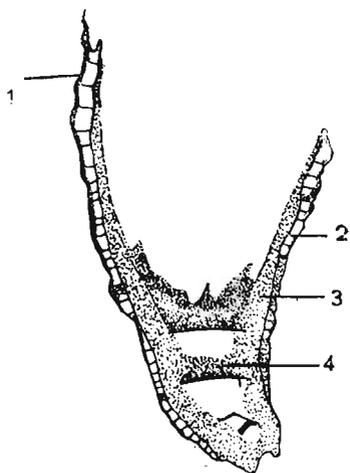


Fig. 3. — *Protomacgeea dobruchnensis* n. sp., holotype. Grzegorzowice beds No. 3. Longitudinal section of corallite; 1 epitheca, 2 zone of flat dissepiments, 3 stereozone, 4 tabula with layer of stereome;  $\times 6$

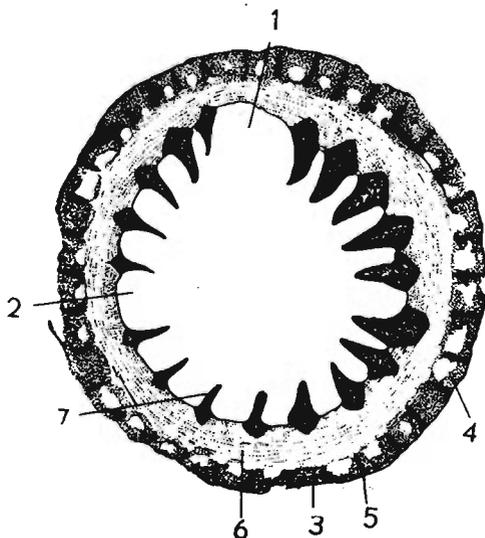


Fig. 4. — *Protomacgeea dobruchnensis* n. sp., holotype. Grzegorzowice beds No. 3. Transverse section, ephebic stage; 1 fossula in place of the aborted cardinal septum, 2 ditto below the alar septum, 3 epitheca, 4 flat dissepiments, 5 peripheral edges of major and minor septa, 6 stereozone, 7 axial edges of major septa;  $\times 12$ .

*Transverse section* (fig. 4) shows three concentrically arranged zones: 1) The outer zone, including the epitheca and the peripheral edges of septa with intervening openings corresponding to horizontal dissepiments. Zone 1 is delimited by a dark circle counterfeiting an inner wall. Accord-

ing to a communication by letter from the recently deceased Dr. S. Smith there is no aulos<sup>3</sup> here. The circle seems to have been given rise to by the process of fossilisation which is responsible, as has more than once been observed by the writer, for the formation of a distinct boundary line delimiting two different zones. 2) The median zone is the stereozone, occurring here as light stereome without signs of septal trabecular lines. 3) In the centre of calyx is a ring of axial parts of major septa. With a diameter of 5 mm there are 18 septa. The cardinal septum is reduced, being replaced by a distinct fossula. Two similar but smaller fossulae occur below the alar septa. The counter septum is generally longer than the adjacent metasepta. Their length is made even in the distal end of the calyx.

*Longitudinal section* (fig. 3) shows the following morphological features: 1) Epitheca with several transverse narrowings, projecting over the pseudotheca. 2) A vertical row of horizontal dissepiments between the epitheca and the stereozone. The epitheca also surrounds the entire pedicel (fig. 8). In the pedicel are visible two thin complete tabulae, whereas the true corallite starts to develop above the third tabula and has its proximal part occupied entirely by the sclerenchyme<sup>4</sup>. The calyx is 2.5 mm deep, the whole length of the corallite being 5 mm. In very young corals the tabulae do not develop owing to the whole interior being occupied by the sclerenchyme. The tabulae here are concave or flat, complete or incomplete.

*Microstructure* (fig. 5) throws some light on the peculiarly characteristic morphology of the corallite. The epitheca is, as usual, squeezed in between the peripheral edges of septa, no structure being detectable. The peripheral edges of septa are trabecular, displaying several centres of calcification and the nearly parallel fibres issuing from the centres and elongated by the rim of the stereome. The stereozone ring, which has been deposited on the inconspicuous horse-shoe dissepiments, is contiguous with the zone of flat axial dissepiments. The septa play no part in building up the stereozone, neither is any trabecular line detectable, its structure being characteristically concentric. Axial edges of septa, with distinct trabecular lines as the prolongation of the interrupted peripheral edges of septa, appear in the median part of stereozone. Their centres of calcification are with long fibres seemingly elongated owing to the lateral contiguity of the stereome. In the longitudinal section (fig 8) trabeculae are not clearly distinguishable, being masked by the stereome. However, occasional striae in the sclerenchyme suggest pre-

<sup>3</sup> S. Smith (1945, p. 4) defines *aulos* as „a tubular wall within the tabularium, formed by the union of the deflected axial edges of the major septa“.

<sup>4</sup> *Sclerenchyme* is „the calcareous tissue of corals“ (S. Smith 1945, p. 8).

sence of trabecular fans, since the trabeculae sometimes show an arrangement from top outside, to the base inward. In tetracorals the predominant direction in the arrangement of trabeculae is oblique from the base outside upward and inward.

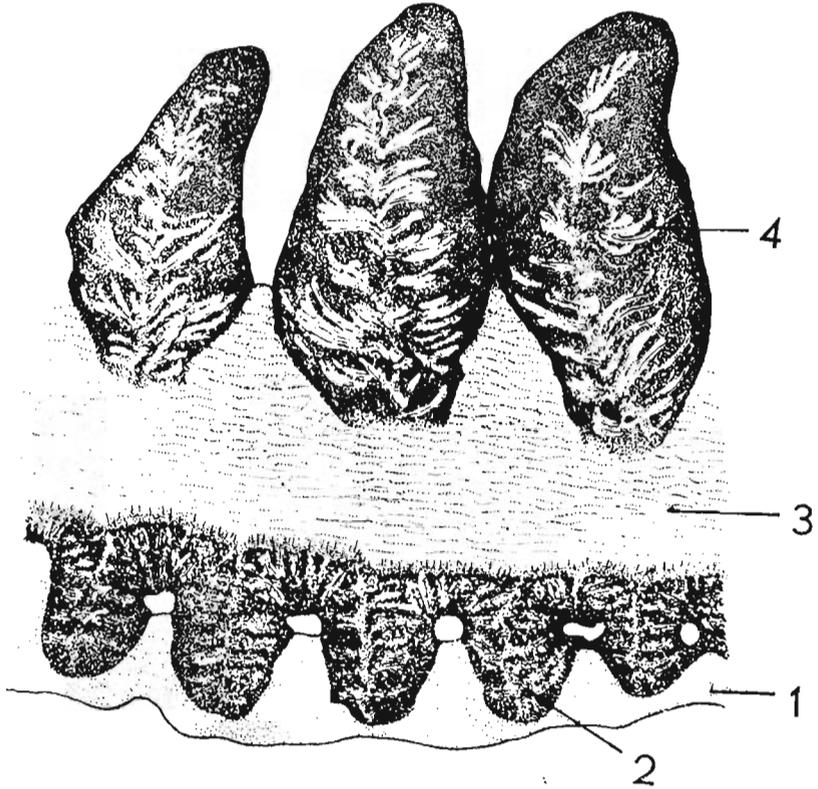


Fig. 5. — *Protomacgeea dobruchnensis* n. sp. Grzegorzowice beds No. 3. Microstructure of part of calyx in transverse section; 1 epitheca, 2 peripheral edges of septa with trabecular line, 3 stereozone made up of concentrically disposed stereome flakes, 4 trabecular lines of axial parts of septa;  $\times 66$ .

*Ontogeny* (fig. 6A-C, 8). — The Grzegorzowice specimens yielded by hard bituminous limestones are occasionally so beautifully preserved as to give most interesting issues resulting from observation of their ontogeny. In the 1st (nepionic) stage (fig. 6A, 8), the larva, upon attachment, produced a pedicel with a diameter of 0.7 mm and 2 mm in length. The pedicel is covered by the epitheca, there are 8 septa which are disposed as short ridges with bilateral symmetry, their peripheral edges are inserted in the epitheca. Two complete tabulae are distinguishable in the longitudinal section. The 2nd stage (early neanic) is shown in fig. 6B). The transverse section of a young individual, 1.3 mm in diameter, clearly

indicates the development of but one septum, the counter septum. The remaining part of the corallite is occupied by sclerenchyme. Stage 3 (fig. 6C) shows the long counter septum and on each of its sides from 3 to 4 shorter septa. The quadrants, near the yet undeveloped cardinal septum, are occupied by structureless sclerenchyme. The zone of horizontal dissepiments is still lacking, too. Stage 4 (fig. 7), 6 mm in diameter, is with 22 major septa inside the calyx and 22 minor septa within the epitheca and the horizontal dissepiments so that the total number of septa in the calyx is 44. The cardinal septum is markedly short, below it is a fossula which has been formed owing to the pinnate arrangement of adjacent septa. The counter septum continues to be very long. The final stage is figured in fig. 4 showing the transverse section of calyx. The

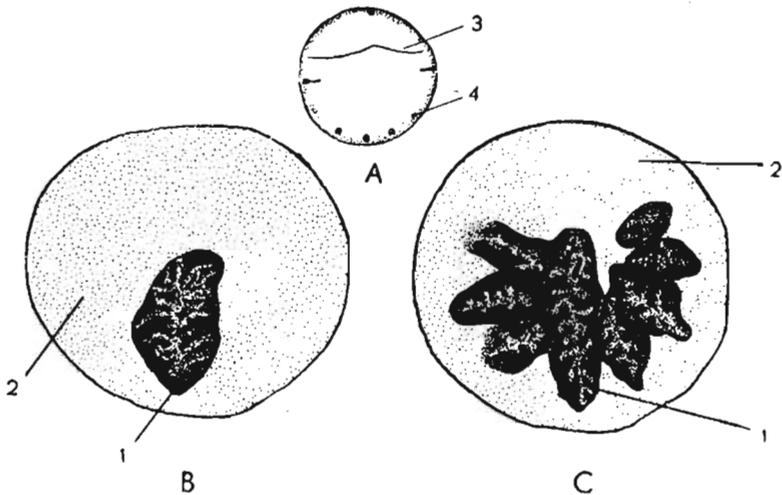


Fig. 6. — *Protomacgeea dobruchnensis* n. sp. Grzegorzowice beds No. 3. A transverse section of pedicel in the first (nepionic) stage,  $\times 10$ ; B transverse section in second (neanic) stage,  $\times 40$ ; C transverse section in the third (neanic) stage,  $\times 23$ ; 1 counter septum, 2 stereome, 3 tabula, 4 septum set in epitheca.

cardinal septum is almost entirely reduced, only the trabecular line of its peripheral edge being distinguishable. The counter septum has attained the level of the adjacent septa. The stereozone between the peripheral and axial septal zone is clearly indicated.

The general conclusions to be drawn from a study of the above ontogeny may be summed up as follows: 1) The corallite is provided with a pedicel which is rather an exceptional character in tetracorals. The wall consists of the epitheca only, the tabulae are complete, the septa of trabecular structure, with a bilateral symmetry arrangement. 2) The structure of the corallite begins to develop above the pedicel. It is mar-

kedly characteristic of that genus by the interior of the corallite being wholly occupied by sclerenchyme, showing a striking bilateral symmetry since the counter septum only is developed. 3) The stereome is first reduced on the side of the counter septum and it is there that the next septa appear. 4) The bilateral symmetry persists all through the

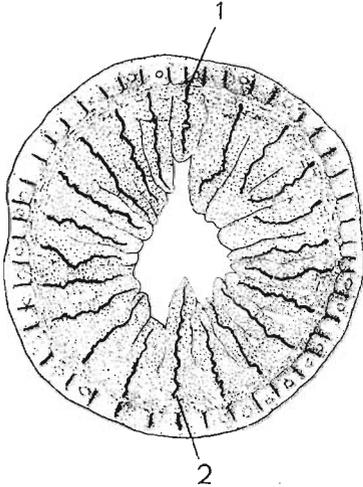


Fig. 7. — *Protomacgeea dobruchnensis* n. sp. Grzegorzowice beds No. 3. Transverse section in the fourth (neanic) stage; 1 cardinal septum, 2 counter septum;  $\times 7.5$ .

ontogeny owing to the presence of the long counter septum and the reduction of the cardinal septum. The stereome about the cardinal septum is reduced last, while on the horse-shoe dissepiments it persists through all ontogenic stages.

*Individual variability* is very strong in this form. Straight forms occur along with bent, even forms together with narrowed, stout with slender ones. The largest specimens have been collected from marls where they attain 21 mm in height. Variability of internal structure is displayed by different rate of reduction of stereome which may either occupy the whole inside of the corallite, or be reduced already in its early ontogenic stages. The tabulae are complete or incomplete, concave or horizontal. The septal structure does not change, the horse-shoe dissepiments do not develop. Mutual relation of the septa to the calicular diameter is not clearly determinable owing to the septa, thickened by stereome, being so completely contiguous, that it is not possible to count them.

*Affinities and differences.* — Morphologic structure and ontogeny are here of very peculiar type, not encountered in any other representatives of the Pachyphyllinae. The assignment of this species to the Pachyphyllinae has been confirmed by S. Smith, recently deceased, an outstanding authority in problems pertaining to tetracorals. A specimen of this form

being sent to him by the present writer, requesting his opinion, S. Smith asserted that it comes nearest to *Thamnophyllum stachei* Penecke. The topotype of *Th. stachei* Penecke has been kindly supplied to the writer by Dr. H. Flügel of Graz, for which she here wishes to convey her best thanks. A comparison between the Polish and Austrian specimens disclosed difference in structure and generic position.

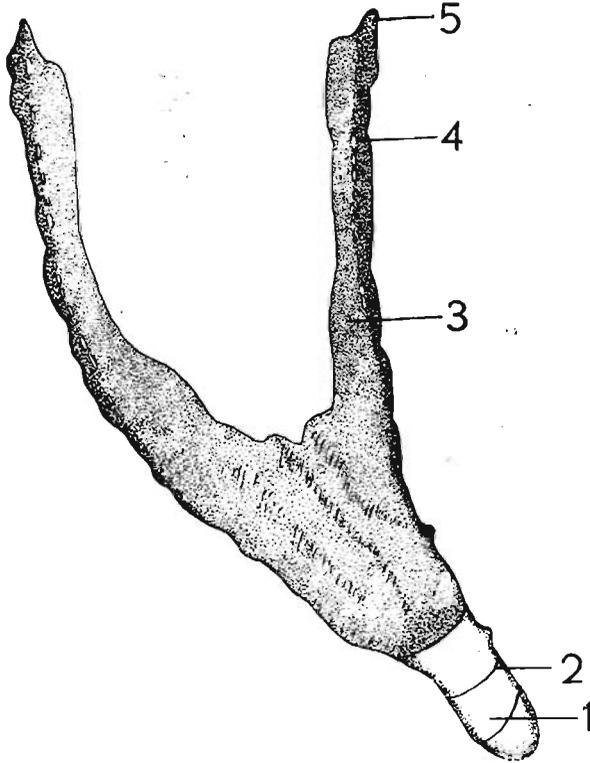


Fig.8. — *Protomacgeea dobruchnensis* n. sp. Grzegorzowice beds No. 3. Longitudinal section of an immature individual with pedicel; 1 pedicellum, 2 tabula, 3 stereozone, 4 flat dissepiment, 5 epitheca;  $\times 8$ .

*Occurrence.* — All the studied specimens have been yielded by Middle Couvinian beds where they are associated with *Rhopalophyllum heterophyllum* E. & H. and *Pseudozonophyllum excentricum* Rózk. in Grzegorzowice and Wydrysów. In Poland it is the oldest representative of Pachyphyllinae.

Genus *Macgeea* Webster, 1889*Macgeea bathycalyx bathycalyx* (Frech)

(fig. 9, 10)

1886. *Cyathophyllum bathycalyx* Frech; F. Frech, Die Cyathophylliden..., p. 67, text and drawing.
1949. *Cyathophyllum bathycalyx* Frech; A. v. Schouppé, Die „Thamnophyllen“..., p. 175.

F. Frech (1886) has described *Cyathophyllum bathycalyx* from the Middle Devonian of the Eifel Mts. (crinoidal-, *Calceola*-, and *Stringocephalus*-beds). His drawings figured on plates 5 & 7, however, show that individuals belonging to other genera (Frech's pl. 5 fig. 17-23 and pl. 7 fig. 8-11) have by F. Frech been referred to this species in addition to representatives of genus *Macgeea* (Frech's text-figure on p. 67).

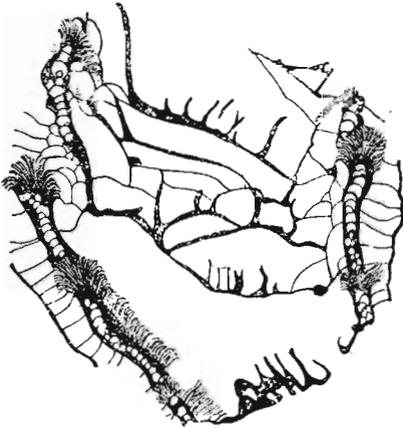


Fig. 9. — *Macgeea bathycalyx bathycalyx* (Frech). Skaly beds No. 8. Longitudinal section resembling F. Frech's drawing on p. 67 (1886);  $\times 5$ .

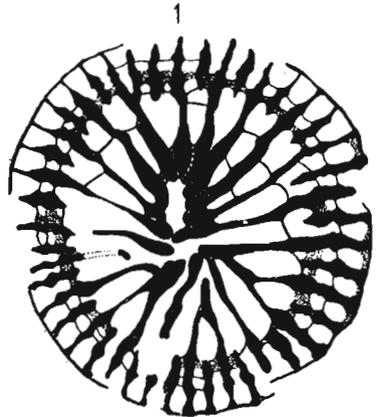


Fig. 10. — *Macgeea bathycalyx bathycalyx* (Frech); same specimen as fig. 9. Transverse section in neanic stage; 1 cardinal septum;  $\times 7.5$ .

Specimens of *M. bathycalyx* (Frech), as clearly shown by the text-figure on p. 67 (F. Frech, 1886), are with the following diagnostic characters: corallite in the shape of a slightly bent cone; longitudinal section with a wide row of horizontal dissepiments; closely spaced horse-shoe dissepiments with inflated walls, a zone of ordinary obliquely set dissepiments; vesiculate periaxial tabulae; axial tabulae somewhat convex, occasionally with supplementary plates. This description leads us to infer that *Cyathophyllum bathycalyx* Frech is a representative of genus *Macgeea*, as has already been correctly asserted by A. Schouppé (1949).

F. Frech's original material was not, regretfully, accessible to the writer. Nevertheless, the allied forms recorded from the Givetian deposits of Skaly are by her regarded as subspecies and mutations of this species. One specimen among them, of which two sections have been cut, comes nearest the typical *Cyathophyllum bathycalyx* Frech. It is with a conical shape and similar internal structure.

There are 23 major septa in the *transverse section* of the proximal part of the corallite (fig. 10), with a diameter of 6 mm. The cardinal septum is shorter. The adjacent septa have a nearly parallel arrangement. The counter septum is somewhat longer than the septa in the neighbouring quadrants. Major septa are long, almost reaching the axis of the calyx. Their axial edges are rhopaloid. The minor septa are short, extending somewhat beyond the zone of the small thick-walled horse-shoe dissepiments.

The *longitudinal section* (fig. 9) cut of a badly damaged corallite, 12 mm in length, shows in the proximal end dilated septa, longitudinally intersected. The flat dissepiments are wide. The horse-shoe dissepiments are with thickened wall and, as in F. Frech's drawing, arranged in flexuous lines. Ordinary dissepiments occur along with gently convex, incomplete tabulae.

On evidence of Polish material, the above species displays extreme variability, though it also has constant features, characteristic of all the varieties. They are: 1) shortened cardinal septum with a fossula near it, 2) counter septum longer than the adjacent septa reduced to same length in calicular pit, 3) tabulae incomplete, more or less convex, occasionally with supplementary plates.

On the above mentioned characters the writer has established, besides the type form, the following 4 subspecies and 1 mutation:

<i>Macgeea bathycalyx kasimiri</i>	<i>M. bathycalyx regularis</i>
<i>M. bathycalyx josephi</i> , very wide-spread and with the greatest vertical range	<i>M. bathycalyx longiseptata</i>
	<i>M. bathycalyx amabilis</i> , the youngest representative of this group.

*Macgeea bathycalyx kasimiri* n. subsp.

(fig. 11-15; table 1)

Holotype: fig. 12, 13.

*Material*. — 33 specimens collected from mudstones intercalated in limestones of strata 6 and from argillaceous marly shales in beds No. 8. Five transverse and longitudinal thin sections were prepared.

*Diagnosis*. — Corallites low, shaped like a suddenly dilating, bent cone, rarely provided with a talon, surface with concentric striation of

epitheca which terminates about 3 mm below the calicular margin. The corallites average about 10 mm in diameter and have about 29 major septa. Calyx deep, steep, attaining sometimes three fourths of the length of the corallite. Septa carinate, the major septa extending to the axis of calyx, while the cardinal septum is somewhat shorter, the counter septum being slightly longer than the adjacent septa. Broad flat dissepiments, slight thick-walled horse-shoe dissepiments. Tabulae incomplete, vesicular, with a thick stereome cover. The proximal end entirely occupied by sclerenchyme. Bilateral symmetry followed through all the ontogenetic stages.

*Macroscopic description* (fig. 11). — Corallite horn shaped, with suddenly increasing diameter. The proximal end is pointed, talon generally wanting. The entire surface closely covered by epitheca, either smooth

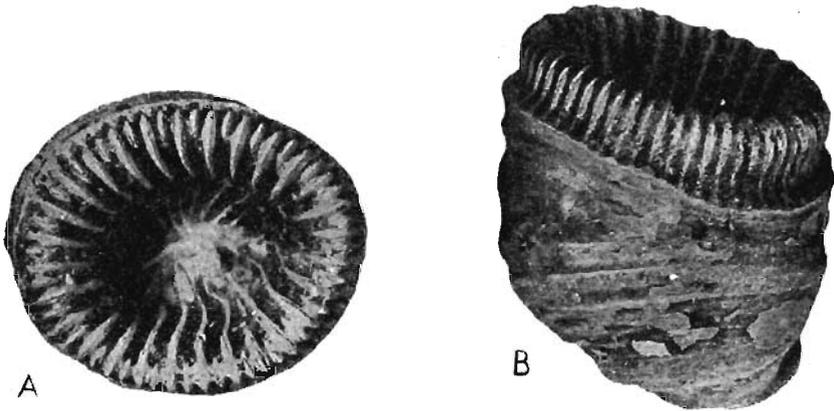


Fig. 11. — *Macgeea bathycalyx kasimiri* n. subsp., paratype. Skaly beds No. 6; A inside of calyx,  $\times 4$ ; B side view of corallite;  $\times 3.3$ .

or transversely striated, as is common in genus *Macgeea*, the epitheca does not extend to the very margin of the calyx, but terminates 3 mm below it. This leaves the septa uncovered, with an arched distal edge carrying carinae. The sides of the septa are ornamented by granules in a most regular fan-like arrangement. The calyx is very deep and generally attains from one third to one half the height of the corallite; in very young individuals it is three fourths of the general length, in one very young individual, 4 mm high and 4 mm in diameter, the calicular depth is 3 mm. The sides of the calyx descend vertically, the floor is gently convex with the counter septum visible on it, the latter being very long and extending beyond the axis of the calice. Major septa nearly reach the axis while the cardinal septum is short and does not reach the floor of the calyx.

*Transverse section* (fig. 12), cut above the tabularium, shows the epitheca into which are welded the somewhat dilated peripheral edges of septa. The zone corresponding to the cone of flat dissepiments is broad, the septa are here narrowed while they swell out again within the ring of horse-shoe dissepiments. The walls of the horse-shoe dissepiments are dilated, their lumen is small. The major and minor septa differ in their length only, since minor septa are but slightly external to the pseudotheca (fig. 12). The number of septa is dependent on the size of diameter, as is shown in table 1.

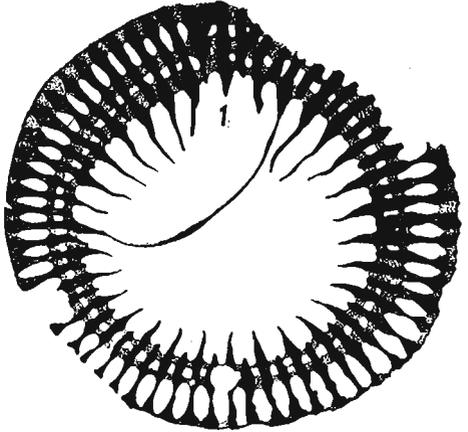


Fig. 12. — *Macgeea bathycalyx kasimiri* n. subsp., holotype. Skaly beds No. 6. Transverse section of calyx; 1 cardinal septum:  $\times 4.7$ .

T a b l e 1

Correlation between the number of septa and the diameter of calyx in *Macgeea bathycalyx kasimiri* n. subsp.

Number of septa	Diameter of calyx (in mm)								Number of specimens ↓
	3;4	5;6	7;8	9;10	11;12	13;14	15;16	17;18	
14; 15	1								1
16; 17		1							1
18; 19		1							1
20; 21		1							1
22; 23									
24; 25			3						3
26; 27			1	4					5
28; 29				2	4	1			7
30; 31				1	1				2
32; 33						1			1
Total:	1	3	4	7	5	2			22

*Longitudinal section* (fig. 13, 14). The interior is characterized by a thick deposit of the stereome found on the epitheca, the horse-shoe dissepiments and on the tabulae most particularly so. The proximal end is

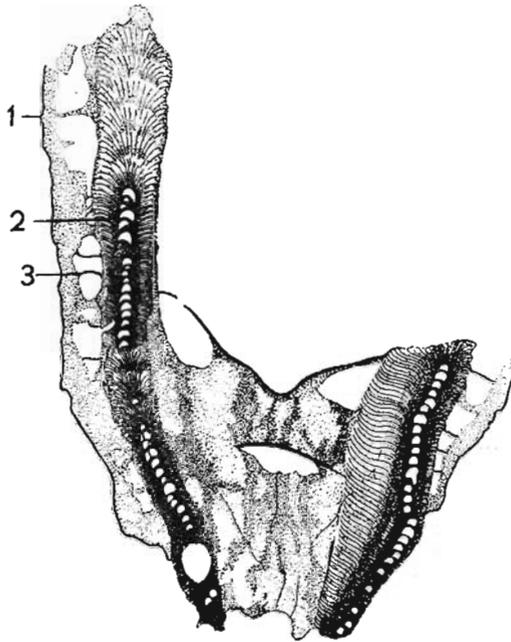


Fig. 13. — *Macgeea bathycalyx kasmiri* n. subsp., holotype. Skaly beds No. 6. Longitudinal section of immature individual;  
1 epitheca, 2 horse-shoe dissepiments with trabecular fan, 3 flat dissepiment:  
× 5.3.

entirely occupied by sclerenchyme, through which the horse-shoe dissepiments are seen as small globose foramina. In this part the tabulae are missing, they occur somewhat higher up (fig. 14), consisting of globose periaxial elements and gently convex or flat axial elements. All these parts are strongly thickened by stereome.

*Microstructure.* — Trabecular fans and stereome are the predominant skeletal elements of these corallites. As may be observed in the longitudinal thin section (fig. 13, 14), the fans are broad and flat. In the periaxial end trabeculae are almost horizontally arranged. Growth striation is clearly indicated (fig. 13), new trabeculae appear by insertion in the trabeculae of the already existing fan, always above the new horse-shoe dissepiment. In the peripheries trabeculae branch dichotomously. They are made up of sclerodermite bundles corresponding to the trabecular granules on the lateral septal surface. On the tabulae, in the proximal

part more particularly so, the stereome mass consists of calcareous flakes disposed in irregular bands which, when contiguous to fans, form their continuation. In transverse section septa are seen to be built of closely spaced calcification centres with long fibres, particularly in the dilated part of the septum.

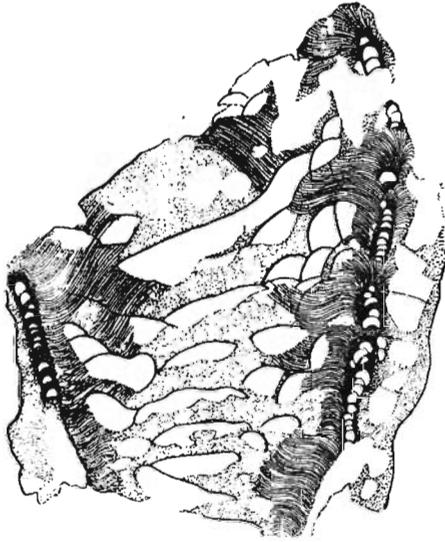


Fig. 14. — *Macgeea bathycalyx kasmiri* n. subsp. Skaly beds. No. 6. Longitudinal section of more mature individual;  $\times 5.3$ .

*Ontogeny* (fig. 15) has its course line uniform in all the varieties of this species from the Givetian deposits of Skaly. Bilateral symmetry predominates from the initial stages; the counter septum is very long and extends beyond the central point of the corallite, while the cardinal septum is shortened and the septa adjacent to it have an almost parallel course. Sclerenchyme occupies all the interior of the proximal end, being first reduced in the axial or peripheral part of the corallite, while the stereome persists longest on the side of the cardinal septa, even through the ephebic stage. In some corallites the stereome is reduced in the proximal part almost from the very beginning, persisting on the side of the cardinal septum only. The talon is to be seen near the proximal end in very few specimens only; it is situated on the side of the cardinal septum, i. e. on the convex side of the corallite. When the epitheca has been worn or washed off in HCl, the cardinal septum is clearly indicated on the surface of the corallite, surrounded by adjacent, pinnately arranged septa, as shown in fig. 15. Bilateral symmetry of the calyx is followed

through the whole ontogeny of the corallite. As late as in the ephelic stage the cardinal septum is distinguished by being shorter than the neighbouring metasepta and set in the fossula formed owing to the inclination of the metasepta.

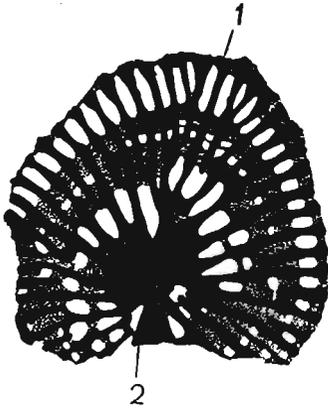


Fig. 15. — *Macgeea bathycalyx kasimiri* n. subsp. Skaly beds No. 6. Transverse section in neanic stage; 1 cardinal septum. 2 counter septum:  $\sphericalangle$  5.

*Individual variability* is displayed in the shape of the cone which may either be that of a short stout horn, or be slender. The surface may be with numerous transverse constrictions. In the interior of the corallite the tabulae may be almost horizontal or have the appearance of being broken up into vesicles. The thickness of stereome cover varies.

*Affinities and differences.* — The above variety presents a shape resembling that of the specimen shown by F. Frech (1886) in a longitudinal section on page 67. The disposition of the tabulae is similar, but in our specimens the stereome is more abundant.

*Occurrence.* — The here considered subspecies is characteristic of mudstones resting directly on *Calceola* limestone of Skaly and less often in marly argillaceous shales.

*Macgeea bathycalyx josephi* n. subsp.

(fig. 16-18; table 2)

Holotype: fig. 16, 17.

*Material.* — This is a subspecies more common than the above described forms and with a greater vertical range. From the mudstones and marls (beds Nos. 5, 6, 8, 10, 12) the writer has collected 71 specimens. 26 longitudinal and transverse thin sections were prepared, some also through the proximal end.

*Diagnosis.* — The corallite is shaped like a bent, elongated cone, sometimes carrying a talon. Distinct bilateral symmetry is followed throughout the ontogeny. The cardinal septum is shorter. Carinae and granules conspicuous. Tabulae incomplete. Periaxial parts vesiculate, the axial convex, frequently with supplementary plates. The corallites average about 9 mm in diameter and have about 29 major septa.

*Macroscopic description* (fig. 17). — Virtually all the corallites are in a damaged condition. The epitheca covers nearly the whole of the specimen terminating somewhat below the calicular margin. In some specimens, with proximal end not damaged, a talon is occasionally distinguishable. The septa have the edges carinate and the sides with granules. The depth of the calyx is not known. The number of septa is dependent on the size of the calyx, as is specified in table 2.

Table 2

Correlation between the number of septa and the diameter of calyx in *Macgeea bathycalyx josephi* n. subsp.

Number of septa	Diameter of calyx (in mm)								Number of specimens ↓
	3;4	5;6	7;8	9;10	11;12	13;14	15;16	17;18	
14; 15	1								1
16; 17									
18; 19									
20; 21									
22; 23		5	1						6
24; 25		3	5	2					10
26; 27			10	2					12
28; 29			4	11	2				17
30; 31				8	2	1			11
32; 33				7	3	1			11
34; 35					1	1			2
36; 37					1	2			3
Total :	1	8	20	30	9	5			73

*Transverse section* (fig. 16). Septa are of two different lengths, in the ephelic stage they do not reach the axis. Practically all the transverse sections show that the cardinal septum is shorter than the adjacent septa, while those belonging to the quadrants about the counter septum, lean against the tabulae and terminate at a nearly level line. The septa have distinct carinae, which are more strongly developed in the ring of the horse-shoe dissepiments. The shorter septa extend beyond the pseudotheca. The lumen of the horse-shoe dissepiments is large since their walls are but slightly dilated.

*Longitudinal section* (fig. 17). Dissepiments broad, fine and flat (1.5 to 2 mm), recognisable only in cases when the epitheca has been preserved. The horse-shoe dissepiments are closely spaced, with walls slightly dilated.

ed; near the horse-shoe dissepiments, normal dissepiments occur with walls somewhat thickened, also vesiculate periaxial tabulae sometimes hardly distinguishable from dissepiments. In the axial part the tabulae

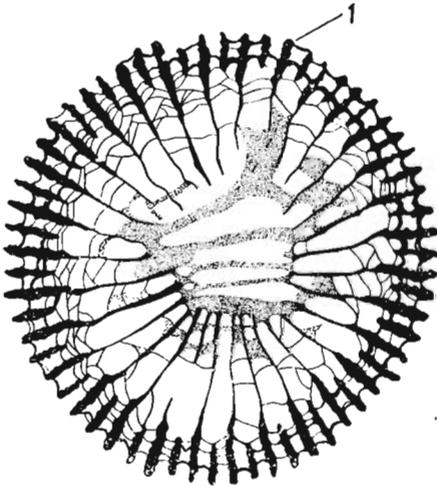


Fig. 16. — *Macgeea bathycalyx josephi* n. subsp., holotype. Skaly beds No. 8. Transverse section in ephelic stage; 1 cardinal septum;  $\times 5$ .

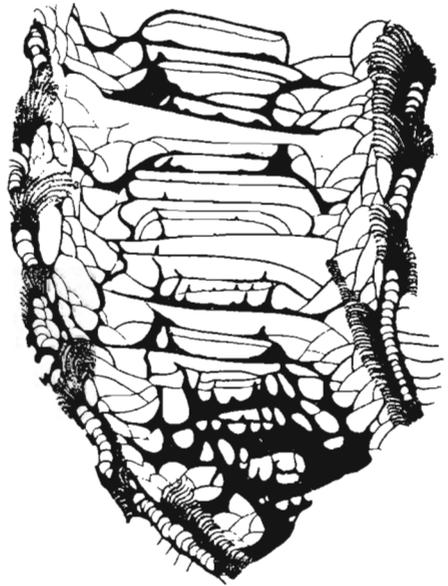


Fig. 17. — *Macgeea bathycalyx josephi* n. subsp., holotype (same specimen as fig. 16). Longitudinal section of corallite;  $\times 5$ .

are flat or convex and occur in bundles, some of them have a thin cover of stereome, more particularly so in the proximal area.

*Ontogeny* (fig. 18). — The proximal part is damaged in most cases, but sections with diameter of 3 mm show that in some corallites the stereome is completely reduced; when so, there is a long counter septum and a short cardinal septum. In other sections, however, septa thickened by stereome are laterally contiguous over their entire length, hardly without any free intervening spaces, even when 5 mm in diameter. The disproportion between the cardinal and the counter septum is always distinct.

*Individual variability* is very marked. It is displayed in the outer shape of the corallites, ranging from forms which are short, broad, conical and bent to straight elongated ones. The internal structure is also subject to great variations. The tabulae may be concave, incomplete, flat or convex.

disposed in bundles. In some corallites the tabulae are broad, flat or convex, occasionally complete. Septa usually very closely follow the bilateral symmetry arrangement. In the epehebic stage of some corallites the cardinal septum is almost flush with adjacent septa, as is also the counter septum. In some specimens the carinae are closely spaced and conspicuous, in others they are not readily recognizable.

*Affinities and differences.* — The longitudinal section of some specimens resembles F. Frech's drawing (1886), but the tabulae of the Skaly specimens are usually more convex and more frequently occur arranged in bundles. D. Sobolew (1904) described *Cyathophyllum bathycalyx* from beds No. 8 and 9 of Skaly (*Calceola* and crinoidal limestones). It was a specimen referable to the here described subspecies. D. Sobolew has also recorded *C. bathycalyx* Frech var. *skalense* Sobolew from the *Cultrijugatus* beds in exposure No. 2 of Grzegorzowice. Although the writer has had at her disposal ample material from the Couvianian beds of Grzegorzowice and in spite of having, with great care, polished the corallites, she did not discover any representative of species *Macgeea bathycalyx*. Forms more common there were those of the converging species *Ceratophyllum typus* Gürich. Fragments of small slender corallites often resemble *Thamnophyllum trigemme*, but *M. bathycalyx josephi* shows normal dissepiments with somewhat dilated walls and attaining the minor septa (according to D. Hill, 1935), while the tabulae are disposed in bundles and the septa are laterally carinate. *Macgeea bathycalyx josephi* differs from subspecies *Macgeea bathycalyx kasimiri* in being shaped like a slightly elongate cone and in the strong reduction of stereome on the tabulae.

*Occurrence.* — The above subspecies is recorded from Skaly in beds containing *Nardophyllum tenue* Wdkd., *Lithophyllum corneolum* Wdkd., *Mesophyllum defectum* Schlüter, *Sparganophyllum* sp., *Heliophyllum halli*, *Pseudocosmophyllum geigeri* Wdkd. After R. Wedekind's stratigraphic scale (1925) these are all forms referable to the Middle Givetian.

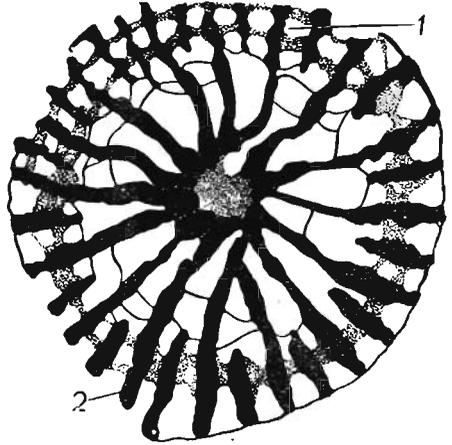


Fig. 18. — *Macgeea bathycalyx josephi* n. subsp. Skaly beds No. 8. Transverse section in neanic stage, septa strongly dilated by sclerenchyme; 1 cardinal septum, 2 counter septum;  $\times 12$ .

*Macgeea bathycalyx regularis* n. subsp.

(fig. 19, 20)

Holotype: fig. 19, 20.

*Material.* — 2 specimens from marly limestones with its transverse and longitudinal sections (beds No. 8).

*Diagnosis.* — The corallite displays a most regular structure, the calyx is circular in section, when the diameter is 13 mm, there are 33 straight major septa, spindle like within the pseudotheca. Extremely numerous carinae. Horse-shoe dissepiments and normal dissepiments thickly coated by stereome. Tabulae incomplete, their axial parts convex and disposed in bundles.

*Description of sections* (fig. 19, 20). — Diagnostic characters of this subspecies are those of the typical *M. bathycalyx*, with, moreover, additional peculiar details of morphology, which allow its assignment to a separate variety occurring in limestones.

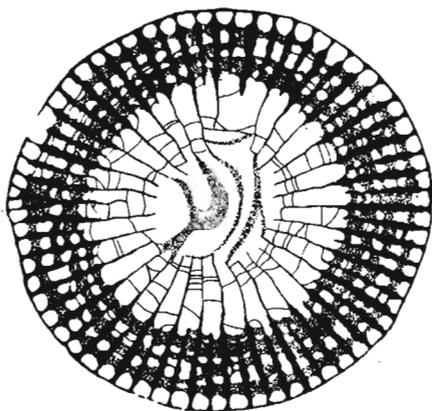


Fig. 19. — *Macgeea bathycalyx regularis* n. subsp., holotype. Skaly beds No. 5. Transverse section in ephobic stage;  $\times 4$ .

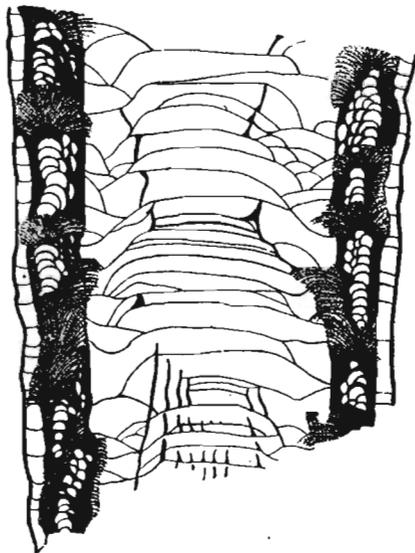


Fig. 20. — *Macgeea bathycalyx regularis* n. subsp., holotype (same specimen as fig. 19). Longitudinal section;  $\times 4.3$ .

The calyx is circular in section, with a diameter of 13 mm. It is involved by almost completely preserved epitheca. The peripheral part of septa is thin within the zone corresponding to the flat dissepiments. Within horse-shoe dissepiments and normal dissepiments the septa are spindle-like and provided with numerous carinae. There is abundant stereome on the walls of the horse-shoe and normal dissepiments. The

axial edges of septa are short and thin. The centre of calyx is free from septa, the sections of tabulae only being recognizable. The minor septa are long and pass through the rings of horse-shoe dissepiments and the thick-walled dissepiments. Longitudinal section (fig. 20) shows the structure to resemble closely that of *M. bathycalyx josephi*. The flat dissepiments are widely spaced. The lateral walls of horse-shoe dissepiments and the walls of normal dissepiments internally contiguous with the horse-shoe dissepiments are strongly dilated. The tabulae consist of a broad periaxial part built up of large vesicles and of an axial part made up of bundles of convex tabulae.

*Affinities and differences.* — The above subspecies comes nearest to *M. bathycalyx josephi* in the number of its septa with correlated calicular diameter and in a markedly similar arrangement of tabulae. The differences lie in the very regular course of septa and the thick cover of stereome on the horse-shoe dissepiments as well as on normal dissepiments.

*Macgeea bathycalyx longiseptata* n. subsp.

(fig. 21, 22)

Holotype: fig. 21, 22.

*Material.* — One damaged specimen, collected from a dump-heap next to an exposure of *Calceola* limestone, of which the transverse and longitudinal sections have been prepared.

*Diagnosis.* — The corallite is sub-cylindrical, circular in transverse section, with 32 major septa when the diameter is 12 mm. Major septa long, minor septa half the length of the major. The cardinal septum slightly shortened. Septa carinate. Tabulae vesiculate, showing a bundle-like arrangement in the axial part.

*Description of sections* (fig. 21). — There are 64 septa in a calyx with diameter of 12 mm. Over half their length the septa are dilated in a spindle-like shape, the axial edges being likewise, in some parts, dilated and leave but a very small free central area, 2 mm in diameter. The somewhat shortened cardinal septum is in the fossula. Minor septa are somewhat narrower and extend beyond the pseudotheca, occasionally attaining nearly half the length of the major septa. Lateral carinae are readily recognizable, particularly so in the zone of the horse-shoe dissepiment ring. Walls of horse-shoe dissepiments sometimes so thick as to close up nearly the whole of their lumen.

Longitudinal section (fig. 22). The structure, as seen in longitudinal section, is strikingly characteristic. A very wide zone of flat dissepiments (2 mm) is seen in the periphery. The horse-shoe dissepiments sometimes occur arranged in two adjacent rows, with lateral walls markedly di-

lated. The stereome also coats the walls of the vertically placed normal dissepiments. Tabulae are incomplete and somewhat different from those in other *Macgeea* varieties thus far described. Their large vesiculate periaxial parts are recognizable in the upper end of the corallite, while in the centre there are bundles of slightly convex axial tabulae. In the proximal end of the corallite the structure of tabulae is irregularly vesiculate, a thick coating of stereome showing on their surface. Since the thin section does not cut through the axial part of the corallite, the short elongate sections of septa are shown in the tabulae.

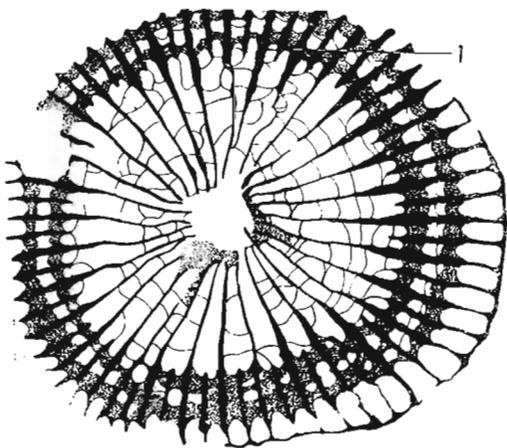


Fig. 21. — *Macgeea bathycalyx longiseptata* n. subsp., holotype. Skaly beds No. 5. Transverse section in ephelic stage; 1 cardinal septum;  $\times$  4.7.

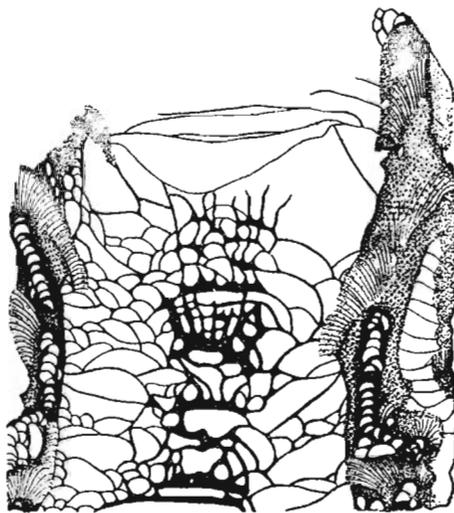


Fig. 22. — *Macgeea bathycalyx longiseptata* n. subsp., holotype. Longitudinal section of specimen of fig. 21;  $\times$  4.

*Microstructure* (fig. 22). — There is a thick layer of concentrically striated stereome on walls of the horse-shoe dissepiments, greatly diminishing the lumen in the horse-shoe dissepiments. The stereome dilation also involves the walls of the widely spaced normal dissepiments. Trabeculae are crowded, the carinae of yard-arm type<sup>5</sup>. The longitudinal section shows a most characteristic representation of strongly differentiated fans of the type observed by the writer in Frasnian *Macgeea* species only, i.e. fans high, trabeculae clearly separated, bifurcating at the margin of fans. Sclerodermites are complex and distant. Occasionally, however, within the zone of horse-shoe dissepiments, instead of separated

<sup>5</sup> „Carinae: flanges on the sides of a septum. Yard-arm carinae when they are opposed and appear in transverse section as short bars crossing the septum at right angles“ (partim S. Smith. 1945).

trabeculae, granules are seen arranged in their direction and corresponding to sclerodermite fascicles.

*Affinities and differences.* — The writer has made the here described specimen a subspecies of species *Macgeea bathycalyx* on the arrangement of septa and the disposition of tabulae which are essentially similar in that respect to *M. bathycalyx josephi*. The differences lie in the longer septa of *M. bathycalyx longiseptata*, in the disposition of the axial parts of tabulae and in the extremely peculiar structure of trabecular fans. From the "Middle Devonian, Eifel" (W. D. Lang & S. Smith, 1935) species *Disphyllum* (or *Macgeea*) *dubium* (de Blainville), our specimen differs in the presence of longer minor septa, in the fossula into which the cardinal septum has been inserted, and in the disposition of tabulae displaying axially a parallel arrangement, in spite of their vesiculate structure.

*Macgeea bathycalyx amabilis* n. mut.

(fig. 23-25; table 3)

Holotype: fig. 23-25.

*Material.* — 56 specimens from lens of strongly arenaceous marly shales occurring in a bryozoan bank (beds No. 11); 11 transverse and longitudinal thin sections with stages of early ontogeny. The specimens are in a fairly satisfactory condition of preservation, except that the calices are mostly damaged and compressed.

*Diagnosis.* — Corallites elongate, slightly bent, less often broadly conical, commonly provided with a talon. The epitheca terminates 2 mm below the margin of corallite. Septa carinate. Calyx deep. Conspicuous bilateral symmetry, particularly so in early ontogeny. Tabulae convex, incomplete, arranged in bundles. The corallites average about 8 mm in diameter and have about 27 major septa.

*Macroscopic description.* — The corallites are satisfactorily preserved, with proximal end not damaged, usually carrying a talon. The surface is entirely covered by a thick epitheca with fine transverse striation through which the septa are not seen, strong transverse narrowings occur frequently. The surface is exposed over an area 2 mm wide, below the calicular margin. Here the septal edges are distinctly carinate, while trabecular granules occur laterally, in a fan-like arrangement. The margin of the calyx is rounded and sometimes narrowed in comparison with the lower part of the corallite; whereas in some specimens the calyx widens out upward. Corallites of this mutation are larger than those in the previously described subspecies, out of 56 specimens, 13 are with height exceeding 20 mm, while septa are proportionate to the calicular diameter, as specified in table 3.

Table 3

Correlation between the number of septa and the diameter of calyx in  
*Macgeea bathycalyx amabilis* n. mut.

Number of septa \ Diameter of calyx (in mm)	Diameter of calyx (in mm)										Number of specimens
	3;4	5;6	7;8	9;10	11;12	13;14	15;16	17;18	19;20		
14; 15	1										1
16; 17	1										1
18; 19											
20; 21		2									2
22; 23		2	1								3
24; 25		1	4								5
26; 27		1	6								10
28; 29			4	4	1						9
30; 31				4	4						8
32; 33					3						3
34; 35					1	2					3
36; 37						1					1
38; 39											
40; 41									1		1
42; 43											
44; 45									1		1
Total :	2	6	15	11	9	3	2				48

*Transverse section* (fig. 23). Thick epitheca involving the peripheral edges of septa. A broad zone corresponding to the flat dissepiment ring. The horse-shoe dissepiment zone is likewise broad. Lumen of horse-shoe dissepiments in the shape of elongate rectangles. The stereome coating on the horse-shoe dissepiments is meagre, being, however, quite thick on the septa in the two cardinal septum quadrants. Cardinal septum is almost flush with the adjacent septa, the counter septum is long. Septa laterally carinate.

*Longitudinal section* (fig. 24). Below the epitheca there is a broad zone of flat dissepiments, 1.5 to 2 mm in width. The horse-shoe dissepiments are semi-luminate and thin-walled. Tabulae incomplete, consisting of vesiculate periaxial parts and of broad, slightly convex axial parts, commonly arranged in bundles. Exceptionally, even complete tabulae may occur.

*Microstructure* (fig. 23). — A thick epitheca involving also the slightly dilated peripheral edges of septa. In transverse section of septa the trabecular line has an almost uninterrupted course and together with the

fibres, owing to its dark colouration, it shows off clearly against the light background of the stereome which thickens the septum. The trabecular line has a zigzag course and alternating carinae are formed where angular indentations of the line occur. Near the cardinal septum the septa are dilated axially inward from the pseudotheca. Here on septa and on periaxial tabulae is deposited a thick coating of stereome, with structure showing parallel striation. The distinct dilation of these elements has been taking place in correlation with certain growth phases (fig. 24). The longitudinal section shows slender, tall trabecular fans with broad trabeculae (0.2 mm), bifurcating in the direction of tabularium.

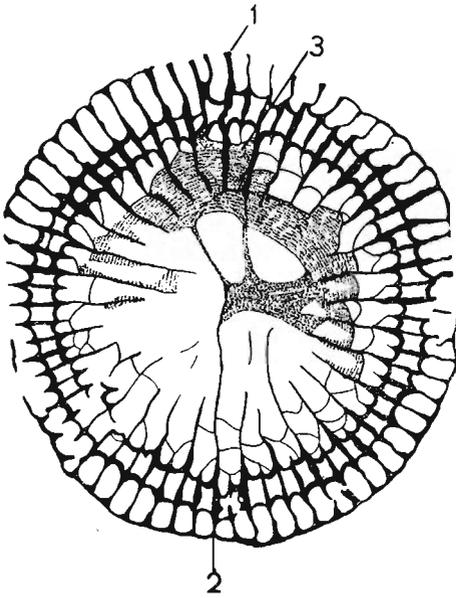


Fig. 23. — *Macgeea bathycalyx amabilis* n. mut., holotype. Skaly beds No. 11. Transverse section in ephelic stage; 1 cardinal septum, 2 counter septum, 3 intraseptal layer of stereome;  $\times 5.3$ .

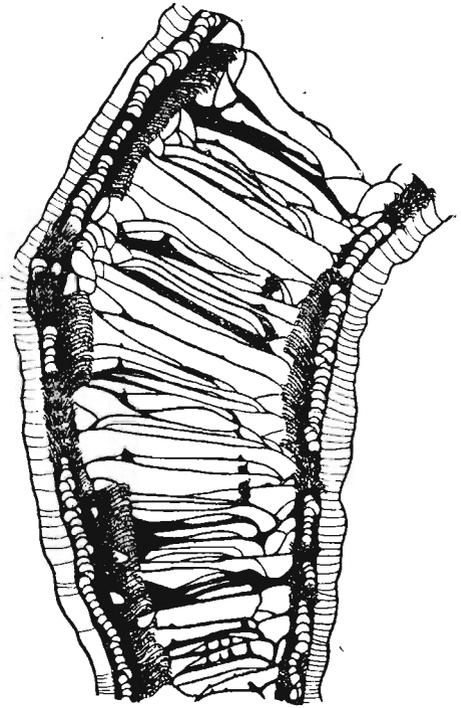


Fig. 24. — *Macgeea bathycalyx amabilis* n. mut., holotype (same specimen as fig. 23). Longitudinal section;  $\times 3.7$ .

*Ontogeny* (fig. 25). — The ontogeny is most symptomatic and in some stages it resembles the structure of *Protomacgeea dobruchnensis*, the zaphrentoid stage being then dominant. In the early neanic stage, with diameter of 4 mm and 32 septa present, the whole interior of the corallite is seen crowded with septa dilated by stereome. It is difficult to recognize among them the long counter and the short cardinal septum, welded into the thick adjacent septa. With diameter of 8 mm there are 50 septa, the

cardinal septum is less short, while the counter septum still continues to be long (fig. 25).

*Individual variability* is very strong and is displayed in the shape of specimens, i.e. that the corallites may be low and broad, or like elongated cones, sometimes straight or curved. The calyx is mostly narrowed, in some specimens widened out. The septa are very slightly dilated, occasionally somewhat more so. In more mature corallites there is stronger reduction of stereome. Tabulae are broad and convex, sometimes flat or even concave, commonly disposed in bundles.

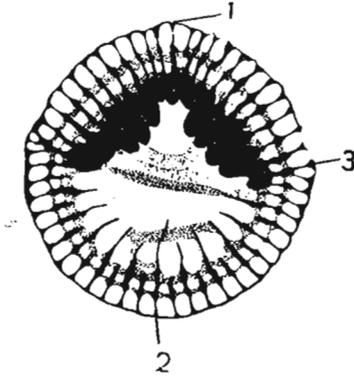


Fig. 25. — *Macgeea bathycalyx amabilis* n. mut. Skaly beds No. 11. Transverse section in neanic stage; 1 cardinal septum, 2 counter septum, 3 alar septum:  $\times 5$ .

*Affinities and differences.* — The above form has been recognized by the writer as a mutation of species *Macgeea bathycalyx* (Frech). The following are features in common with the type form: similar structure of calyx, tabularium and zaphrentoid stage of ontogeny. Most closely allied are the mutation *amabilis* and subspecies *josephi*. The differences lie in the tabulae being broad, the septa around the cardinal septum quadrants strongly dilated and the cardinal septum of the *amabilis* mutation evened up with the adjacent septa during the late neanic and epehebic stages, and the counter septum being longer.

Genus *Thamnophyllum* Penecke, 1894

*Thamnophyllum skalense* n. sp.

(fig. 26-29; table 4)

Holotype: fig. 26, 27A.

*Material.* — 155 polished specimens set in hard limestone (beds No. 5). Also 44 transverse and longitudinal thin sections have been prepared.

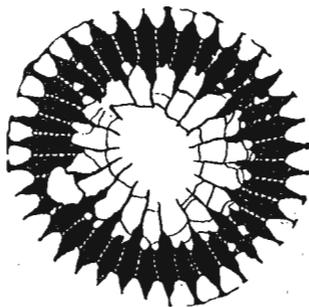
*Diagnosis.* — The corallites are slight, subcylindrical, with parricidal and peripheral increase, they average about 5 mm in diameter and have about 21 major septa. These are straight, peripherally dilated, forming together with the thick-walled horse-shoe dissepiments an almost con-

solidated pseudotheca. Axial edges of septa thin, leaving about 1 mm of free space. Tabulae incomplete, convex, with supplementary plates.

*Macroscopic description* (fig. 27). — The shape is known from longitudinal thin sections only. The corallites are elongated, subcylindrical, sometimes somewhat twisted and transversely narrowed. They produce a talon by which they are attached to the bottom, most frequently to *Thamnopora* or to the laminar *Coenites*. The surface is covered by a thin epitheca which is preserved in some places. It has not been ascertained what level the epitheca had reached and whether it terminated below the calicular margin. Where the epitheca is preserved, a row of flat and broad dissepiments is to be seen below it. These are commonly masked by broad trabecular fans with lines of divergence on horse-shoe dissepiments. The latter are markedly thick-walled and together with the closely spaced trabecular fans they form a conspicuous pseudotheca. The tabulae are convex and consist of dilated, convex, axial parts and of vesiculate, periaxial parts. The calyx is broad, deep, with steep walls and convex floor.

The *transverse section* (fig. 26) shows a thin epitheca and peripheral edges of septa terminating in the epitheca. In some specimens the pseudotheca is nearly consolidated with dissepiments, seen through only here and there. Within the horse-shoe dissepiments the septa are dilated to a spindle-like shape. After leaving the pseudotheca they attenuate and do not reach the axis. As is specified in the attached table 4, the number of septa is dependent on the diameter of calyx.

Fig. 26. — *Thamnophyllum skalense* n. sp., holotype. Skaly beds No. 5. Transverse section;  $\times 7$ .



*Microstructure* (fig. 27). — It is here most characteristic for genus *Thamnophyllum*. The trabecular fans consist of wide trabeculae, separated by a crack. Composite sclerodermites of fibre fascicles are grouped along a dark line. The transverse section shows a light transparent epitheca and within it the septal ends. Septal trabeculae have long fibres, particularly so in the spindle-like dilated part. The pseudotheca is made up of thick-walled horse-shoe dissepiments and of spindle-shaped dilated

septa. These, in addition to closely spaced long fibre trabeculae, also have a thick lateral cover of stereome.

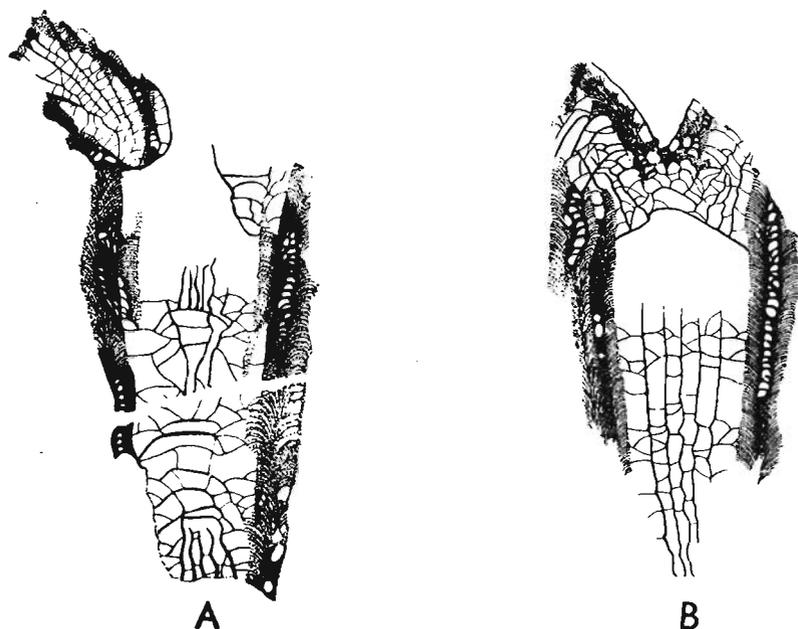


Fig. 27. — *Thamnophyllum skalense* n. sp., holotype. Skaly beds No. 5. A longitudinal section of corallite with peripheral buds,  $\times 4.4$ ; B longitudinal section with 2 parricidal buds;  $\times 5$ .

Table 4

Correlation between the number of septa and the diameter of calyx in *Thamnophyllum skalense* n. sp.

Number of major septa	Diameter of calyx (in mm)								Number of specimens ↓
	2	3	4	5	6	7	8		
10; 11	1								1
12; 13	1	1							2
14; 15		4	3						7
16; 17			3	1					4
18; 19			4	4	3				11
20; 21			1	16	4				21
22; 23				2	6	3	3		14
24; 25						3	2		5
26; 27							4		4
Total :	2	5	11	23	13	6	9		69

*Ontogeny* (fig. 28A). — After attachment and while building up its skeleton the larva produced a talon consisting of elongated septa and transverse dissepiments. The talon is placed on the side of the cardinal septum. The youngest corallite is 1.5 mm in diameter (without talon) and with 8 septa inside the calyx. In the next stage bilateral symmetry is very conspicuous (fig. 29). The corallite is then 2.5 mm in diameter (without talon) and has 12 longer septa. On the side of the cardinal septum the talon is very wide. Bilateral symmetry is made conspicuous in the first place by the pinnate arrangement of septa within the talon. The cardinal and counter septa are not differentiated by any particular length. Pinnately arranged younger septa appear below the alar septa.

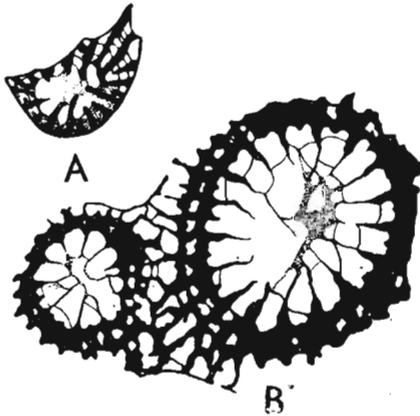


Fig. 28. — *Thamnophyllum skalense* n. sp. Skaly beds No. 5. A transverse section in immature stage with talon  $\times 6.7$ ; B transverse section of parent calyx with bud;  $\times 6.6$ .



Fig. 29. — *Thamnophyllum skalense* n. sp. Skaly beds No. 5. Transverse section of stage somewhat later than in fig. 28A, with talon; 1 cardinal septum;  $\times 10$ .

Increase is of twofold type. The parricidal is more common, but peripheral increase also occurs. The increase is parricidal when two buds are laid down in the calyx of the parent corallite, separated by a transparent epitheca. On the inner side the buds are connected (fig. 27B) by dissepimental tissue. This tissue appears in association with young buds only and has, therefore, by E. D. Soshkina (1953) been called „cenogenetic tissue”.

*Individual variability* is very strong and is made particularly conspicuous by the shape of the corallite, its internal morphology and mode of increase. The shape is markedly differentiated. Individuals in the shape of a wide, low cone will be found together with erect cylindrical forms. Internal morphology is subject to individual variations: tabulae may be either complete, flat or convex and incomplete, the horse-shoe dissepimental

ments may either be larger and thin-walled or minute and thick-walled. The pseudotheca is then either continuous or porous. Mode of increase varies greatly as has been specified above. The following are the constant diagnostic features of this species: diameter usually about 5 mm, with 20-21 major septa, markedly straight, spindle-like septa not extending to the axis. Tabulae are always convex, with supplementary plates, and incomplete.

*Affinities and differences.* — By its constant characters *Th. skalense* comes nearest *Th. trigemme*, from which it differs in only 2 buds being always produced by parricidal increase instead of from 3 to 5; in the strong spindle-like dilation of the septa within the pseudotheca, resulting in lateral contiguity, in the average number of septa in correlation with the diameter, in globose, thick-walled horse-shoe dissepiments; in tabulae which are frequently covered by a thick deposit of stereome and show supplementary axial plates. *Th. skalense* differs from its allied species *Th. caespitosum* by parricidal increase and consolidated pseudotheca.

*Occurrence.* — As far as the writer is able to ascertain, this species occurs in *Calceola* limestone (beds No. 5).

### *Thamnophyllum caespitosum* (Goldfuss)

(fig. 30-32)

1881. *Fascicularia caespitosa* Goldf.; C. Schlüter. Über einige Anthozoen... p. 103, pl. 9, fig. 6, 7.
1896. *Fascicularia caespitosa* var. *striata* Gürich; G. Gürich, Das Paläozoicum..., p. 168, 169.
1935. *Disphyllum (Phacelophyllum) caespitosum* Goldf.; W. D. Lang & S. Smith, *Cyathophyllum*... p. 573, fig. 28, 29.
1949. *Phacelophyllum caespitosum* Goldf., E. C. Stumm, Revision..., pl. 17, fig. 11-13
1949. *Macgeea (Thamnophyllum) caespitosum* Goldf.; A. v. Schouppé. Die Thamnophyllen..., p. 138-152, fig. 3, 40-43.
1950. *Disphyllum (Phacelophyllum) caespitosum* Goldf.; P. W. Taylor. The Plymouth Limestone, p. 186. pl. 3, fig. 3a, b.

*Material.* — This species is rather uncommon, it is characteristic of marly limestones. 15 specimens have been collected from beds No. 8, of which 13 microscopic thin sections have been prepared, 2 specimens are from beds No. 12, 1 — from Kamieniec. The marly limestones from beds No. 8 are rusty, zoogenic or rather phytogenic, packed with calcareous algae arranged in chain-like rows.

*Diagnosis.* — Branchy colonies with lateral increase; the corallites average about 6 mm in diameter and have about 20 major septa, thin, not extending to the axis; tabulae incomplete, flat; in immature stage there is a talon.

*Macroscopic description.* — The specimens are embedded in limestone; their shape is distinguished on polished surfaces and in thin sections. It is feebly branched; with two lateral buds laid down nearly at right angle in relation to the parent specimen.

The following inter-relation between number of septa and diameter of calyx may be asserted from transverse thin sections:

Diameter of calyx (in mm)	Number of major septa
3	14
5	17; 18
6	20; 21
8	22

In *transverse section* (fig. 30) the calyx is circular. The corallite is involved in a thin epitheca. Conspicuous pseudotheca is formed of two concentric rings. The horse-shoe dissepiments have the appearance of

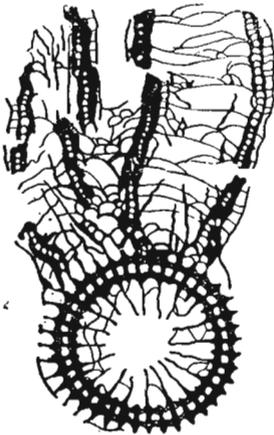


Fig. 30. — *Thamnophyllum caespitosum* (Goldfuss). Skaly beds No. 8. Transverse section of parent corallite showing two lateral buds in longitudinal section;  $\times 4$ .



Fig. 31. — *Thamnophyllum caespitosum* (Goldfuss). Skaly beds No. 8. Longitudinal section of corallite;  $\times 5.3$ .

large rectangles. Septa within the pseudotheca somewhat dilated. Minor septa hardly extend beyond the inner wall of pseudotheca. Major septa attenuate and occasionally sinuous within the tabularium, they do not reach the axis leaving free an area, 1.5 mm in diameter.

*Longitudinal section* (fig. 31) shows a row of flat, widely spaced dissepiments, contiguous with the epitheca. Horse-shoe dissepiments globose,

tall, with large lumen and thickened walls. Tabulae incomplete, axially convex, their periaxial parts widely spaced, large and vesiculate.

Increase is lateral (fig. 30, 32). From 2 to 3 buds are attached to the parent calyx at an angle of  $90^{\circ}$  and are formed directly on the pseudotheca. One epitheca involves both the parent calyx and the bud. A few vesicles belonging to the dissepiments of the cenogenetic tissue are noticed between the septa of the parent specimen and the bud. Flat dissepiments and thick-walled horse-shoe dissepiments are formed under the epitheca of the bud, almost in the earliest stage.

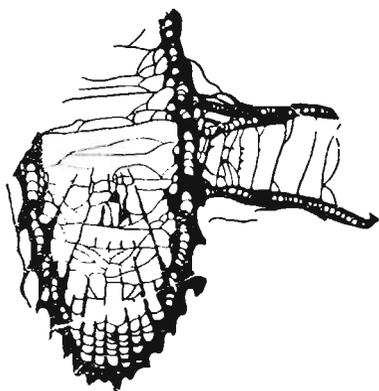


Fig. 32. — *Thamnophyllum caespitosum* (Goldfuss). Skaly beds No. 8. Longitudinal section of corallite with lateral bud;  $\times 3.7$ .

*Affinities and differences.* — Our specimens agree well with the description given by W. D. Lang and S. Smith (1935). They, however, differ considerably from the corallites described by W. Dybowski (1873) as *Fascicularia kunthi* Dames from Mokrszów (Oberkuzendorf), which A. Schouppé (1949) regards as a variety, namely *Macgeea* (*Thamnophyllum*) *caespitosa* (Goldfuss) var. *minus* (Roemer). The Upper Frasnian Sudeten specimens are slight (4 mm) and of irregular shape, owing to frequent lateral increase and lateral processes connecting the adjacent corallites. The septa are spirally curved in the axis of the calyx. The tabulae are usually concave, as has been well figured by W. Dybowski (1873).

*Occurrence.* — A. Goldfuss has described this species from the Middle Devonian of Bensberg (Eifel Mts.).

### *Thamnophyllum trigemme* (Quenstedt)

(fig. 33, 34; table 5)

1894. *Thamnophyllum trigeminum* (Quenst.); K. A. Penecke, Das Grazer Devon. p. 596, pl. 8, fig. 4-6.
1935. *Disphyllum* (*Phac.*) *trigemme* (Quenst.); W. D. Lang & S. Smith, Cyathophyllum.... p. 4, fig. 30, 31.

1949. *Macgeea* (*Thamnoph.*) *hörnesi* (Pen.) var. *trigemme* (Quenst.); A. v. Schouppé, Die „Thamnophyllen“..., p. 131-135, fig. 5, 6, 8, 9, 17a, 29.
1949. *Thamnophyllum trigemme* (Quenst.); E. D. Soshkina, Devonskie korally... p. 78, 79, pl. 32, fig. 1-3.
1952. *Thamnophyllum trigemme* (Quenst.); E. D. Soshkina, Opredeitel..., p. 85, pl. 18, fig. 70.
1953. *Thamnophyllum trigemme* (Quenst.); E. D. Soshkina, Cenogeneticeskie..., p. 85, fig. 7.

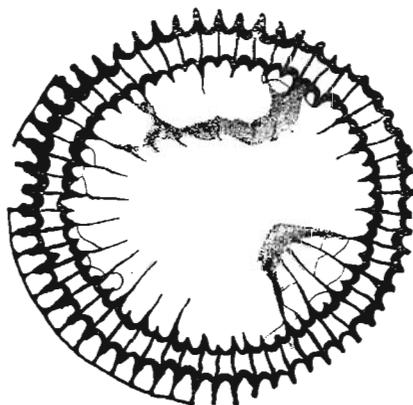
*Material.* — A species very common in the Givetian from Skaly. Numbers of specimens collected by the writer in the several strata are as follows:

14 specimens from beds	6
28	8
15	10
72	12

They are mostly simple fragmentary corallites, 16 of them being budding specimens. Seven transverse and longitudinal thin sections have been prepared.

*Diagnosis.* — Cylindrical corallites with parricidal increase, averaging about 7 mm in diameter and having about 23 thin major septa. Tabulae incomplete, flat or convex axially, convex and inclined periaxially. Large, globose horse-shoe dissepiments. There is a talon during the early ontogeny.

Fig. 33. — *Thamnophyllum trigemme* (Quenstedt). Skaly beds No. 12. Transverse section in epehebic stage;  $\times 5$ .



*Macroscopic description.* — Specimens of this species are branchy in shape. Parricidal buds, usually 3-5 in number are laid down in the parent calyx, rapidly extending over the entire diameter and bending horizontally from the calyx. Within the parent calyx the buds are united by intraepithecal tissue, „cenogenetic” after E. D. Soshkina (1953). Epithecal

rings with delicate concentric striation are noted on the surface; "costae" occur when the epitheca is damaged. Margin of calyx always damaged.

*Description of sections* (fig. 33). — Circular calices are shown in transverse section. As has been specified in the attached table 5, the most frequent diameter is that 6 to 8 mm; while the corresponding number of septa is 40 to 50. The calyx is involved in a thin epitheca. Even within the pseudotheca the septa are thin, the longer septa descend somewhat into the calyx, over two thirds or three fourths of the radial length. Shorter septa extend slightly beyond the inner wall of the horse-shoe dissepiments. In transverse section the horse-shoe dissepiments appear as large rectangles since their walls are but feebly dilated.

Longitudinal section (fig. 34A) shows incomplete tabulae; they are complete very rarely only. The axial part is wide, convex or flat, the periaxial part being convex, usually wide. The epitheca has been preserved less often, disclosing a row of horizontal, wide-spaced flat dissepiments. Horse-shoe dissepiments thin-walled, globose.

Table 5

Correlation between the number of septa and the diameter of calyx in *Thamnophyllum trigemme* (Quenstedt)

Diameter of calyx (in mm)									Number of specimens ↓
	3	4	5	6	7	8	9	10	
16; 17	1	1	1						3
18; 19		2	2	1					5
20; 21			4	9	6				19
22; 23			2	13	15	3			33
24; 25					10	11	3		24
26; 27					5	7	3		15
28; 29							3	5	8
Total:	1	3	9	23	36	21	9	5	107

*Ontogeny.* — The proximal end, conically pointed, is preserved in one specimen only, where it is provided with a talon encircling the minute skeleton of some tabulate coral.

Increase is parvicidal (fig. 34B). From 3 to 5 buds are produced by a calyx, 7-10 mm in diameter. The buds are laid down near the last tabula in the calyx. They envelop themselves with a thin epitheca and first produce complete convex tabulae. Horse-shoe dissepiments are sometimes produced early, but in one case not before the length of 7 mm is

attained. The buds are united by means of the intraepithelial tissue which persists in the parent calyx only.

*Individual variability* is strong. It is demonstrated in the differentiated shape of the corallite which may be straight or curved; some specimens show constrictions and attain maturity with diameter not more

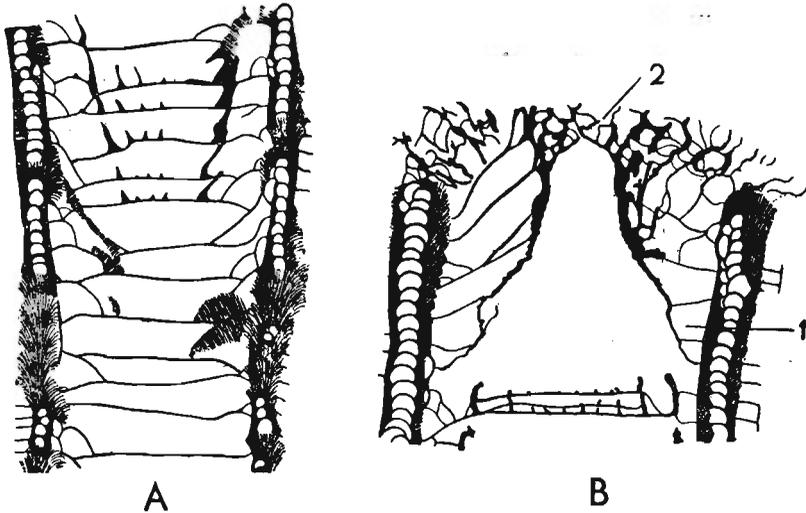


Fig. 34. — *Thamnophyllum trigemme* (Quenstedt). Skaly beds No. 12. A longitudinal section of specimen in fig. 33,  $\times 5$ ; B longitudinal section with two parricidal buds,  $\times 5$ ; 1 parricidal bud, 2 ceno-genetic tissue.

than 7 mm, while others not before the diameter is 10 mm. There are from 3 to 5 buds, but sometimes one only. In transverse section some septa are extremely thin, almost in an even line, while others are dilated in a distinctly spindle-like shape. The horse-shoe dissepiments always occur as large quadrangles, they may be tall, ovate or wider, sub-globose. The tabulae may be crowded or widely spaced, if so, complete.

*Affinities and differences.* — Both in structure of calyx and of tabularium the above described species comes closest to *Thamnophyllum caespitosum*. It differs in the mode of increase foremost, since in *Th. caespitosum* this is always lateral, while in *Th. trigemme* it is parricidal. Moreover, in *Th. caespitosum* the diameter is small, never exceeding 8 mm with 44 septa. It is most common for this form, however, to have 20 major septa and a diameter of 6 mm, whereas in *Th. trigemme*, calices with 7 mm in diameter and with 22-23 major septa, predominate, as is specified in the accompanying table 5. A. Schouppé (1949) has also asserted the close resemblance of these two species, quoting *Th. trigemme*, however, as a variation of *Th. hoernesii*. An extensive lapse of time divides

these forms as *Th. hoernesii* belongs to the „barrandei level”, after W. D. Lang and S. Smith (1935), while *Th. trigemme* is of Middle Givetian age. Moreover, these two species differ in the structure of tabulae, which are concave and always complete in *Th. hoernesii*, while in *Th. trigemme* they are convex and incomplete. *Th. hoernesii* is with a larger diameter of calyx — from 15 to 20 mm — with horse-shoe dissepiments strongly narrowed owing to stereome cover.

*Occurrence.* — In Poland this species is recorded from the Middle Givetian of Skały, in beds No. 6, 8, 10, 12, also from Miłoszów. In palaeontological works it is quoted from the Middle and Upper Givetian and Lower Frasnian of the Eifel Mts., Austria, Great Britain and U. S. S. R. (the Russian Platform and the Ural).

*Thamnophyllum trigemme pajchelae* n. subsp.

(fig. 35, 36; table 6)

Holotype: fig 35A, B.

*Material.* — 141 damaged specimens, recovered from marly shales of Skały (beds No. 11). Of these about one third are budding specimens. 18 transverse and longitudinal thin sections have been prepared. Two thin sections show the presence of a talon.

*Diagnosis.* — Corallites slender and cylindrical, most commonly with a diameter of 4 mm, usually with 16-17 major septa, producing three to five parricidal buds. In the immature stage they display a talon and bilateral symmetry. The tabulae are flat and complete. Horse-shoe dissepiments thick-walled. Within the pseudotheca the septa are strongly dilated to a spindle-like shape. In major septa the axial parts are thin and straight, almost reaching the axis; minor septa slightly extend beyond the inner wall of the horse-shoe dissepiments. The epitheca is frequently preserved.

*Macroscopic description* (fig. 36). — Slender dendritic colonies producing from two to five buds. These soon bend upward. The buds are united and covered by an epitheca with delicate concentric striation. The calicular margin is rounded, the septa low, nearly even at the border of pseudotheca. The epitheca terminates 1 mm below the calicular margin and is often in a satisfactory state of preservation. The surface of the corallite is then pretty smooth. All the specimens are damaged, it is hence hard to ascertain at what level the budding occurs. The buds are produced even with diameter of only 3 mm, most commonly however when diameter reaches 4 and 4.5 mm. The calyx is deep with vertical walls and flat floor.

*Description of sections.* — The transverse section (fig. 35A) shows off well the circular calyx with a thin epitheca. The peripheral septal edges,

which extend beyond the pseudotheca, are thin; within the pseudotheca the septa are so strongly dilated to a spindle-like shape as to be sometimes laterally contiguous. The axial septal edges are thin. Within the pseudotheca septa of both orders are of the same thickness, though the minor septa scarcely extend beyond the inner ring of the pseudotheca. The horse-shoe dissepiments are thick-walled so that in transverse section their lumen is markedly small.

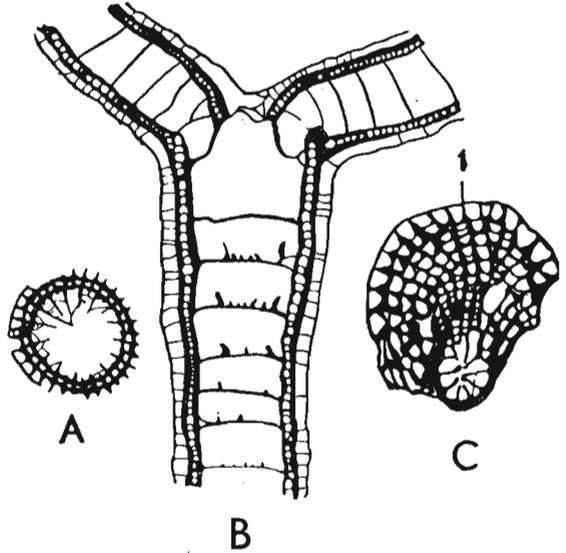


Fig. 35. — *Thamnophyllum trigemme pajchetae* n. subsp. Skaly beds. No. 11. A transverse section in ephobic stage,  $\times 4,5$ ; B longitudinal section of same specimen with two parricidal buds,  $\times 5,3$ ; C transverse section of immature stage with talon,  $\times 5,3$ ; 1 cardinal septum.

Longitudinal section (fig. 35B) shows well preserved epitheca, thin horizontal or slightly concave dissepiments and a contiguous row of horse-shoe dissepiments with thick walls. The tabulae are flat, straight, complete, arranged as steps of a ladder; they may be with supplementary lateral oblique plates. The complete tabulae are here a characteristic feature of both immature and adult specimens.

*Microstructure.* — In septa the centres of calcification within the pseudotheca are crowded with long fibres, laterally bent to the sides. Within each of the two rings the septa are swollen owing to a layer of stereome and together with the strongly dilated horse-shoe dissepiment wall they form the outer and inner rings of the pseudotheca. Owing to fossilization the shape of septa is clearly indicated. In longitudinal section the horse-shoe dissepiments are with a thick lateral layer of stereome, their upper wall being less swollen. The fans are small. The sclerodermites, disposed in bundles, have a pinnate upward arrangement.

*Ontogeny* (fig. 35C). — The youngest stages investigated by the writer are those of the „skalense” type. The calyx, with a diameter of 1.5 mm and 12 septa, follows distinctly bilateral symmetry. This is clearly indi-



Fig. 36. — *Thamnophyllum trigemme pajchelae* n. subsp. Skały beds No. 11. Corallite with 5 parricidal buds masked by an epitheca;  $\times 2.5$ .

cated by the talon being with prolonged septa pinnately disposed in relation to the cardinal septum. Thus, the cardinal septum seems to be set in a groove formed by the laterally bending metasepta. Neither the cardinal nor the counter septa are differentiated in length. With diameter of 2.5 mm and 24 septa there is distinct radial symmetry, the talon not having persisted. The increase is exclusively par-ricidal. From 2 to 5 buds are laid down within the calyx, just above the last tabula (fig. 35B). They are connected in the calyx by cenoge-netic tissue, externally covered by the epitheca (fig. 36).

*Individual variability.* Specimens of this species ordinarily display rather uniform struc-ture. Slender, stem-like and unusually fine shaped, they differ in the number of buds only. Internal morphology dif-fers in different thickness of septa and of horse-shoe dissepiments. The tabulae are more or less widely spaced, the supplementary tabulae vary.

*Affinities and differences.* — The above species shows great similar-ities with *Th. trigemme* in their parricidal mode of increase. The differen-ces lie in the growth of *Th. trigemme pajchelae* having suffered some check and in the simplification of its internal structure. *Th. trigemme pajchelae* is mostly with a diameter of 4 mm and with 16-17 major septa.

T a b l e 6  
Correlation between the number of septa and the diameter of calyx in *Thamnophyllum trigemme pajchelae* n. subsp.

Number of major septa	Diameter of calyx (in mm)	2	3	4	5	6	7	Number of specimens
		10; 11						
12; 13		1	5					6
14; 15			14	6				20
16; 17			3	23	2			28
18; 19				1	2			3
20; 21				1	4			5
22; 23					2	5	3	10
24; 25							1	1
Total:		1	22	31	10	5	4	73

*Th. trigemme* is mostly 7 mm in diameter and has 22-23 major septa. Additional differences consist in the constant occurrence of complete tabulae in *Th. trigemme pajchelae*, in strong dilation of pseudotheca and in frequent parricidal increase.

E. D. Soshkina (1954) described from the Semikukskie beds of the Russian Platform *Th. petinense* Sosh. with a similarly small diameter of from 4 to 5 mm, few septa (28-32) and complete tabulae. In the Russian species, however, the increase is lateral. In *Th. virgatum* Soshkina (1952), from the Frasnian of the Ural and Timan, corallites have been recorded of cylindrical shape, similarly slender, with diameter of 4-4.5 mm and 36-40 septa, but their mode of increase is lateral, while the major septa are spirally curved to one side.

*Occurrence.* — This species is recorded only from strongly arenaceous marls in beds No. 11.

Genus *Pachyphyllum* Edwards & Haime, 1850

*Pachyphyllum sobolewi* n. sp.

(fig. 37-39)

1904. *Phillipsastraea hennani* Lonsd.; D. Sobolew, *Devonskijja* ... p. 38. 39. pl. 5. fig. 1, 2, 2a, 3, 3a,

Holotype: fig. 37-39.

*Material.* — Fragments of colonies from the Kamieniec reef (the longest fragment 60 cm in length), 3 specimens. 9 specimens from Pokrzywianka Górna (beds No. 15). 17 transverse and longitudinal thin sections have been prepared.

*Diagnosis.* — Colonies plocoid; greatest diameter of corallites  $12 \times 18$  mm, with 42 slender septa of almost uniform thickness; major septa not reaching the axis, minor septa somewhat shorter. Spindle-like dilations inconspicuous, peripheral ends sinuous, quite minute, widely spaced carinae. Convex incomplete tabulae. Wide thin-walled horse-shoe dissepiments. Trabecular fans resting on a row of horse-shoe dissepiments and consisting of minute and closely packed trabeculae. Extremely thin-walled dissepiments. Intercalicular increase.

*Macroscopic description.* — The transverse section in fig. 37 shows large irregularly shaped calices with numerous septa.

Over the entire length the septa are thin, with barely distinguishable dilation within the pseudotheca, which is formed of rather closely spaced dissepimental rings. Both major and minor septa are uniformly thin, the minor being only very little shorter than the major and with axial edges

Average diameter (in mm)	Number of major septa	Diameter of central space (in mm)
6	13	1
7	15; 16	1
9	15	1.2
11	19; 20	1.5
12	19	1.5
13	18; 19; 20	1.5
14	19; 21	1.5
15	19; 20; 21	1.5
16	20; 21; 23	1.5
17	21; 22	1.5

slightly extending beyond the rings of the horse-shoe dissepiments. Axial edges of major septa do not reach the axis, leaving a central, exposed area, 1-1.5 mm in diameter. The septa are straight or delicately zigzag.

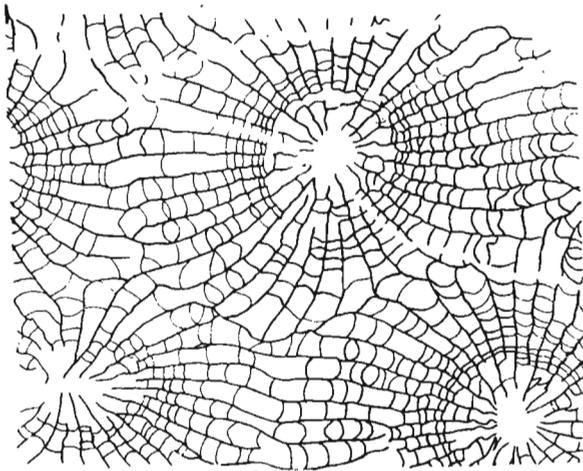


Fig. 37 — *Pachyphyllum sobolewi* n. sp., holotype. Skały. Pokrzywianka beds. Transverse section of plocoid colony;  $\times 3$ .

showing minutely carinate curves; their peripheral edges are frequently somewhat curved. There is no wall between the calices. The septa either have the ends free or curved and contiguous with the septa of the adjacent calices; some elongate passing without interruption into the septa of the adjacent calyx.

*Longitudinal section* (fig. 38). The tabularium is 4 mm in diameter; the tabulae are convex, often incomplete, with supplementary plates. The periaxial parts are tall, vesiculate. The horse-shoe dissepiments flat, wide,

cap-like; the larger ones containing the smaller. The dissepimental tissue descends from them steeply, outward.

*Microstructure* (fig. 38). — The septa are built up of quite minute trabeculae so closely packed together that the fibres have an almost

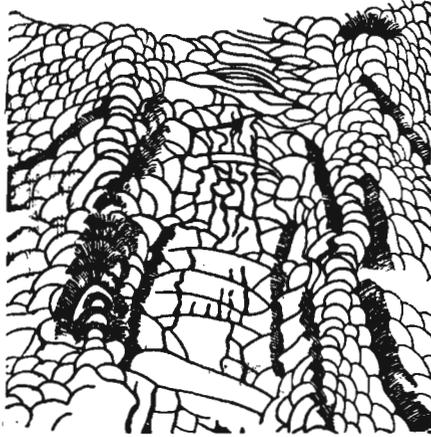


Fig. 38. — *Pachyphyllum sobolewi* n. sp. Longitudinal section of one individual from the same colony as in fig. 37.  $\times 5.3$ .

parallel course, particularly so in the somewhat dilated septal part. The zigzag curvings of the septa due to trabeculae pushed out of the trabecular line in the transverse section of septa. The carinae are widely spaced and very minute, they occur in the zigzag curves. In longitudinal section the trabecular fans are shown to be wide, the line of divergence being on the horse-shoe dissepiment. The trabeculae are straight, very thin and extremely crowded. Thin-walled horse-shoe dissepiments are to be seen through the misty fans.

*Increase*. — Thin section of fig. 39 shows two young intercalicinal buds, sometimes apparently quite non-contiguous with the calices. The peripheral edges of the young septa are free, they develop between the septa of the adjacent mature calices. The axial edges of the young septa are short leaving exposed a proportionately large space, as much as one fifth part of the calicular diameter. The young septa are uniformly thin over nearly the entire length, curving in a zigzag manner.

*Individual variability* is not conspicuous. All the calices are of irregular shape, usually lacking the outer wall, sometimes, however, their septa unite to form a pseudotheca. All the septa are uniformly thin and curved. The carinae are only occasionally somewhat more closely spaced.

The tabulae vary, being complete or incomplete, but always gently convex.

*Affinities and differences.* — This species, as far as the writer's knowledge goes, is the only form recorded from the Givetian. Frasnian forms are all different, being more massive.

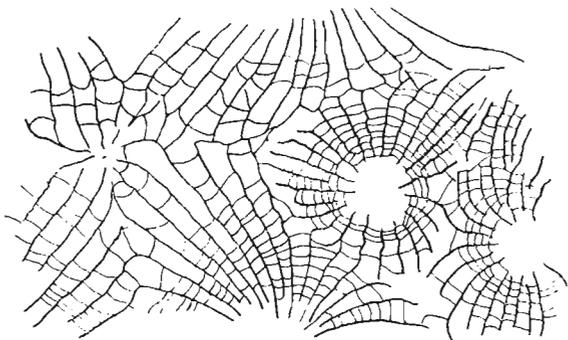


Fig. 39. — *Pachyphyllum sobolewi* n. sp. Transverse section of colony with two intercalical buds from the same colony as in fig. 38;  $\times 5$ .

*Remarks.* — Though genus *Pachyphyllum* has not, thus far, been recorded from the Middle Givetian, the writer assigns the here described specimens to genus *Pachyphyllum* on the presence of horse-shoe dissepiments and symmetrical trabecular fans. D. Sobolew (1904) described this species under the name of *Phillipsastraea hennani* Lonsdale. Dr. S. Smith, to whom a specimen was sent by the writer in 1954, for the purpose of comparison with the holotype, has ascertained that our specimens are different from *Phillipsastraea hennani* Lonsdale and that they are a new species.

*Occurrence.* — So far, specimens of this species have only been collected from the reef facies of the „Pokrzywianka beds” of Skały (Kamieniec) and of Pokrzywianka Dolna. Its faunal association, namely: *Heliolites* sp., *Schizophyllum acanthicum*, *Sparganophyllum* sp., *Litophyllum* sp. and *Nardophyllum* sp. confirm the age of the reef as being Middle Givetian.

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Poznań, June 1956

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MARIA RÓZKOWSKA

PACHYPHYLLINAE ZE ŚRODKOWEGO DEWONU GÓR ŚWIĘTOKRZYSKICH

Część I

Streszczenie

WSTĘP

Praca niniejsza jest częściowym wynikiem zespołowych badań nad fauną dewonu w profilu Grzegorzowice-Skały-Włochy w Górach Świętokrzyskich. Moim zadaniem jest opracowanie koralowców czteropromiennych, najpierw z podrodziny Pachyphyllinae. W 1953 r. ukazała się część moich badań, obejmująca Pachyphyllinae z górnego dewonu obszaru Kieleckiego. W niniejszej pracy opisane są formy środkowo-dewońskie. Fauna pochodząca z żywetu zebrana została w latach 1946 oraz

1953-54 w Skałach. Materiały eifelskie wyeksploatowano w Grzegorzowicach i Wydryszowie w latach 1953 i 1955 w związku z pracami prowadzonymi przez mgr M. Pajchlową.

Niniejsza praca zawiera, obok charakterystyki litologicznej i faunistycznej zbadanych utworów (fig. 1 i zestawienie na str. 278 tekstu angielskiego), przede wszystkim opis gatunków, podgatunków i mutacji podrodziny Pachyphyllinae. Zagadnienia ogólne, jak zmienność form, filogeneza, paleogeografia, paleoekologia itd., zostaną przedstawione w części II tej pracy.

Część systematyczna obejmuje opis 12 gatunków i podgatunków z podrodziny Pachyphyllinae. Oprócz 3 znanych gatunków: *Macgeea bathycalyx bathycalyx* (Frech), *Thamnophyllum caespitosum* (Goldfuss) i *Th. trigemme* (Quenstedt), pozostałe uważam jako nowe.

Niżej podaję diagnozy opisanych form, pełne ich opisy natomiast podane są w tekście angielskim.

## OPIS FAUNY

### *Protomacgeea* n. gen.

(genotyp *Protomacgeea dobruchnensis* n. sp., fig. 2-4)

*Diagnoza.* — Drobne korality osobnicze w kształcie wydłużonego stożka, całkowicie osłonięte epiteką. Głęboki kielich zajmuje więcej niż połowę wysokości koralita. Septa I rzędu przeważnie silnie poszerzone stereomą<sup>1</sup>, nieciągłe (części peryferyczne oddzielone od osiowych stożkiem zwartej sklerenchymy<sup>2</sup>), wypełniające prawie całe światło koralita w części proksymalnej, zaś krótkie w dystalnej. Septum główne zredukowane prawie całkowicie, na jego miejscu fossula. Septum przeciwległe długie. Septa II rzędu nie wychodzące poza strefę płaskich dissepimentów. Tabule kompletne i niekompletne, poziome lub wklęsłe, silnie zgrubiałe. Istnieje pedicillum. W ontogenezie przejawia się przewaga septum przeciwległego, a redukcja septum głównego. Mikrostruktura septów trabekularna, układ guzków trabekularnych na bokach septów wachlarzowaty.

### *Protomacgeea dobruchnensis* n. sp.

(holotyp fig. 2-4)

*Diagnoza.* — Drobne korality osobnicze, stożkowate, całkowicie pokryte epiteką i opatrzone pedicillum. Najczęstsza długość 15 mm, średnica 4-5 mm, liczba septów I i II rzędu 32-42. Największa liczba septów — 58 przy średnicy 9 mm. Między epiteką i stereozoną rząd płaskich dissepimentów. Dwie kategorie septów: 1) Septa

<sup>1</sup> „*Stereoma* to warstwa wapiennej substancji różnej grubości nałożona wtórnie na septa oraz podobne struktury“ (R. R. Shrock & W. H. Twinnofel, 1953, p. 139).

<sup>2</sup> „*Sklerenchyma* — wapienna tkanka koralii“ (S. Smith, 1945).

I rzędu długie, przy czym septum główne zredukowane, na jego zaś miejscu fossula. Septum przeciwległe najdłuższe. Brak ciągłości septów w obrębie stereozony<sup>3</sup>. 2) Septa II rzędu krótkie, ograniczone do strefy płaskich dissepimentów. Tabule czasami niekompletne, wklęsłe lub poziome. Struktura septów trabekularna. Guzki trabekularne ułożone wachlarzowo. Silny nadkład stereomy na septach, dissepimentach i tabulach. Podkówki niewidoczne.

*Macgeea bathycalyx bathycalyx* (Frech)

(fig. 9, 10)

Nie miałam, niestety, dostępu do oryginalnego materiału F. Frecha. W żywocie Skał występują jednakże formy zbliżone, które uważam za podgatunki i mutacje tego gatunku. Wybrałam jeden okaz, podobny najbardziej do gatunku Frecha. Ma on pokrój stożkowaty. W przekroju poprzecznym koralita w części proksymalnej przy średnicy 6 mm są 23 septa<sup>4</sup>. Septum główne jest krótkie, septa sąsiednie są prawie równoległe ustawione. Septum przeciwległe jest nieco dłuższe, niż septa sąsiednich kwadrantów. Septa I rzędu są długie, o końcach osiowych maczugowato poszerzonych. W przekroju podłużnym, długości 12 mm, widać szeroką strefę płaskich dissepimentów, podkówki o zgrubiałych ścianach oraz normalne dissepimenta obok niekompletnych, lekko wypukłych tabul.

Gatunek ten wykazuje wielką zmienność. Cechy stałe, które łączą liczne tutaj wyróżnione podgatunki, są następujące: 1) skrócone septum główne, obok niego fossula; 2) septum przeciwległe, dłuższe od sąsiednich, wyrównujące się dopiero w kielichu; 3) tabule niekompletne, mniej lub więcej wypukłe, miejscami z dodatkowymi płytkami.

*Macgeea bathycalyx kasimiri* n. subsp.

(holotyp fig. 12, 13)

*Diagnoza.* — Korality niskie, kształtu szybko poszerzającego się zgietego stożka. rzadko opatrzone talonem; powierzchnia pokryta koncentrycznie prążkowaną epiteką, kończąca się około 3 mm poniżej brzegu kielicha. Największy okaz, długości 28 mm i średnicy 14 mm, z 33 septami, z kielichem głębokości 12 mm. Kielich głęboki, stromy, zajmujący w krańcowym przypadku 3/4 długości koralita. Septa opatrzone listewkami, dłuższe dochodzące do osi kielicha, przy czym główne septum nieco krótsze, w fossuli, przeciwległe zaś dłuższe od sąsiednich. Szerokie, płaskie dissepimenta; drobne, grubościennie podkówki. Tabule niekompletne, pęcherzykowate, z grubym nadkładem stereomy. Koniec proksymalny całkowicie wypełniony sklerenchymą. W całej ontogenezie zachowuje się symetria bilateralna.

<sup>3</sup> *Stereozona*, w ujęciu D. Hill (1935), to strefa elementów strukturalnych silnie poszerzonych przez nadkład stereomy. U rodzaju *Protomacgeea* stereozoną objęty jest okółek dissepimentów-podkówek.

<sup>4</sup> Ilości septów, podawane w dalszych diagnozach, dotyczą septów I rzędu.

*Macgeea bathycalyx josephi* n. subsp.

(holotyp fig. 16, 17)

*Diagnoza.* — Korality o pokroju zgiętego, wydłużonego stożka, czasem opatrzone talonem. Wyraźna symetria bilateralna w całej ontogenezie. Septum główne krótsze, w fossuli, przeciwległe zaś dłuższe. Listewki i guzki wydadne. Tabule niekompletne. Części przyosiowe pęcherzykowate, części osiowe wypukłe, często z dodatkowymi płytkami. Przy wysokości koralita 12 mm i średnicy 9 mm septów jest 29.

*Macgeea bathycalyx regularis* n. subsp.

(holotyp fig. 19, 20)

*Diagnoza.* — Koralit o nader regularnej budowie. Kielich w przekroju kolisty, przy średnicy 12 mm z 32 septami prostymi, wrzecionowato poszerzonymi w obrębie pseudoteki. Listewki bardzo liczne. Gruby nadkład stereomy na podkówkach i normalnych dissepimentach. Tabule niekompletne, ich części osiowe wypukłe i zebrane w wiązki.

*Macgeea bathycalyx longiseptata* n. subsp.

(holotyp fig. 21, 22)

*Diagnoza.* — Koralit subcylicylniczny, w przekroju poprzecznym okrągły, z 32 septami przy średnicy 12 mm. Septa I rzędu długie; septa II rzędu o połowę krótsze. Septum główne nieco skrócone. Na septach listewki. Tabule pęcherzykowate, w części osiowej zebrane w wiązki.

*Macgeea bathycalyx amabilis* n. mut.

(holotyp fig. 23-25)

*Diagnoza.* — Korality wydłużone, lekko zgięte, rzadziej szeroko stożkowate, przeważnie posiadające talon. Epiteka kończąca się o 2 mm poniżej brzegu koralita. Na septach listewki. Kielich głęboki. Wydadna bilateralna symetria, zwłaszcza we wczesnej ontogenezie. Tabule wypukłe, niekompletne, zebrane w wiązki. Okaz największy długości 44 mm, z 44 septami przy średnicy 16 mm.

*Thamnophyllum skalense* n. sp.

(holotyp fig. 26, 27A)

*Diagnoza.* — Korality drobne, subcylicylniczne, pączkujące parycydalnie i peryferycznie, do 20 mm długości i 8 mm największej średnicy, z 27 septami. Septa proste, poszerzone, tworzące na peryferii wraz z grubościennymi podkówkami prawie związałą pseudotekę. Końce osiowe septów przewężone, zostawiające około 1 mm wolnej przestrzeni. Tabule niekompletne, wypukłe, z dodatkowymi płytkami.

*Thamnophyllum caespitosum* (Goldfuss)

*Diagnoza.* — Kolonie gałęziste, pączkujące lateralnie; przy średnicy 6-8 mm jest 20-22 septów nie dochodzących do osi. Tabule niekompletne, w młodości talon,

*Thamnophyllum trigemme* (Quenstedt)

*Diagnoza.* — Korality cylindryczne, pączkujące paracydalnie. mające przy średnicy 7-9 mm 20-29 cienkich septów. Epiteka cienka. Tabule niekompletne, płaskie lub wypukłe w części osiowej, wypukłe i ukośne w części przyosiowej. Podkówki kuliste, duże. We wczesnej ontogenezie talon.

*Thamnophyllum trigemme pajchelae* n. subsp.

(holotyp fig. 35A, B)

*Diagnoza.* — Korality cylindryczne, cienkie, najczęściej średnicy 3-4 mm. wtedy przeważnie mające 16-17 septów, wytwarzających 3 do 5 pączków paracydalnych. W młodości istnieje talon i symetria jest bilateralna. Tabule proste, kompletne. Podkówki owalne, grubościennie. Septa w obrębie pseudoteki silnie wrzecionowato poszerzone. Septa I rzędu mają osiowe części cienkie, proste, podchodzące prawie do osi. Septa II rzędu wychodzą nieznacznie poza wewnętrzną ścianę podkówek. Epiteka często zachowana.

*Pachyphyllum sobolewi* n. sp.

(holotyp fig. 37-39)

*Diagnoza.* — Kolonie plokoidalne, korality o największej średnicy 12×18 mm. z 22 cienkimi septami prawie równej grubości. Septa I rzędu nie dosięgają środka; septa II rzędu są nieco krótsze. Wrzecionowate zgrubienia nieznaczne, końce peryferyczne powyginane, listewki bardzo drobne, rzadkie. Tabule wypukłe, niekompletne. Podkówki szerokie, cienkościennie. Wachlarze trabekularne oparte o rząd podkówek, złożone z bardzo drobnych i gęsto umieszczonych beleczek. Dissepimenta bardzo cienkościennie. Pączkowanie interkalicynalne.

## OBJASNIENIA DO ILUSTRACJI

Fig. 1 (p. 273)

Szkic geologiczny okolic Grzegorzowice-Skały (wg danych M. Pajchlowej).

Fig. 2 (p. 281)

*Protomacgeea dobruchnensis* n. sp., holotyp. Grzegorzowice w. 2. Część dystalna kielicha widziana od wewnątrz (nieco schematycznie); 1 epiteka, 2 strefa płaskich dissepimentów, 3 strefa spłaszczonych prążków septalnych, 4 strefa septów blaszkowatych, 5 guzki trabekularne. × 8.5.

Fig. 3 (p. 282)

*Protomacgeea dobruchnensis* n. sp., holotyp. Grzegorzowice w. 3. Przekrój poprzeczny koralita; 1 epiteka, 2 strefa płaskich dissepimentów, 3 stereozona, 4 tabuła z nadkładem stereomy. × 6.

Fig. 4 (p. 282)

*Protomacgeea dobruchnensis* n. sp. holotyp. Grzegorzowice w. 3. Przekrój poprzeczny w stadium efebicznym; 1 fossula na miejscu zredukowanego septum głównego, 2 fossula poniżej septum bocznego, 3 epiteka, 4 płaskie dissepimenta, 5 peryferyczne końce septów I i II rzędu, 6 stereozona, 7 osiowe końce septów I rzędu. × 12.

Fig. 5 (p. 284)

*Protomacgeea dobruchnensis* n. sp. Grzegorzowice w. 3. Mikrostruktura części kielicha w przekroju poprzecznym; 1 epiteka, 2 peryferyczne końce septów z linią trabekularną, 3 stereozona zbudowana z koncentrycznie ułożonych grudek sklerenchymy. 4 linie trabekularne części osiowych septów.  $\times 66$ .

Fig. 6 (p. 285)

*Protomacgeea dobruchnensis* n. sp. Grzegorzowice w. 3. A przekrój poprzeczny przez pedicillum, stadium 1 (nepioniczne),  $\times 10$ ; B przekrój poprzeczny, stadium 2 (neaniczne),  $\times 40$ ; C przekrój poprzeczny, stadium 3 (neaniczne),  $\times 23$ ; 1 septum przeciwległe, 2 stereoma, 3 tabula, 4 septum w epitece.

Fig. 7 (p. 286)

*Protomacgeea dobruchnensis* n. sp. Grzegorzowice w. 3. Przekrój poprzeczny, stadium 4 (neaniczne); 1 septum główne, 2 septum przeciwległe.  $\times 7,5$ .

Fig. 8 (p. 287)

*Protomacgeea dobruchnensis* n. sp. Grzegorzowice w. 3. Przekrój podłużny młodego osobnika z pedicillum; 1 pedicillum, 2 tabula, 3 stereozona, 4 płaskie dissepimentum, 5 epiteka.  $\times 8$ .

Fig. 9 (p. 288)

*Macgeea bathycalyx bathycalyx* (Frech). Skały w. 8. Przekrój podłużny zbliżony do rysunku F. Frecha (1886, p. 67).  $\times 5$ .

Fig. 10 (p. 288)

*Macgeea bathycalyx bathycalyx* (Frech); ten sam okaz, jak wyżej. Przekrój poprzeczny w stadium neanicznym; 1 septum główne.  $\times 7,5$ .

Fig. 11 (p. 290)

*Macgeea bathycalyx kasimiri* n. subsp., paratyp. Skały w. 6. A wewnątrz kielicha.  $\times 4$ ; B koralit widziany z boku,  $\times 3,3$ .

Fig. 12 (p. 291)

*Macgeea bathycalyx kasimiri* n. subsp., holotyp. Skały w. 6. Przekrój poprzeczny przez jamkę kielicha; 1 septum główne.  $\times 4,7$ .

Fig. 13 (p. 292)

*Macgeea bathycalyx kasimiri* n. subsp., holotyp. Skały w. 6. Przekrój podłużny koralita młodocianego; 1 epiteka, 2 podkówki z wachlarzem trabekul, 3 płaskie dissepimentum.  $\times 5,3$ .

Fig. 14 (p. 293)

*Macgeea bathycalyx kasimiri* n. subsp., Skały w. 6. Przekrój podłużny koralita starszego.  $\times 5,3$ .

Fig. 15 (p. 294)

*Macgeea bathycalyx kasimiri* n. subsp. Skały 6. Przekrój poprzeczny stadium neanicznego; 1 septum główne, 2 septum przeciwległe.  $\times 5$ .

Fig. 16 (p. 296)

*Macgeea bathycalyx josephi* n. subsp., holotyp. Skały w. 8. Przekrój poprzeczny stadium efebicznego; 1 septum główne.  $\times 5$ .

Fig. 17 (p. 296)

*Macgeea bathycalyx josephi* n. subsp., holotyp (ten sam okaz, jak wyżej). Przekrój podłużny koralita.  $\times 5$ .

Fig. 18 (p. 297)

*Macgeea bathycalyx josephi* n. subsp. Skały w. 8. Przekrój poprzeczny stadium neanicznego; septa silnie poszerzone sklerenchymą; 1 septum główne, 2 septum przeciwległe.  $\times 12$ .

Fig. 19 (p. 298)

*Macgeea bathycalyx regularis* n. subsp., holotyp. Skały w. 5. Przekrój poprzeczny stadium efebicznego.  $\times 4$ .

Fig. 20 (p. 298)

*Macgeea bathycalyx regularis* n. subsp., holotyp (ten sam okaz, jak wyżej). Przekrój podłużny.  $\times 4,3$ .

Fig. 21 (p. 300)

*Macgeea bathycalyx longiseptata* n. subsp., holotyp. Skały w. 5. Przekrój poprzeczny stadium efebicznego; 1 septum główne.  $\times 4,7$ .

Fig. 22 (p. 300)

*Macgeea bathycalyx longiseptata* n. subsp., holotyp. Przekrój podłużny okazu fig. 21.  $\times 4$ .

Fig. 23 (p. 303)

*Macgeea bathycalyx amabilis* n. mut., holotyp. Skały w. 11. Przekrój poprzeczny stadium efebicznego; 1 septum główne, 2 septum przeciwległe, 3 osad stereomy między septami.  $\times 5,3$ .

Fig. 24 (p. 303)

*Macgeea bathycalyx amabilis* n. mut., holotyp (ten sam okaz, jak wyżej). Przekrój podłużny.  $\times 3,7$ .

Fig. 25 (p. 304)

*Macgeea bathycalyx amabilis* n. mut. Skały w. 11. Przekrój poprzeczny stadium neanicznego; 1 septum główne, 2 septum przeciwległe, 3 septum boczne.  $\times 5$ .

Fig. 26 (p. 305)

*Thamnophyllum skalense* n. sp., holotyp. Skały w. 5. Przekrój poprzeczny.  $\times 7$ .

Fig. 27 (p. 306)

*Thamnophyllum skalense* n. sp., holotyp. Skały w. 5. A przekrój podłużny koralita z pączkami marginalnymi.  $\times 4,4$ ; B przekrój podłużny z 2 pączkami parycydalnymi.  $\times 5$ .

Fig. 28 (p. 307)

*Thamnophyllum skalense* n. sp. Skały w. 5. A przekrój poprzeczny stadium młodocianego z talonem,  $\times 6,7$ ; B przekrój poprzeczny kielicha macierzystego wraz z pączkiem.  $\times 6,6$ .

Fig. 29 (p. 307)

*Thamnophyllum skalense* n. sp. Skały w. 5. Przekrój poprzeczny stadium nieco późniejszego, niż na fig. 28A, z talonem; 1 septum główne.  $\times 10$ .

Fig. 30 (p. 309)

*Thamnophyllum caespitosum* (Goldfuss). Skały w. 8. Przekrój poprzeczny koralita macierzystego z 2 pączkami lateralnymi w przekroju podłużnym.  $\times 4$ .

Fig. 31 (p. 309)

*Thamnophyllum caespitosum* (Goldfuss). Skały w. 8. Przekrój podłużny koralita.  $\times 5.3$ .

Fig. 32 (p. 310)

*Thamnophyllum caespitosum* (Goldfuss). Skały w. 8. Przekrój podłużny koralita z pączkiem lateralnym.  $\times 3.7$ .

Fig. 33 (p. 311)

*Thamnophyllum trigemme* (Quenstedt). Skały w. 12. Przekrój poprzeczny w stadium efebicznym.  $\times 5$ .

Fig. 34 (p. 313)

*Thamnophyllum trigemme* (Quenstedt). Skały w. 12. A przekrój podłużny okazu fig. 33,  $\times 5$ ; B przekrój podłużny z 2 pączkami paracydalnymi,  $\times 5$ ; 1 pączek paracydalny, 2 tkanka cenogenetyczna.

Fig. 35 (p. 315)

*Thamnophyllum trigemme pajchelaе* n. subsp., holotyp. Skały w. 11. A przekrój poprzeczny stadium efebicznego,  $\times 4,5$ ; B przekrój podłużny tego samego okazu z 2 pączkami paracydalnymi,  $\times 5,3$ ; C przekrój poprzeczny młodocianego okazu z talonem.  $\times 5,3$ ; 1 septum główne.

Fig. 36 (p. 316)

*Thamnophyllum trigemme pajchelaе* n. subsp. Skały w. 11. Koralit z 5 pączkami paracydalnymi, zasłoniętymi wspólną epitką.  $\times 2,5$ .

Fig. 37 (p. 318)

*Pachyphyllum sobolewi* n. sp., holotyp. Skały, w. pokrzywiańskie. Przekrój poprzeczny kolonii płokoidalnej.  $\times 3$ .

Fig. 38 (p. 319)

*Pachyphyllum sobolewi* n. sp. Przekrój podłużny jednego osobnika z tej samej kolonii, co fig. 37.  $\times 5,3$ .

Fig. 39 (p. 320)

*Pachyphyllum sobolewi* n. sp. Przekrój poprzeczny kolonii z 2 pączkami interkalicynalnymi z tej samej kolonii.  $\times 5$ .

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МАРИЯ РУЖКОВСКА

РАСЧУРPHYLLINAE ИЗ СРЕДНЕГО ДЕВОНА СВЕНТОКРЖИСКИХ ГОР

Часть I

Резюме

В 1953 году автор представила результаты исследований над представителями подсемейства Pachyphyllinae из франского яруса Польши. В настоящей заметке она приводит описание Pachyphyllinae из эйфельского и живетского ярусов

Свентокрийских Гор в профиле Пржегоржовице—Скалы—Влохы и в Выдрышове. Рядом с литологической и фаунистической характеристикой исследованных отложений (фиг. 1 и сводка на стр. 278 английского текста), настоящая статья содержит главным образом описание видов, подвидов и мутаций подсемейства *Pachyphyllinae*, собранных в упомянутых ярусах. Все общие вопросы возникающие из исследований этой группы *Tetracoralla* будут представлены в следующей статье.

В фауне кораллов эйфеля и живета, очень разнообразной и количественно чрезвычайно богатой, *Pachyphyllinae* принадлежат к числу более редких форм. Автор описала отсюда 12 видов и разновидностей:

*Protomacgeea dobruchnensis* n. gen. & n. sp.

<i>Macgeea bathycalyx bathycalyx</i> (Frech)	<i>Thamnophyllum skalense</i> n. sp.
<i>M. bathycalyx josephi</i> n. subsp.	<i>Th. caespitosum</i> (Goldfuss)
<i>M. bathycalyx regularis</i> n. subsp.	<i>Th. trigemme</i> (Quenstedt)
<i>M. bathycalyx longiseptata</i> n. subsp.	<i>Th. trigemme pajchelaе</i> n. subsp.
<i>M. bathycalyx amabilis</i> n. mut.	<i>Pachyphyllum sobolewi</i> n. sp.

В эйфельских мергелях и известняках Гжегоржовиц и Выдрышова содержится мелкая единичная форма *Protomacgeea dobruchnensis* n. gen. & n. sp., близкая роду *Macgeea*. Она имеет плоские диссепименты, на месте подковок развита стереозона, а трабекулярные веера отражаются только в веерообразном размещении бугорков по бокам септ.

В живетских отложениях выше упомянутого профиля род *Macgeea* представлен одним видом — *M. bathycalyx bathycalyx* (Frech). Наш экземпляр наиболее напоминающий рисунок Фреха (F. Frech, 1886, p. 6) изображен на рис. 9—10. Этот вид проявляет большую изменчивость. Автор выделила 4 формы, встречающиеся вместе, как подвиды, и одну форму — геологически более молодую как мутацию. Все эти разновидности связывает сходная билатеральная симметрия, сохраняющаяся в течении всего онтогенеза, сходная внутренняя морфология и соответствующее количество септов при равном диаметре чашечки.

Род *Thamnophyllum* представлен четырьмя видами, которые характеризуются типом почкования и внутренней морфологией.

В строматопорово-табулятовом рифе покрживянского слоя содержится *Pachyphyllum sobolewi* n. sp., описанный Соболевым, (1903), как *Phillipsastraea hennani* Lonsdale. Вид имеет однако черты характерные для рода *Pachyphyllum*, а в частности подковки и опирающиеся на них трабекулярные веера. *Pachyphyllum sobolewi* — это наиболее древний представитель этого рода, так как находится здесь в отложениях средней части живетского яруса, что видно по следующему составу кораллового сообщества: *Breviphrentis multiseptatus* Gürich, *Schizophyllum acanthicum* Frech, *Sparganophyllum* sp. с сильно свернутыми осевыми концами септ, *Neostrophophyllum* sp. и очень редкие *Lithophyllum* sp. и *Nardophyllum* sp.