MARIA RÓŻKOWSKA *

CONTRIBUTION TO THE FRASNIAN TETRACORALS FROM POLAND

(plates 1-10)

Abstract. — Thirty nine Frasnian tetracoral species assigned to 25 genera and 12 families are described. The following 7 genera are new: *Smithicyathus* (subfamily Phillipsastraeinae), *Trigonella*, *Debnikiella* (subfamily Marisastrinae), *Piceaphyllum* (family Charactophyllidae), *Fedorowskicyathus* (family incertae sedis), *Kowalaephyllum* (family Chonophyllidae), *Rachaniephyllum* (family? Cystiphyllidae); 22 new species are introduced. The described fauna comes from the Holy Cross Mts. (Góry Świętokrzyskie), Silesia-Cracow Upland, Sudetes, Pomerania and Lublin region. The stratigraphic and geographic distribution of all so far described Polish Frasnian tetracorals is summarized. It has been noted that the long lasting parallel monacanths posses no major value for classification, but the rhipidacanthine fans are taxonomically important. The secondary alteration of septa that appears in the Upper Frasnian corals indicates on their homeomorphy with some Silurian genera.

Streszczenie. — Zbadano tetrakorale frańskie z odsłonięć w Górach Świętokrzyskich i w Sudetach, z wierceń na Pomorzu, na Wyżynie Śląsko-Krakowskiej i w regionie lubelskim. Opisano 39 gatunków tetrakorali, w tym 17 gatunków znanych z literatury oraz 22 gatunki nowe. Należą one do 12 rodzin i 25 rodzajów, w tym 7 rodzajów nowych. Nowe rodzaje to: *Smithicyathus*, *Trigonella*, *Debnikiella*, *Piceaphyllum*, *Fedorowskicyathus*, *Kowalaephyllum* i *Rachaniephyllum*. Występują one przeważnie w górnym franie, w poziomie *Palmatolepis gigas*. Omówiono znaczenie tetrakorali dla biostratygrafii franu w oparciu o ich współwystępowanie z konodontami. Skorelowanie tetrakorali z konodontami umożliwia bardziej precyzyjne stosowanie tetrakorali w stratygrafii utworów biogenicznych franu, w których konodontów często brak.

Ważnymi cechami rodzajowymi są, poza cechami morfologicznymi, mikrostruktura i struktura septów. Niektóre typy mikrostruktury są długotrwałe i występują w różnych rodzinach tetrakorali (np. fibro-normalna, disfyloidalna). W rodzinie Phillipsastraeidae trabekule-monakanty są ustawione wychlarzowato, a w 3 podrodzinach: Phillipsastraeinae, Phacellophyllinae i Marisastrinae, monakanty są rozwidlone i noszą nazwę ripidakantów. W niektórych rodzajach znaczenie diagnostyczne ma struktura peryferycznych końców septów. Typ „naotic", spotykany u *Chonophyllum*, *Craterophyllum* i *Kowalaephyllum*, cechuje się dywergentnie ustawionymi pręcikami trabekularnymi i blaszkowatymi dissepimentami. U *Tabulophyllum* istnieją tylko pręciki. W strukturze cystifyloidalnej septa są zredukowane do krótkich kolców septalnych, umieszczonych na wewnętrznej powierzchni ściany zewnętrznej i na pęcherzach. Tak zmodyfikowane peryferyczne końce septów są częste u tetrakorali sylurskich. W górnym franie znamionują one raczej szczytową fazę rozwoju niektórych linii lub są homeomorfami.

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* Prof. Dr Maria Różkowska died on June 20, 1979, while this paper was in press.

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INTRODUCTION

The attempt has been made here to present the current knowledge about the Frasnian tetracorals in Poland. The systematic part of the paper contains descriptions of all the not described so far Frasnian tetracoral species, found in Poland. In table 1, both the earlier and the newly described species are tabulated in respect of their stratigraphic and geographic distribution in Poland. In this table an attempt has also been made to correlate stratigraphic ranges and distribution of tetracoral species with the conodont zones. The general conodont zonation of

the Frasnian deposits in the Holy Cross Mts. was accepted after SZULCZEWSKI (1971), that of Bolechowice locality after RACKI (1976, unpublished M. Sc. Thesis, Warsaw University), and that of the borehole Karniowice after CHOROWSKA (1975).

The lithological descriptions of the coral bearing outcrops and cores have been much simplified. In each case a short discussion has been introduced in order to express the comparison of the given tetracoral assemblage with the conodont zones and with the recently established Belgian biostratigraphic horizons. For more complete lithological data the reader is referred to GUNIA (1962, 1966, 1968), SZULCZEWSKI (1971), RÓŻKOWSKA and FEDOROWSKI (1972), ŚLÓSARZ and ŻAKOWA (1975), MIŁACZEWSKI (1975) and PAJCHLOWA (1975).

The material studied was collected during the years 1946-1976. The first part was assembled by the present author with the financial support of the Museum of Earth and with the geological advice of J. CZARNOCKI. Later on financial support was received from the Institute of Paleobiology (formerly Paleozoology) of the Polish Academy of Sciences. L. CIMASZEWSKI and L. SZOSTEK sent core material from Pomerania and Silesia-Cracow Upland, respectively. In 1975 the Geological Institute (Warsaw) supplied the core material from the Lublin region, segregated by Dr. J. FEDOROWSKI, Dr M. SZULCZEWSKI sent tetracorals from the Kowala railroad cut, Czarnów and Górno, and Prof. T. GUNIA collected corals from the Sudetes. In 1976 T. WRZOŁEK collected corals from Kowala and Bolechowice, which were offered to the present author by the Department of Geology, Warsaw University.

The earliest references to the Frasnian tetracorals in Poland are those of DYBOWSKI (1873) from the Sudetes; GÜRICH (1896) described phillipsastraeid, disphyllid and other genera from the Holy Cross. Mts. and SOBOLEW (1909) cited Frasnian species from Kowala and Bolechowice. New studies have not been made since RÓŻKOWSKA's papers (1953, 1956, 1960) describing Phillipsastraeidae from the Polish Frasnian and discussing some general problems concerning blastogeny and individual variation in several genera. GUNIA (1962, 1966, 1968) described some Frasnian species from the Sudetes, and RÓŻKOWSKA and FEDOROWSKI (1972) described species of *Disphyllum* DE FROMENTEL.

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ABBREVIATIONS USED

UAM Department of Geology, University of Poznań.
U. Wr. Department of Geology, University of Wrocław.
IG Geological Institute in Warsaw.

n/d	Septal index, where „n" designates the number of major septa, and „d" the corallite diameter.
d:t:d	Width ratio of the dissepimentarium „d" and the tabularium „t".
t/5	Determines the number of tabulae on the stretch of 5 mm.
L	Corallite length.
dc	Corallite diameter.
dt	Tabularium diameter.
sI:sII	Determines the length ratio of major septa (sI) and minor septa (sII).

DESCRIPTION OF EXPOSURES AND BOREHOLES

Holy Cross Mountains (Góry Świętokrzyskie)

The Frasnian tetracoral faunas have been discovered in numerous places in the western part of the Holy Cross Mts. and in only a few isolated areas in its eastern part. Coral assemblages of particular outcrops are listed in table 1.

Zagórze. — In a series of small quarries, situated south of Kielce-Mójcza road and east of Wietrznia quarry, dolomites and fine grained coral bearing limestones with numerous *Marisastrum sedgwicki* (EDW.-H.) and *Disphyllum caespitosum* (GOLDFUSS) are exposed. The tetracoral assemblage is closely comparable with the niveau F2a-h in Belgium, i. e. the *Polygnathus asymmetricus* Zone.

Wietrznia hill. — The boundary between Upper Givetian and Lower Frasnian is not established, hidden within biohermal limestones without conodonts. The lowermost points (1.2.4.8) of RÓŻKOWSKA (1953) are of a reefoid type with large stromatoporoids, large *Marisastrum sedgwicki* (EDW.-H.), abundant other tetracorals and *Receptaculites*. Higher up in thick crinoidal limestones (points 11.13.22) of RÓŻKOWSKA (*l. c.*) SZULCZEWSKI (1971) found *Ancyrognathus triangularis*. In the Middle (?) Frasnian, solitary and branching tetracorals prevail. Points 15.19.21 of RÓŻKOWSKA *(l. c.)*, nowadays inaccessible, yielded a rich Upper Frasnian phillipsastraeid fauna, similar to that characteristic of the Belgium F2i-j zone. Besides abundant phillipsastraeids there are also many other tertacorals comprising one of the richest assemblages of Frasnian tetracorals in Poland. The presence of *Frechastraea pentagona* (GOLDFUSS) and *Iowaphyllum* STUMM indicates the third niveau of *Phillipsastrea* (COEN *et al.*, 1976).

Kadzielnia hill. — The oldest Frasnian limestones are characterized by *Thamnophyllum kozlowskii* RÓŻKOWSKA, but the contact with the Givetian deposits is unknown. In the middle of the profile, around the "Geologists' Rock", a massive biohermal limestone containing large stromatoporoids, branching Tabulata and solitary tetracorals, mainly *Temnophyllum*, appears (see PAJCHLOWA and STASIŃSKA 1965). All the so far discussed deposits (points 1 to 21 of RÓŻKOWSKA, *l. c.*) do not contain conodonts. However, a rich coral assemblage, very similar to that of Belgian F2a-h niveau, makes it possible to consider them as being equivalents of *Polygnathus asymmetricus* Zone. The Upper Frasnian age of the upper limestone on the Kadzielnia hill is determined by the presence of *Ancyrognathus triangularis* and *Palmatolepis gigas* (SZULCZEWSKI, 1971: 66) and by *Phillipsastrea ananas* (GOLDFUSS) found by RÓŻKOWSKA *(l. c.)* in her point 22.

Psie Górki. — According to SZULCZEWSKI (1971: 67) the whole profile of the thick-bedded limestones is approximately 30 m thick and includes Upper *Polygnathus asymmetricus* (to Iβ) and Lower *Palmatolepsis gigas* (to Iγ) Zones.

Karczówka hill. — Although conodonts have not been found there, the lower part of the profile, consisting of a biohermal limestone crowded with Stromatoporoidea, Tabulata, and calcisphaeres, appertains perhaps to the *Polygnathus asymmetricus* Zone. In its upper part,

near the convent, the present author found an Upper Frasnian phillipsastraeid fauna, which corresponds with Belgian zone F2i-j (COEN-AUBERT 1972: 76), or with the *Ancyrognathus triangularis* subzone of the *Palmatolepis gigas* Zone.

Czarnów. — This is a small hill near the Śluchowice quarry. Lithology and conodont fauna were studied by SZULCZEWSKI (1971 :60) who established Lower or Middle *Polygnathus asymmetricus* Zone as the age of these deposits. RÓŻKOWSKA and FEDOROWSKI (1972) described *Disphyllum caespitosum* (GOLDFUSS) from there.

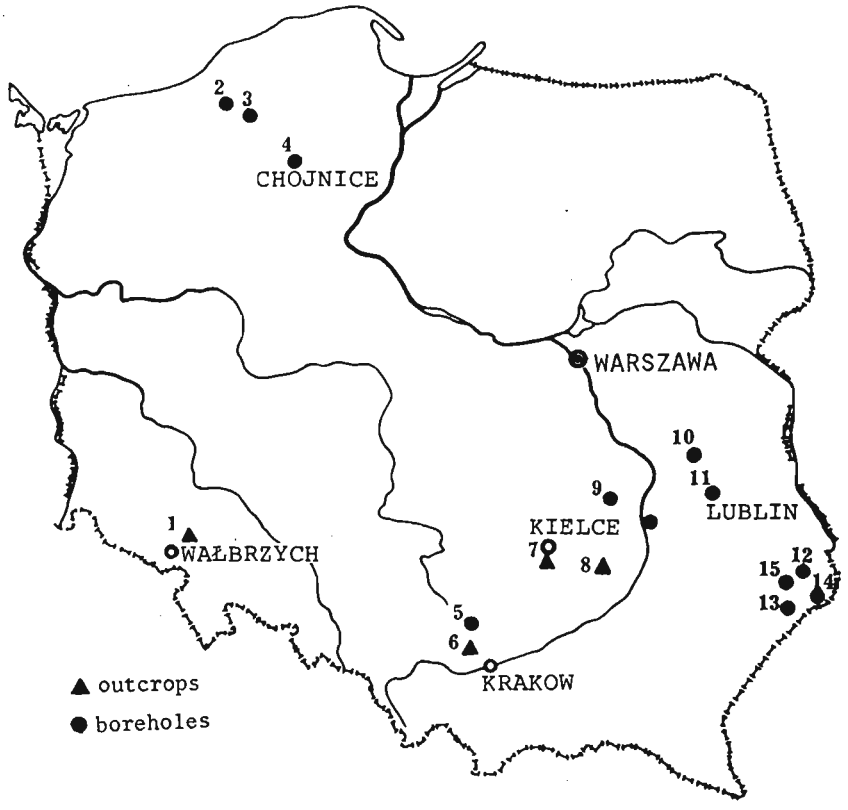

Fig. 1

A sketch-map of Frasnian outcrops and location of boreholes: Sudetes: *1* — Świebodzice Depression (outcrops: Mokrzeszów, Chwaliszów, Witoszów, Pełcznica, Lubiechów); Pomerania: *2* — Kościernica, *3* — Polanów, *4* — Chojnice (Żerniki); Silesia-Cracow Upland: *5* — Olkusz region (boreholes in Czubrowice, Chechło, Klucze, Karniowice); *6* — Dębnik outcrop; Holy Cross Mts: *7* — Zagórze, Wietrznia, Kadzielnia, Psie Górki, Karczówka, Czarnów, Kowala I, Kowala II, Bolechowice (Jaźwica); *8* — Górno, Łagów, Sobiekurów; Lublin region: *9* — Bąkowa, *10* — Kock, *11* — Niesiołowice, *12* — Tyszowce, *13* — Rachanie, *14* — Tomaszów Lubelski, *15* — Korczmin.

Kowala. — In the vicinity of Kowala village, two Frasnian coral bearing outcrops are exposed. They are called here as follows: Kowala I, the railroad-cut along the Kielce-Busko railway, and Kowala II, the road-cut leading to the quarry Wola Murowana.

Kowala I (railroad cut). SZULCZEWSKI (1971: 74) described in detail the lithology of Frasnian deposits of this outcrop and divided them into series A-H, characterized by a conodont fauna. As the corals are abundant there, and come from precisely established lithological sets, the following short list is given in addition to the table 1.

Unit A2 *Thamnophyllum kozlowskii* RÓŻKOWSKA, *Temnophyllum turbinatum* Hill,
Unit A3 *Thamnophyllum kozlowskii,*
Unit A5 *Thamnophyllum kozlowskii, Disphyllum kweihsiense* YOH,
Temnophyllum isetense (SOSHKINA), *T. turbinatum* HILL, *Thamnophyllum monozonatum* SOSHKINA, *Piceaphyllum breviseptatum* sp. n.

Unit B *Thamnophyllum kozlowskii, Pterorrhiza berdensis* (SOSHKINA), *Disphyllum kweihsiense* YOH, *Temnophyllum isetense* SOSHKINA

Unit C9 *Thamnophyllum kozlowskii, Disphyllum wirbelauense bonae* RÓZKOWSKA, *Aristophyllum angustum* (GÜRICH), *Temnophyllum isetense* SOSHKINA, *Piceaphyllum breviseptatum* sp. n.

Unit C10 *Thamnophyllum kozlowskii.*

All these units correspond with Lower *Polygnathus asymmetricus* Zone.

Unit D, E8 *Pterorrhiza berdensis* (SOSHKINA), *Temnophyllum isetense* SOSHKINA, Middle and Lower *Polygnathus asymmetricus* Zone (to Iα).

Unit F.G.H. *Thamnophyllum kozlowskii, T. monozonatum.* Upper *Polygnathus asymmetricus* Zone (to Iβ) to Lower *Palmatolepis triangularis* Zone (to Iδ).

Kowala II (road cut). In contrast to more limy deposits of Kowala I the interbedded shales and platy limestones with insertions of cherts occur in Kowala II. The rich coral fauna, sponges, crinoids and brachiopods are partially silicified. No conodonts have been described from these oustcrops as yet, but presence of *Phillipsastrea* indicates an Upper Frasnian age of these deposite. Some undescribed conodonts characterize Lower *Palmatolepis gigas* Zone ((to Iγ) SZULCZEWSKI, personal comm.).

Bolechowice Jaźwica quarry. — This profile corresponds stratigraphically with that of Kowala I. Racki (1976, unpublished M. Sc. Thesis) distinguished there the same sets A-H as SZULCZEWSKI (1971) for Kowala I. The set H containing especially rich coral fauna is composed of reddish and grey platy limestones with insertions of marly shales and intercalations of concretions and intraformational conglomerates.

Górno. — The age of the marly limestones on Józefka Hill has been well documented (MAŁKOWSKI 1971) by the following condont species characteristic for the Lower *Polygnathus asymmetricus* Zone (to I α): *Schmidtognathus* sp., *P. asymmetricus ovalis* ZIEGLER and KLAPPER and *Ancyrodella rotundiloba alata* GLENISTER and KLAPPER (see BIERNAT and SZULCZEWSKI 1975: 2, 11). These limestones also yield *Phlogoiderhynchus polonicus* (ROEMER) and tetracorals *Peneckiella szulczewskii* sp. n. and *Pterorrhiza berdensis.*

Łagów. — For detailed description of lithology see RÓŻKOWSKA and FEDOROWSKI (1972: 271). The Frasnian deposits with abundant disphyllids are exposed at the Łagowica river; conodonts are lacking. The coral-bearing deposits may be of the Lower or Middle Frasnian age.

Sobiekurów. — This is a small quarry exposed close to Sobiekurów village, 0.5 km of Kielce-Opatów road. In the southernmost part of the quarry dark, thick-bedded limestones with rare, simple tetracorals (*Pseudopetraia devonica* SOSHKINA) are exposed. Further to the north large colonies of *Alveolites suborbicularis* and layers with *Amphipora* sp. appear. Above these deposits, in the foot of the northern wall of the quarry, large colonies of *Phillipsastrea plantae* sp. n. occur. The series of deposits is capped by a bed of limestone with numerous colonies of *Phillipsastrea dybowskii* RÓŻKOWSKA, resting in a life position, and forming a distinct horizon, accompanied by rare stromatoporoids and Tabulata. Conodonts have not been so far found there. According to the present author's opinion the lower, dark, thick-bedded limestones may be correlated with the F2a-h zone in Belgium. The Upper horizon with *Phillipsastrea* is probably an equivalent of F2i-j niveau, that is, of *Acyrognathus triangularis* Subzone in *Palmatolepis gigas* Zone.

Sudetes

A rich but badly preserved tetracoral fauna has been collected in the Świebodzice depression, appearing *in situ* only in Mokrzeszów and in shales of Witoszów. First two Frasnian species were described by DYBOWSKI (1873). Later on intensive studies on corals were carried out by GUNIA (1962, 1968), RÓŻKOWSKA (1957) and RÓŻKOWSKA and FEDOROWSKI (1972). GUNIA (1968) described and interpreted lithology and stratigraphy of Devonian deposits.

Mokrzeszów. — For detailed description of lithology see GUNIA (1968, outcrop 15). No conodonts have so far been found there. The tetracoral fauna is rich, but with no *Phillipsastrea*, probably due to unfavourable environmental conditions. An abundant *Tabulophyllum priscum* MÜNSTER, especially common in the upper part of the profile, may indicate the Upper Frasnian age.

Witoszów. — For detailed lithological description see GUNIA (1968, outcrops 6 and 10). In light-grey silty shales with limestone lenses a rich tetracoral fauna occurs. According to recent personal communication of Professor GUNIA, all this fauna rests in situ. The investigated assemblage (table 1) does not resemble that of Mokrzeszów. The disphyllids may indicate the Middle Frasnian age.

Pełcznica. — For detailed lithological description see GUNIA (1968, outcrop 49). The poor and redeposited coral fauna may indicate Middle Frasnian age of the silty shales with lenses of grey limestone, which yield the corals.

Chwaliszów. — See GUNIA (1968, outcrop 61). The sparse tetracoral fauna (table 1) preserved within the conglomerates in the form of pebbles indicates Lower or Middle Frasnian age.

Silesia-Cracow Upland

Olkusz area: *Chechło BB18 borehole.* — The Devonian rocks, composed of grey crystalline limestone alternating with dolomites, are recorded at a depth of 221-413 m. At the depth of 394 m in the sediment of biohermal type the present author identified *Temnophyllum isetense* SOSHKINA. At the depth of 285-319 m *Aristophyllum angustum* (GÜRICH), *Pterorrhiza berdensis* SOSHKINA and some disphyllids appear. This poor tetracoral assemblage indicates a Lower or Middle Frasnian age, and is comparable with niveau F2a-h of Belgian division.

Klucze BB46 borehole. — Limestones and calcareous marls predominate within the deposits. Coelenterata have been recorded at an interval of 224-361 m (see table 1). The disphyllids and temnophyllids testify a Lower or Middle Frasnian age.

Karniowice 4 borehole. — According to ŚLÓSARZ and ŻAKOWA (1975:21) Devonian sediments, consisting of dolomites and limestones, appear at interval 95-300 m. A rich tetracoral fauna has been cited by RÓŻKOWSKA and FEDOROWSKI (1971:277) from the depth of 254-265 m and 286-299 m. The other species, coming from the depth of 294 m and 298 m, are listed herein in table 1. Conodonts found at the depth of 291 m were identified by CHOROWSKA (1975: 71) as *Ancyrodella rotundiloba* (Lower-Middle *Polygnathus asymmetricus* Zone). According to SZULCZEWSKI (personal comm.) the age of the sediments at the depth of 294-298) m is not older than the Middle *P. asymmetricus* Zone (to Iα).

Czubrowice I borehole. — The dolomites from the depth interval 168.4-210 m interbedded with marls and shales have been identified by ŚLÓSARZ and ŻAKOWA (1975:15) as Frasnian; CHOROWSKA (1975) who found *Icryodus symmetricus* BRANSON and MEHL at the depth of 210 m, is of a similar opinion.

Dębnik area: *Żarnówczany Dół.* — Grey, massive coral bearing limestones are exposed in a small abandoned quarry near Dębnik village. The rich tetracoral assemblage (RÓŻKOWSKA 1957:143) is easily comparable with that of the Upper Frasnian *Palmatolepis gigas* Zone of the Kielce area (see table 1).

Pomerania

Polanów borehole. — A series of greyish-green, sandy marls and limestones yields Frasnian tetracorals of the F2a-h niveau at the depth interval 1675.0-1955 m, and have been described by RÓŻKOWSKA and FEDOROWSKI (1972:277).

Chojnice borehole. — Limestones at the depth of 2879-2883 m yield a phillipsastraeid

assemblage of the Rugosa, characteristic for the *Palmatolepis gigas* Zone (to Iγ), contemporaneous with Belgian F2i-j niveau.

Kościernica borehole. — At the depth of 2023-2025 m *Peneckiella szulczewskii* sp. n. occurs in grey limestones. This species which is also known from the Józefka hill near Górno in the Holy Cross Mts indicates the Lower *Polygnathus asymmetricus* Zone (= to Iα).

Wyszebórz borehole. — Greyish-green marly limestones, yielding crushed branches of *Disphyllum caespitosum* (GOLDFUSS) and badly preserved temnophyllids represent Frasnian at the depth of 2019-2021 m. The coral assemblage probably indicates the Lower or Middle Frasnian age.

Lublin region

Niesiołowice IG-1 borehole. — Dark, fine-grained crystalline limestones, with numerous massive and dendroid stromatoporoids, bear rare Frasnian tetracorals *Pterorrhiza multizonata* (REED) and *Temnophyllum* sp. at the depth interval 1330-1336 m. Higher up, at the depth of 1258-1264 m, the species listed in table 1 occur in the biohermal limestone. They may indicate Lower or Middle Frasnian age.

Tyszowce IG-1 borehole. — The tetracorals appear at the depth interval of 2000-2053 m, appertaining to the Zubowicka Formation (see MIŁACZEWSKI 1975, for lithological description). *Rachaniephyllum andreae* sp. n., which occurs in other localities together with a phillipsastraeid fauna, indicates Upper Frasnian age.

Rachanie IG-1 borehole. — Dark grey, alternating granular and pelitic limestones with brachiopod banks, yield sporadic fasciculate *Rachaniephyllum andreae* sp. n. and *Phillipsastrea ananas* (GOLDFUSS) at the depth interval 1808-1821 m. At the depth interval 1871.2-1878.4 m *Rachaniephyllum andreae* sp. n. and some brachiopods occur in dark greyish-brown, pelitic and microcrystalline limestones. According to MIŁACZEWSKI (1975), the limestones of both depths cited appertain to the Frasnian Zubowicka Formation. Occurrence of *Phillipsastrea ananas* (GOLDFUSS) settles the age as F2i-j niveau, i. e. the *Palmatolepis gigas* Zone.

Korczmin IG-1 borehole. — At the depth interval of 2009-2080 m dark greyish-brown limestones bear numerous brachiopods, and the tetracoral assemblage with *Rachaniephyllum andreae* sp. n., that settles the Upper Frasnian age.

Korczmin IG-2 borehole. — At the depth of 1951-1954 m the phillipsastraeid fauna *Smithicyathus lacunosus* (GÜRICH) and *Phillipsastrea smithi* (RÓŻKOWSKA) determines the Upper Frasnian age.

Korczmin IG-3 borehole. — At the depth interval 1978-1993 m dark greyish-brown, pelitic, laminated and nodular limestones, and grey pelitic dolomites yield tetracoral fauna *Smithicyathus lubliniensis* sp. n. and *Aristophyllum irenae* which probably indicate the *Palmatolepis gigas* Zone.

Kock IG-2 borehole. — At the depth interval 3124-3140 m the greyish-brown, fine crystalline limestone of the Zubowicka Formation yields both the Upper Frasnian and the longlasting tetracorals (see table 1).

Tomaszów Lubelski IG-1 borehole. — At the depth interval 1796-1798 m dark grey, fine crystalline, unbedded dolomitic limestones of the Zubowicka Formation yield numerous recrystallized coelenterates, but only subordinately tetracorals, which may indicate the Upper Frasnian age.

At the depth interval 1808-1813 m dark nodular, dolomitic, locally pelitic and cryptocrystalline limestones contain rare *Phillipsastrea ibergensis* (ROEMER), *Tabulophyllum priscum* MÜNSTER which indicate the Upper Frasnian age. At the depth interval 1833-1839 m dark, grey, fine-grained coral limestone, chiefly composed of dendroid coelenterates bears rare *Phillipsastrea ananas* (GOLDFUSS), *Pterorrhiza multizonata* (REED) which indicate the *Palmatolepis gigas* Zone (= to I, niveau F2i-j in Belgium).

Bąkowa IG-1 borehole. — Depth1672-1677 m: Dark dolomitic limestone with *Thamnophyllum kozlowskii* RÓŻKOWSKA, *Pterorrhiza berdensis* (SOSHKINA), *Temnophyllum turbinatum* HILL, *Acantophyllum frasniense* sp. n. indicating the Lower or Middle Frasnian.

Depth 1708-1711 m: Dark, fine-grained limestones yield *Thamnophyllum monozonatum* SOSHKINA, *T. kozlowskii* RÓŻKOWSKA, *Disphyllum kostetskae* (SOSHKINA), *Temnophyllum turbinatum* HILL, indicating Lower or Middle Frasnian.

Depth 1805-1811 m: Dark grey, marly limestone, with rare *Aristophyllum irenae* sp. n., *GrypophyHum unduliseptatum* IVANIA, indicating perhaps the same age as above.

Depth 1817-1823 m: Dark grey, marly limestone with sporadic *Thamnophyllum kozlowskii* RÓŻKOWSKA, *Temnophyllum isetense* SOSHKINA, *T. menyouense* HILL and JELL indicating the same age as above.

Depth 1829-1935 m: Dark limy shales with brachiopods and solitary, Lower or Middle Frasnian tetracorals represented by *Breviphrentis* sp., *Pterorrhiza multizonata* (REED), *Temnophyllum turbinatum* HILL, *T. menyouense* HILL and JELL, *Acanthophyllum frasniense* sp. n.,

Depth 1856-1883 m: Dark marly limestones with black shales' intercalations. Rugosa are diversified, Middle or Lower Frasnian: *Thamnophyllum kozlowskii* RÓŻKOWSKA, *Pterorrhiza multizonata* (REED), *P. berdensis* (SOSHKINA), *T. isetense* SOSHKINA, *T. turbinatum* HILL, *T. miniarense* (SOSHKINA), *Aristophyllum irenae* sp. n.

Depth 1889 m: The deposits are similar to these characterized above but with *Acanthophyllum frasniense* sp. n. only.

Depth 1895-1913: Black marly limestones with Coelenterata. At the depth of 1907-1913 m they are crowded with massive stromatoporoids. Diversified Rugosa indicate the same age as above.

Depth 1931-1947 m: Black marly limestones, interbedded with black shales, yield lower or Middle Frasnian tetracorals.

Depth 1966-1976 m: Dark grey, fine-grained limestone crowded with Coelenterata. Tetracoralla such as *Pterorrhiza multizonata* (REED), *Temnophyllum isetense* SOSHKINA, *Aristophyllum irenae* sp. n., *Acanthophyllum frasniense* sp. n., indicate Lower of Middle Frasnian.

Depth 1981-1984 m: Black shales interbedded with black mudstones yield *Pterorrhiza multizonata* (REED).

Depth 1984-1996 m: Dark grey marly limestone with *Pterorrhiza multizonata* (REED), brachiopods and crinoid stems belongs probably to Lower or Middle Frasnian.

According to Pajchlowa (1975) the Frasnian deposits appear only as late as at the depth of 1398-1462 m. The tetracoral fauna here investigated indicates the Lower or Middle Frasnian age of the deposits resting down to the depth of 1996 m. The corals bearing strata belong to *Polygnathus asymmetricus* Zone, synchronic with the Belgian F1 or F2a-h niveau.

FRASNIAN TETRACORALS AS AGE INDICATORS

A large part of the Upper Givetian and Frasnian deposits in Poland consists of biohermal or biostromal limestones, containing only a few or no conodonts, but bearing abundant coral faunas instead. This caused a lack of detailed subdivision of these deposits on the one hand and an increase of stratigraphic importance of tetracorals on the other. The similar biohermal Frasnian deposits in Belgium have been subdivided by COEN (1968) and COEN-AUBERT (1972) into 3 substages:

F1 with Hexagonaria GÜRICH and Tabulata

F2a-h with *Disphyllum* de FROMENTEL, *Pterorrhiza* EHRENBERG, *Thamnophyllum* PENECKE.

F2i-j with massive colonial Phillipsastraeidae ROEMER and *Iowaphyllum* STUMM.

In the Polish zonation of the Frasnian deposits, only two subzones are recognized: *Polygnathus asymmetricus* Zone and *Palmatolepis gigas* Zone. An attempt to correlate stratigraphic distribution of particular coral species with these zones is given in the table 1.

TABLE 1

Geographic and stratigraphic range of Frasnian tetracorals in Poland

Species	Holy Cross Mountains													Silesia-Cracow Upland					Sudetes						Pomerania						Lublin Region							Conodont Zones	
		Zagórze	Wietrznia	Kadzielnia	Psie Górki	Karczówka	Czarnów	Kowala II	Kowala I	Bolechowice	Górno	Łagów	Sobiekurów	Czubrowice	Karniowice	Olkusz	Dębnik	Dzikowiec	Mokrzeszów	Chwaliszów	Witoszów	Pełcznica	Lubiechów	Żerniki	Kościernica	Chojnice	Polanów	Wyszobórz	Bąkowa	Korczmin	Tomaszów Lubelski	Tyszowce	Kock	Rachanie	Niesiołowice	Polygnathus asymmetricus Zone	Palmatolepis gigas Zone
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Pseudopetraia devonica SOSHKINA													+																								+	
Breviphrentis sp.																														+							+	
Craterophyllum humile sp. n.								+																														+
Heliophyllum proliferum (FRECH *non* ROEMER)																								+													+	
Thamnophyllum soshkinae RÓŻKOWSKA			+	+																																	+	
Thamnophyllum monozonatum SOSHKINA		+	+	+					+						+													+		+							+	+
Thamnophyllum kozlowskii RÓŻKOWSKA		+	+	+					+																			+		+							+	+
Peneckiella minor kunthi (DAMES)																			+																			+
Peneckiella fascicularis (SOSHKINA)															+	+											+										+	
Peneckiella szulczewskii sp. n.											+															+											+	
Sudetia lateseptata RÓŻKOWSKA																			+																			+
Pterorrhiza multizonata (REED)																	+					+				+	+	+			+		+					+	+
Pterorrhiza berdensis (SOSHKINA)			+	+					+						+	+						+						+			+							+	+
Pterorrhiza czarnockii (RÓŻKOWSKA)		+	+	+							+						+					+				+											+	
Pterorrhiza ultima (WALTHER)			+	+	+										+																						+	+
Pterorrhiza siemiradzkii (RÓŻKOWSKA)			+																																		+	
Phillipsastrea plantana sp. n.													+																									+
Phillipsastrea smithi (RÓŻKOWSKA)										+																					+							+
Phillipsastrea macouni (SMITH)					+																				+													+
Phillipsastrea friedbergi (RÓŻKOWSKA)					+	+											+																					+
Phillipsastrea ibergensis (ROEMER)					+																												+	+				+
Phillipsastrea ibergensis progressa (RÓŻKOWSKA)					+								x																				+	+				+

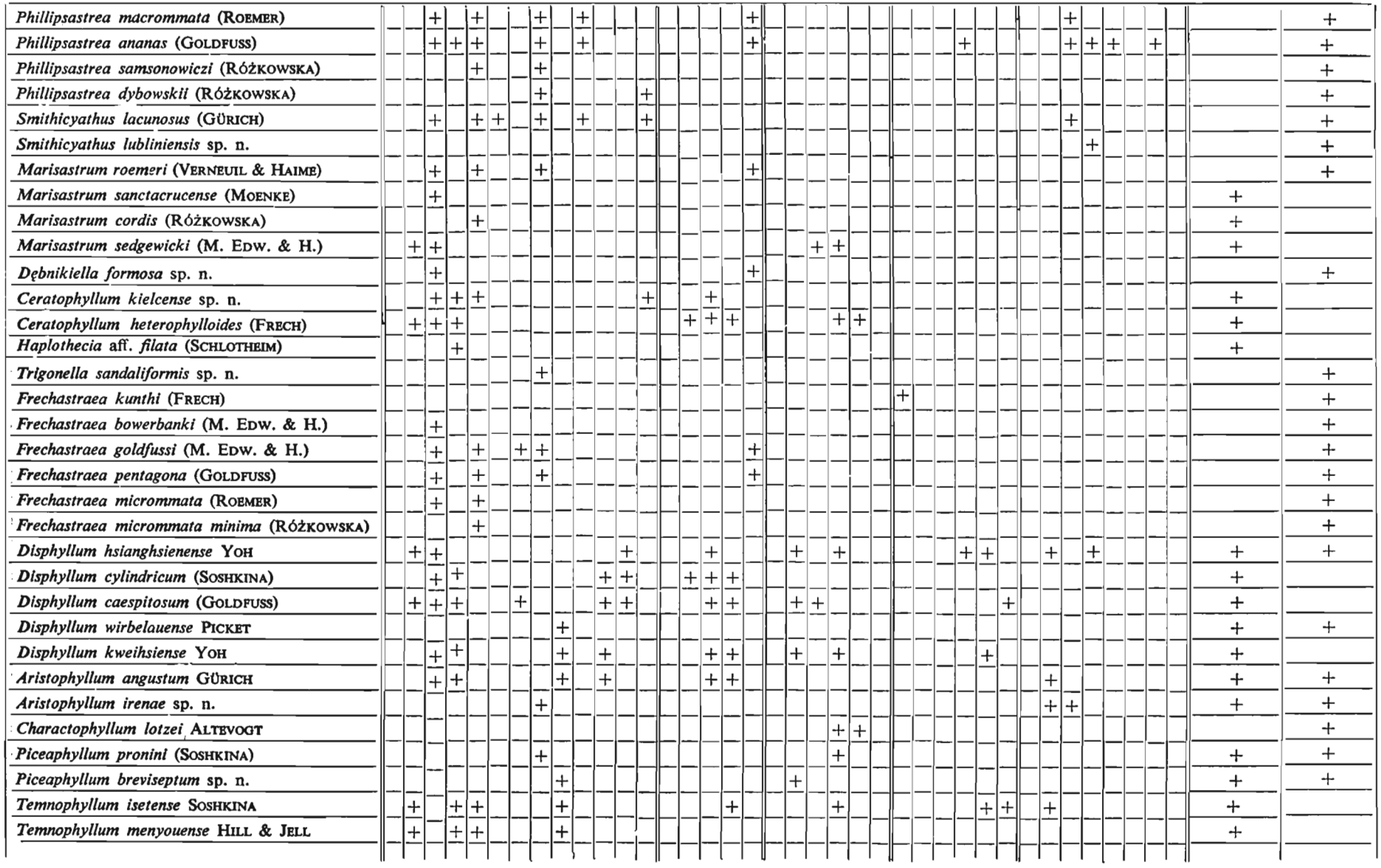
Phillipsastrea macrommata (ROEMER)
Phillipsastrea ananas (GOLDFUSS)
Phillipsastrea samsonowiczi (RÓŻKOWSKA)
Phillipsastrea dybowskii (RÓŻKOWSKA)
Smithicyathus lacunosus (GÜRICH)
Smithicyathus lubliniensis sp. n.
Marisastrum roemeri (VERNEUIL & HAIME)
Marisastrum sanctacrucense (MOENKE)
Marisastrum cordis (RÓŻKOWSKA)
Marisastrum sedgewicki (M. EDW. & H.)
Dębnikiella formosa sp. n.
Ceratophyllum kielcense sp. n.
Ceratophyllum heterophylloides (FRECH)
Haplothecia aff. *filata* (SCHLOTHEIM)
Trigonella sandaliformis sp. n.
Frechastraea kunthi (FRECH)
Frechastraea bowerbanki (M. EDW. & H.)
Frechastraea goldfussi (M. EDW. & H.)
Frechastraea pentagona (GOLDFUSS)
Frechastraea micrommata (ROEMER)
Frechastraea micrommata minima (RÓŻKOWSKA)
Disphyllum hsianghsienense YOH
Disphyllum cylindricum (SOSHKINA)
Disphyllum caespitosum (GOLDFUSS)
Disphyllum wirbelauense PICKET
Disphyllum kweihsiense YOH
Aristophyllum angustum GÜRICH
Aristophyllum irenae sp. n.
Charactophyllum lotzei ALTEVOGT
Piceaphyllum pronini (SOSHKINA)
Piceaphyllum breviseptum sp. n.
Temnophyllum isetense SOSHKINA
Temnophyllum menyouense HILL & JELL

table 1 (continued)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Temnophyllum turbinatum HILL				+					+																							+		+	+				+	+
Temnophyllum verum sp. n.			+	+														+																				+	
Temnophyllum elongatum sp. n.													+																										+	
Temnophyllum miniarense (SOSHKINA)			+																											+		+						+	
Alaiophyllum jurushevskyi (GORIANOV)				+																																		+	
Fedorowskicyathus similis sp. n.								+			+															+													+
Mictophyllum guniae sp. n.																				+		+																	+
Chonophyllum dulce sp. n.			+																																				+
Iowaphyllum oliveri sp. n.			+			+		+																															+
Kowalaephyllum excelsum sp. n.								+																															+
Kowalaephyllum poculum sp. n.			+																																			+
Kowalaephyllum mirabile sp. n.								+																															+
Tabulophyllum densum sp. n.		+	+																														+					+	+
Tabulophyllum priscum (MÜNSTER)			+					+					+							+				+									+	+					+
Tabulophyllum mconnelli (WHITEAVES)								+																															+
Tabulophyllum irregulare sp. n.			+					+										+															+					+
Acanthophyllum frasniense sp. n.																																+	+					+	
Grypophyllum unduliseptatum (IVANIA)			+	+									+			+	+			+		+	+							+		+		+		+		+	
Rachaniephyllum andreae sp. n.																																	+		+		+			+

TAXONOMIC VALUE OF FINE SEPTAL STRUCTURE

The fine structure of septa, although trabecular in most cases investigated in the present paper, differs in particular genera or groups of genera, and may be characterized as follows:

(1) The *fibro-normal fine structure.* This is a rare phenomenon among Frasnian tetracorals. In the present study it has been found only in *Pseudopetraia* SOSHKINA (family Petraiidae DE KONINCK), in *Acanthophyllum* DYBOWSKI and *Grypophyllum* WEDEKIND (family Ptenophyllidae WEDEKIND).

(2) *Monacanthine trabeculae* are arranged in various patterns.

(a) In the *disphylloid pattern* the trabeculae are parallel to one another and are set at various angles to the horizontal. They are to be seen in *Aristophyllum* BULVANKER *et al.* (family Disphyllidae HILL) and in *Mictophyllum* LANG and SMITH (family Mictophyllidae HILL).

(b) The *charactophylloid pattern* (PEDDER 1972) is characteristic for *Charactophyllum* SIMPSON, *Temnophyllum* WALTHER, *Alaiophyllum* GORIANOV, *Piceaphyllum* gen. n. All are included in the family Charactophyllidae PEDDER.

(c) The *rhipidacanthine fine structure* (JELL, 1969) with fans of bifurcated trabeculae, are very widely spread in most but not all genera of the family Phillipsastraeidae ROEMER. The present author ascribes it to the following genera and subfamilies: *Smithicyathus* gen. n., *Phillipsastrea* (Phillipsastraeinae ROEMER), *Pterorrhiza* EHRENBERG, *Peneckiella* SOSHKINA (Phacellophyllinae WEDEKIND), *Ceratophyllum* GÜRICH, *Debnikiella* gen. n., *Haplothecia* SCHLOTHEIM (Marisastrinae RÓŻKOWSKA). In *Trigonella* gen. n. the fine structure is not visible.

(d) Except for the fine structure sensu stricto, there are structures of peripheral parts of septa, which also possess some taxonomic value.

(d_1) The naotic septa representing an evolutionary advanced stage of septal development, in which the peripheral septal ends form a combination of saucer-like or plate-like dissepiments and of parallel or divergent radial trabecular rods. The genera *Craterophyllum* FOERSTE (family Arachnophyllidae DYBOWSKI), *Chonophyllum* M. EDW.-H., *Kowalaephyllum* gen. n., *Iowaphyllum* STUMM (family Chonophyllidae HOLMES) have this septal structure.

(d_2) In *Tabulophyllum* FENTON and FENTON (family Chonophyllidae) the peripheral septal parts are represented only by divergent trabecular rods. Plate-like dissepiments are lacking.

(d_3) In *Rachaniephyllum* gen. n. (family Cystiphyllidae M. EDW.-H.) the septa are reduced to short, pinnately arranged septal spines.

The taxonomic importance of the fine structure has been variously evaluated by different students, e. g. VAUGHAN (1943) considered it to be diagnostic for genera, while according to LECOMPTE (1952) and JELL (1969) it characterizes families. The present author's observations indicate that the taxonomic rank of this feature varies among particular groups of Frasnian Rugosa. Namely: the rhipidacanthine fine structure is common among phillipsastraeids and met in three subfamilies: Phillipsastraeinae ROEMER, Phacellophyllinae WEDEKIND, and Marisastrinae RÓŻKOWSKA. *Frechastraea* SCRUTTON having fan-shaped trabeculae, which are not bifurcated, may not belong to the subfamily Phillipsastraeinae.

All genera of the family Charactophyllidae PEDDER have fine undulated trabeculae, which are rarely met in other Frasnian tetracorals. These charactophylloid trabeculae have been described for the genera *Charactophyllum*, *Temnophyllum*, *Piceaphyllum* gen. n. However, the cited genera have been included into this family mainly on the basis of this type of fine structure.

The various types of fine structure may independently appear in different lineages. The same is true for modifications of septal morphology, described above. They are diagnostic for some genera, but may also occur on different stages of tetracoral evolution. The Frasnian representatives of the genera *Craterophyllum* and *Chonophyllum* described herein with a question mark, are probably only homeomorphs of the Silurian type-species of those genera in spite of the identical morphology of their septa.

SYSTEMATIC PART

Order **Rugosa** MILNE-EDWARDS and HAIME, 1850
Family **Petraiidae** de KONINCK, 1872
Genus *Pseudopetraia* SOSHKINA, 1951 *non* SCHINDEWOLF, 1924
Pseudopetraia devonica SOSHKINA, 1951

(pl. 1: 7*a*, *b*)

1951. *Pseudopetraia devonica* SOSHKINA: 24, pl. 2: 1-9, figs 1-4.
1960. *Pseudopetraia devonica* SOSHKINA; SPASSKY: 22, pl. 1: 1-2; pl. 26: 1-3 (see synonymy).
1962. *Pseudopetraia devonica* SOSHKINA; SOSHKINA, DOBROLJUBOVA and KABAKOVITSH: 321, pl. 12: 2.

Material. — One transversely and longitudinally sectioned specimen without a proximal end.

Dimensions (in mm):

	L	n/d
UAM TcI/1	16	18:5.5

Supplementary description. — An available part of the subcylindrical corallite possesses a deep cup-shaped calice. Major septa, which deep into a peripheral wall, are long, straight, wedge-shaped, united into systems, and slightly differentiated in length. The cardinal and counter septa, which rest in a kind of fossulae, almost meet each other in the centre of corallite. Minor septa are restricted mostly to the wall. Only some of them slightly extend into the corallite lumen to form a kind of knobs.

Remarks. — SCHINDEWOLF (1924) established a new genus *Pseudopetraia* on the basis of a different ontogeny of the Upper Devonian coral from Saalfeld in comparison to that of the Silurian genus *Petraia* MÜNSTER. He did not describe any species of *Pseudopetraia*. The neotype species, *P. devonica* SOSHKINA from Eifelian of the USSR was introduced by SOSHKINA (1951: 24). She also demonstrated that the minor septa in *P. devonica* appear cyclically. The Polish specimen resembles the type specimen in having a similar n/d ratio and slightly similar arrangement of septa. It differs in possessing concave tabulae. The last character is variable in the Russian specimens, however (SOSHKINA 1951: 8; SPASSKY 1960, pl. 26: 1-3).

Family **Streptelasmatidae** NICHOLSON *in* NICHOLSON and LYDEKKER, 1889.
Genus *Breviphrentis* STUMM, 1949
(?) *Breviphrentis* sp.

(pl. 1: 1*a*, *b*)

Material. — One fragmentary specimen.

Dimensions (in mm):

	L	n/d
IG-1429. II. 1	23	23/18

Description. — Irregularly curved, wedge-shaped septa of two orders are fibro-normal in their fine structure. Their thickened peripheral parts form a 1-2 mm thick septotheca. Major septa are almost equal in length, occupying approximately 1/2 of the corallite radius. Those of the cardinal quadrants are inclined obliquely towards the shortened cardinal septum, forming an U-shaped cardinal fossula. Minor septa reach slightly less than one half of length of the major ones. A wide tabularium is composed of complete horizontal tabulae.

Remarks. — The available specimen is too fragmentary for certain identification even on a generic level. *Zmeinogorskia* SPASSKY (1960: 32) from Middle Devonian of the Rudnyi

Altai, possessing similar septa and tabulae, differs from the discussed specimen in not having a U-shaped fossula. *Alaiophyllum* IVANIA (1965: 10) differs in having thickened septa in the cardinal quadrants and well developed dissepimentarium. *Breviphrentis* seems to be the most similar genus.

Family **Arachnophyllidae** DYBOWSKI, 1873
Genus *Craterophyllum* FOERSTE, 1909
Craterophyllum (?) *humile* sp. n.

(pl. 1: 8*a*, *b*; fig. 2: *a*, *b*)

Holotype: UAM No. TcI/2; pl. 1: 8*a*, b; fig. 2*a*, *b*.
Type horizon: *Palmatolepsis gigas* Zone.
Type locality: Kowala II, Holy Cross Mts.
Derivation of the name: Lat. *humilis* — low.

Diagnosis. — Corallite trochoid with everted calice; major and minor septa naotic, equal in length and width, densely spaced; axial tabellae short forming a concave floor; small elongated dissepiments in a wide dissepimentarium; rejuvenescences present.

Material. — One silicified specimen.

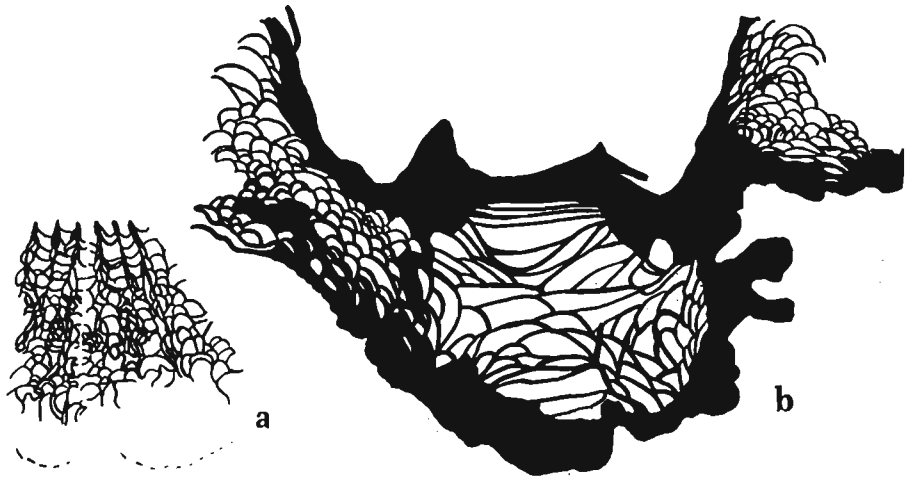

Fig. 2
Craterophyllum (?) *humile* sp. n. *a* — septal structure in the dissepimentarium in cross section, ×3; *b* — longitudinal section, ×3.4. Holotype (UAM Tc/2), Kowala II.

I

Description. — The calicular part of the corallite is composed of a series of superposed calicular margins 0.5-1 mm apart. The calice has a wide reflex peripheral platform and a narrow saucer-shaped central region. The naotic septa, 2 mm wide at the periphery, become thinner and lamellar near the tabularium. They bear crossbar carinae on their lamellar parts and terminate at the tabularium boundary. Peripheral, disintegrated parts of septa are composed of convex or rounded plates and of fine spine-like radiating trabeculae. Similar septa have been described by LANG (1926, fig. 2, nos 3, 4). Interseptal loculi are only 0.2 mm wide and are filled up with fine dissepiments.

In the vertical section of the reflex calicular platform there are approximately 20 series of fine, elongated dissepiments arranged in horizontal rows. In the inner part of the corallite similar dissepiments are standing in vertical rows. Tabulae are incomplete, small and concave.

Remarks. — This specimen is similar to, but not certainly congeneric with *Craterophyllum* (Dr. OLIVER'S personal comm., 1976). Consequently, the new species is only provisionally assigned to the genus *Craterophyllum*. It may belong to quite a different lineage.

Family **Zaphrentidae** MILNE-EDWARDS and HAIME, 1850
Genus *Heliophyllum* HALL *in* DANA, 1846
Heliophyllum proliferum (FRECH, 1885, *non* ROEMER, 1855)

(pl. 1: 4)

1885. *Hallia prolifera* (ROEMER); FRECH: 82, pl. 7: 5*a*, *b*.
1966. *Charactophyllum proliferum* (ROEMER); GUNIA: 304, pl. 2: 8; pl. 3: 1.
non 1855. *Cyathophyllum proliferum* ROEMER: 29, pl. 6: 10.

Material. — One thin cross-section of a fragmentary corallite (U. Wr. D. Św./K 1).

Description. — Major and minor septa of the preserved fragment of the corallite are almost equal in length and thickness. They bear yardarm carinae, which are slightly more prominent at the periphery of corallite. Most of the axial region of corallite is damaged, but, in part of it, there is a peripheral offset preserved. The latter incorporated some inner ends of septa of the parent corallite, and produced new long septa at its new wall. These new septa are carinated, but their yardarm carinae are covered with stereoplasmatic layers.

Remarks. — Since the specimen of *Cyathophyllum proliferum* (ROEMER 1855) appeared to be a tabulate coral, the corallites desribed subsequently by FRECH (1885) as *Hallia prolifera* (ROEMER 1855) and by GUNIA (1966) as *Charactophyllum proliferum* (ROEMER 1855), became automatically excluded from that species. The specimen identified by GUNIA *(l. c.)* is here redescribed as *Heliophyllum proliferum* (FRECH 1855, *non* ROEMER 1855). This identification is only a tentative one, as FRECH's (1885) specimen was most probably lost together with the rest of his collection.

Family **Phillipsastraeidae** ROEMER, 1883
Subfamily **Phillipsastraeinae** ROEMER, 1883
Genus *Smithicyathus* gen. n.

Type species: *Phillipsastrea cincta* SMITH, 1945.
Derivation of the name: Named in honour of the late Dr. STANLEY SMITH, Bristol, Great Britain.
Species assigned: *Phillipsastrea cincta* SMITH, 1945; *Pachyphyllum lacunosum* GÜRICH, 1896; *Smithicyathus lublinlensis* sp. n.
Stratigraphic and geographic range: Canada. Poland; Upper Frasnian.

Diagnosis. — Fan-shaped trabeculae of the rhipidacanthine type supplement the SMITH's (1945: 43) diagnosis.

Remarks. — The new genus is distinguished from all genera of Phillipsastraeinae by its epithecate (tripartite) wall (SORAUF 1967 in JELL 1969: 62), surrounding corallites within the corallum. The genus *Stellatophyllum* SPASSKY (1968: 30) with its massive colony, having "uninterrupted" walls is most similar to the new genus. In *Smithicyathus*, however, there is a trend to surround more than a single corallite with an "epithecal" wall; to form locally a subphaceloid shape, and to produce intracalicinal offsets.

Smithicyathus lubliniensis sp. n.

(pl. 1: 2 and 3*a-c*)

Holotype: IG-1429. II. 5; pl. 1: 3*a-c*.
Type horizon: Upper Frasnian, stratum with *Phillipsastrea*.

Type locality: Borehole Korczmin IG-III, depth 1891-1897 m.
Derivation of the name: after the town Lublin.

Diagnosis. — A cerioid-subphaceloid corallum with short septa of two orders, separated from the epitheca by lonsdaleoid dissepiments; the epitheca surrounds only one corallite in its ephebic stage; tabulae complete, slightly concave or sagging.

Material. — Four fragments of coralla, 5 thin sections.

Dimensions (in mm):

	d:t:d	n/d
IG-1429. II. 5	1:2.5:1	16/5

Description. — Irregularly polygonal corallites are unequally arranged within the colonies, having their centres at a distance of 4-5 mm from one another. Thickened septa, almost equal in length, form a distinct ring around tabularia. They only slightly extend out of the zone of the horseshoe dissepiments. A zone of lonsdaleoid dissepiments 0.4-2 mm wide, separates them from external walls of corallites. In the longitudinal section the internal part of the dissepimentarium consists of a 0.3 mm wide row of small horseshoe dissepiments. Peripherally they become replaced by flat, irregular, rarely globose, lonsdaleoid dissepiments. Tabulae usually complete, horizontal or concave, densely spaced of about 7 in 5 mm. In cross-section trabeculae densely spaced with 0.1-0.2 mm in width. In the thickened part of septa they are set in 1-2 rows. In longitudinal section they form very low fans with rhipidacanthine trabeculae entirely in contact.

Blastogeny. — The only record on the mode of offsetting within the genus *Smithicyathus* gen. n. was that of RÓŻKOWSKA (1953) who described an appearance of 2-3 intracalicinal offsets in a dissepimental tissue of *Pachyphyllum lacunosum* GÜRICH, 1896. In *S. lubliniense* sp. n. offsets appear near an external wall of a parent corallite. For a long period of development they are not separated from a parent corallite by any type of a wall. Such a group of corallites, surrounded by a common epitheca, may be compared with *Phillipsastrea cincta* SMITH. A new epitheca between a parent and an offset appears when the latter already possesses well developed thickened septa and a pseudotheca.

Variation. — Inter- and intra-colonial variation is not considerable. The main differences are: 1) occasional removal of corallites, causing gaps in the cerioid corallum; 2) slightly elongated major septa, which in a few observed cases may almost reach an external wall.

Remarks. — *Phillipsastrea cincta* SMITH with its almost completely cerioid colony is the most similar species. In *Pachyphyllum lacunosum* GÜRICH the colony is distinctly subphaceloid; the tabulae are incomplete and the lonsdaleoid dissepimentarium is absent.

Genus *Phillipsastrea* d'ORBIGNY, 1849
Phillipsastrea plantana sp. n.

(pl. 1: 9; 2: 1*a*, *b*)

Holotype: UAM No. TcI/4; pl. 2: 1*a*, *b*.
Type horizon: Upper Frasnian, F2i-j niveau, stratum with *Phillipsastrea*.
Type locality: Sobiekurów, Planta quarry, Holy Cross Mts.
Derivation of the name: after Planta quarry.

Diagnosis. — Pseudocerioid coralla with corallites 9-11 mm in diameter; major septa long, nearly reaching a corallite axis, carinated only in the inner pseudotheca. Horseshoe dissepiments arranged in one discontinuous row; tabulae incomplete, convex; trabeculae composed, short, set in high, narrow fans.

Material. — Two fragmentary coralla, 5 thin sections.

Dimensions (in mm):

	Dc	Dt	sI
UAM TcI/4	9-11	5-7.2	16-20

Description. — Transverse section. Corallites in a tabular corallum are irregular in shape, and separated by a strongly zigzagged pseudotheca; straight major septa, attenuated in the dissepimentarium and tabularium, spindle-shaped and slightly dilated in the ring of horseshoe dissepiments, form a discontinuous septo-cyathotheca. The minor septa, which rarely enter the tabularium, are slightly thinner than the major ones. In the longitudinal section three zones may be distinguished within the dissepimentarium: (1) peripheral zone, which is composed of about 4 rows of horizontal and flat dissepiments; (2) zone of horseshoe dissepiments, forming an irregular row; (3) internal zone, in which dissepiments are arranged in 1-3, very steep, almost vertical rows. Tabularium consists of slightly concave, horizontal or oblique, sometimes alternating periaxial tabellae, and of flat or convex axial tabellae, some of which may bear accessory plates.

Fine structure is trabecular; particular trabeculae form small nodules on surfaces of thin external parts of septa. Dimensions of trabeculae in thin septa reach 0.1-0.2 mm while those of dilated parts of septa may reach up to 0.3 mm in diameter. Trabeculae are united into fans, but the preservation is bad, and bifurcation of trabeculae is only faintly visible.

Remarks. — The species described differs from the most similar *P. macrommata* (ROEMER), in having more numerous septa (16-20 against 14-15 in *P. macrommata*), by a larger diameter of the tabularium, more strongly zigzagged outer pseudotheca, and discontinuous trabecular fans.

Subfamily **Phacellophyllinae** WEDEKIND, 1921
Genus *Pterorrhiza* EHRENBERG, 1834
Pterorrhiza multizonata (REED, 1922)

(pl. 1: 5, 6*a*, *b*)

1922. *Cyathophyllum (Thamnophyllum) multizonatum* REED: 12, pl. 1: 7-12; pl. 2: 1-7.
1935. *Macgeea multizonata* REED; LANG and SMITH: pl. 37: 13-15.
1968. *Macgeea* cf. *multizonata* (REED); GUNIA: 149, pl. 4: 11, 12.
non 1951. *Macgeea multizonata* (REED); SOSHKINA: 80-81: pl. 14: 1-4.
non 1953. *Macgeea* cf. *multizonata* (REED); RÓŻKOWSKA: 27, pl. 3: 1-7.

Material. — Nine specimens; 15 thin sections, 6 peels.
Dimensions (in mm):

	L	Dc	sI
IG-1429. II. 3	20	22	34

Remarks. — The discussed species is one of the most frequent in the Lublin region. Particular corallites closely resemble in all morphological characters of major importance the Indian topotype, illustrated by LANG and SMITH (1935): septa are thick and spindle-shaped in the dissepimentarium; the minor ones only penetrate the tabularium. The major septa thin rapidly in the tabularium, becoming thread-like thin and curved. Carinae and lateral knobs on septa are absent. Horseshoe dissepiments are thick-walled (pl. 1: 6*a*). Very fine, steeply inclined internal dissepiments form 1-2 rows. Broad concave tabularium consists of sagging axial tabellae. Fine structure is typically rhipidacanthine with trabeculae 0.1-0.3 mm in width. The Lublin specimens differ from those described by SOSHKINA (1951) and by RÓŻKOWSKA (1953) in having very short thickened peripheral septal ends.

Genus *Peneckiella* SOSHKINA, 1939
Peneckiella fascicularis (SOSHKINA, 1952)

(pl. 2: 3a, b; 4)

1952. *Schlüteria fascicularia* SOSHKINA: 100, pl. 40: 140.

Material. — Five fragments of coralla, 7 thin sections.
Dimensions (in mm):

	L	Dc	sI
UAM TcI/7	15	9	24

Description. — Corallum dendroid, offsetting laterally. Corallites possess cup-shaped calices with protuberant floors and rounded calicular edges. The major septa are dilated and knobbed in the dissepimentarium, thread-like thin in the tabularium, nearly reaching the axis. Their peripheral ends penetrate the 0.2 mm thick external wall. The minor septa do not enter the tabularium. In longitudinal section there is only one row of peneckielloid, locally horseshoe dissepiments. Tabulae are mostly complete, undulate; they are spaced of about 8 in 5 mm. Trabeculae 0.2 mm thick, in the septo-cyathotheca somewhat wider, alternated, arranged in fans of the rhipidacanthine type.

Blastogeny. — Offsets arise in the region between the 2 rings of stereozones. They either deviate laterally with a large angle, or grow parallel to the parent corallite. In the last case the parent corallite loses its outer stereozone and the offset produces its own new stereozone.

Remarks. — The described specimens differ from the type-specimen only in their larger septal index (n/d) that equals 22/8 in the Chojnice specimen, versus 17/12 in the type specimen.

Peneckiella szulczewskii sp. n.

(pl. 2: 2*a-e*)

Holotype: UAM No. TcI/6; pl. 2: 2*a-e*.
Type horizon: *Polygnathus asymmetricus* Zone.
Type locality: Józefka Hill near Górno, Holy Cross Mts.
Derivation of the name: in honour of Dr. MICHAŁ SZULCZEWSKI, University of Warsaw.

Diagnosis. — Laterally offsetting *Peneckiella* with n/d ratio 18-20/7-9; peneckielloid dissepiments dominant, but horseshoe and sigmoidal ones also present; tabularium irregular; septa carinated.

Material. — Two fragments of a well preserved corallum (5×6×7 cm and 7×4×2 cm) and 11 thin sections.
Dimensions (in mm):

	L	Dc	SI
UAM Tc I/b	22, 27, 30	7-9	18-20

Description. — Corallites irregularly bent, rounded or elliptical in sections, possessing calices cup-shaped and slightly flattened at the margins. Sharp external ends of septa deeply penetrate the 0.4 mm thick external wall. The distinctly thickened dissepimental parts of major septa bear yardarm or zigzag carinae, while their long, tabular parts, which almost reach the corallite axis, are smooth, thin and slightly wavy. The minor septa are less distinctly carinated and thinner than the major ones. Most of them penetrate the tabularium. The dissepimentarium contains 1-3 rows of peneckielloid, horseshoe, sigmoidal and regular, globose dissepiments (pl. 2: 2*c*, *e*). The comparatively wide tabularium is composed of obliquely downwards inclined periaxial tabellae and of narrow, convex, globose axial tabellae. Offsetting of the tham-

nophylloid lateral type, characteristic for the genus *Peneckiella*, has been described by RÓŻKOWSKA (1960: 30).

Fine structure. — The trabecular centres either produce laterally elongated fibres, which form yardarm carinae, or they are arranged alternately, causing zigzagged septa with xyloid carinae. The asymmetric rhipidacanthine trabecular fans are composed of 0.2-0.3 mm thick trabeculae.

Individual variation. — The species described shows a considerable intra- and intercolony variation: (a) in septal dilation starting from the septa spindle-shaped in the dissepimentarium through all gradations down to an unthickened and not carinated septa at the end; (b) in tabularium changes that may be broad and domed or narrow and convex with many types of incomplete tabulae, and (c) in the dissepimentarium thickness and its composition of various dissepiments.

Remarks. — *P. szulczewskii* sp. n. is most similar to *P. salternensis* SCRUTTON (1968). The last species differs in having flat and domed, very regularly spaced tabulae, small diameter of corallites (maximum 6.3 mm), short major septa and different n/d ratio.

Subfamily **Marisastrinae** RÓŻKOWSKA, 1965
Genus *Haplothecia* FRECH, 1885
Haplothecia aff. *filata* (SCHLOTHEIM, 1820)

(pl. 2: 5*a*, *b*)

Material. — One fragmentary corallum; 1 thin section.
Dimensions (in mm):

	Dc	sI
UAM TcI/5	8-11	15-18

Description. — The corallum is strongly damaged and fragmentary. The calices are slightly deepened with a boss. The epithecal walls are straight or deflexed or locally lacking. Septa of 2 orders in the lumen are nearly equal in length and width, strongly carinated, with crossbar carinae that are irregular near the periphery and disappearing in the tabularium. Between the septa there are 6-8 rows of small axially convex dissepiments in cross section. In the vertical section trabecular fans of the rhipidacanthine type are present (according to PEDDER 1969).

Remarks. — SCRUTTON (1967: 271) based his description on FRECH's lectotype from Grund in the Harz Mts. SOSHKINA (1951, 1952) described under the same specific name some specimens from the Frasnian in the Ural Mts., which SCRUTTON *(l. c.)* regarded as congeneric, but non conspecific with Frech's type specimen. The specific identification of the Polish specimen is also doubtful, due to its bad preservation and somewhat greater n/d ratio (15-18/8-11 against 12-15/7-8 in the Harz Mts).

Genus *Ceratophyllum* GÜRICH, 1896
Ceratophyllum kielcense sp. n.

(pl. 3: 7-9; 10*a*, *b*)

Holotype: UAM No. TcI/9; pl. 3: 10*a*, *b*.
Type horizon: Lower or Middle Frasnian, *Polygnathus asymmetricus* Zone, F2a-h.
Type locality: Kielce, Wietrznia quarry, Holy Cross Mts.
Derivation of the name: found in Kielce.

Diagnosis. — Subcylindrical corallite with long, spindle-shaped, trabecular nodules bearing

septa; dissepimentarium arched, distinctly separated from the convex tabularium; asymmetric fans of rhipidacanthine trabeculae.

Material. — Beside the holotype there are 8 fragmentary specimens.

Dimensions (in mm):

	L	n/d
UAM TcI/9	20	29/10

Description. — Corallites are round in section with 0.2-0.3 mm thick external walls, deeply penetrated by septal ends (pl. 3: 10*b*). Septa spindle-shaped in the dissepimentarium, slowly thinning in the tabularium. The dissepiments, horizontal and globose near the periphery, become small and steeply inclined near the tabularium (pl. 3: 7, 10*a*). Tabularium domed, tabulae incomplete, 12-15 in 5 mm.

Fine structure. — The rhipidacanthine trabeculae are arranged in broad asymmetric fans, densely packed and steeply inclined axially. The alternately arranged trabeculae form knobs on the lateral surfaces of the dilated parts of septa.

Remarks. — The above described specimens may in fact belong to two species. The material is too fragmentary to separate them, however.

Ceratophyllum heterophylloides (FRECH, 1885)

(pl. 3: 11*a*, *b*; fig. 3)

1885. *Cyathophyllum heterophylloides* FRECH; FRECH: 30, pl. 1: 2a-e.
1896. *Cyathophyllum heterophylloides* FRECH; GÜRICH: 158, pl. 2: 7.
1966. *Charactophyllum heterophylloides* (FRECH); GUNIA: 303, pl. 2: 6-7.

Material. — From 2 transversely and longitudinally sectioned specimens, only thin sections are preserved.

Dimensions (in mm):

	L	dc	sI
UAM TcI/14	30	22	30

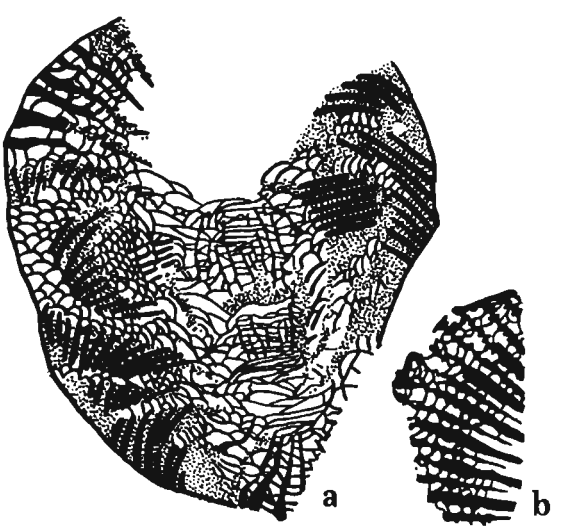

Fig. 3
Ceratophyllum heterophylloides (FRECH) *a* — longitudinal section, ×3; *b* — septal structure in the dissepimentarium in cross section, ×3; (UAM TcI/13a), Wietrznia 13.

Supplementary description. — Corallites are short, subcylindrical; one of them (fig. 11a) is slightly curved. They possess calicular edges flattened and floors of calices broad, slightly convex. The septa are spindle-shaped in the dissepimentarium, slowly thinning in the tabularium. Their peripheral ends are irregularly knobbed. The minor septa are somewhat shorter and thinner than the major ones. The dissepimentarium is broad and convex. The dissepiments are horizontal and globose near the periphery, becoming small and inclined steeply downwards near the tabularium. Tabulae are convex and incomplete. Trabeculae, arranged in asymmetric fans are axially steeply inclined.

Remarks — GÜRICH (1896) and GUNIA (1966) gave only illustrations of horizontal sections and very laconic descriptions of this species. FRECH's (1885) description is more comprehensive. He described flat marginal dissepiments, which he did not illustrate, however, and which do not exist in the Polish specimens.

Genus *Trigonella* gen. n.

Type species: *T. sandaliformis* sp. n. monotypic.
Derivation of the name: after the triangular shape of the corallite.

Occurrence. — Bolechowice syncline, Jaźwica quarry, Upper Frasnian, *Palmatolepis gigas* Zone.

Diagnosis. — (?) Marisastrid corallite with *Calceola* shape; major septa long, spindle-shaped in the dissepimentarium, thin in the tabularium; minor septa contratingent; cardinal septum short, thick; cardinal fossula triangular, open; counter septum elongated; dissepimentarium everted; tabularium broad, concave; fine structure of septa trabecular with fanshaped trabeculae of the rhipidacanthine (?) type.

Remarks. — The peripheral sharp ends of septa resemble those in *Pterorrhiza* EHRENBERG, but lack of horseshoe dissepiments clearly distinguishes these two genera. The new genus is also similar to *Ceratophyllum* GÜRICH in its everted dissepimentarium and broad tabularium, but differs in having septal costae and a triangular shape.

Trigonella sandaliformis sp. n.

(pl. 2: 6*a-c*; fig. 4)

Holotype: UAM No. TcI/13; pl. 2: 6*a-c*; fig. 4.
Type horizon: *Palmatolepis gigas* Zone.
Type locality: Bolechowice syncline, Jaźwica quarry, Holy Cross Mts.
Derivation of the name: after sandal-like shape.

Diagnosis. — As for the genus *Trigonella*.

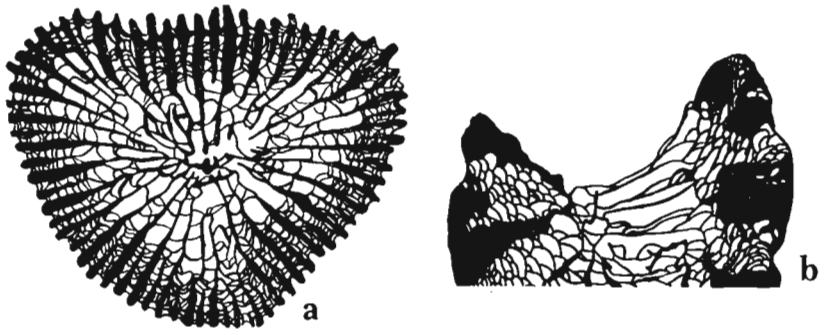

Fig. 4
Trigonella sandaliformis sp. n. *a* — transverse section, *b* — longitudinal section ×2, Holotype (UAM TcI/14), Kowala II.

Material. — One well preserved specimen.
Dimensions (in mm):

	L	Dc	sI
the holotype	35	27×22	36

Description. — Specimen silicified in its external part, with destroyed epitheca and exposed distinct septal costae. Arrangement of the protosepta and the symmetry of the corallite depends of its shape. The counter septum is located at the flattened side of the corallite, the cardinal septum in the corner opposite to that flattening, and the alars in the other two corners. Number of septa is equal in all quadrants (septal formula $\frac{8|8}{8|8}+4$); they are distinctly thickened in the dissepimentarium, and thin, irregularly wavy in the tabularium. The majority of septa extends close to the corallite axis; the minor septa are similar in shape and reach approximately 1/2-1/3 of the length of the major ones. Dissepiments mainly pseudoherringbone, regular, axially concave. Lateral-cystose dissepiments locally developed. In the longitudinal section the small globose dissepiments are arranged in hemispherical rows, and form an everted dissepimentarium. The tabularium is not clearly distinguished from the dissepimentarium, as its outer part is composed of dissepiment-like globose tabellae, which differ from the dissepiments in being slightly larger in size. These globose tabellae are replaced in the axial part of the corallite by plate-like, flat, or slightly concave, axial tabellae.

Fine structure. — Poorly preserved. Judging from the everted dissepimentarium, the trabeculae were most probably arranged in fans. It cannot be maintained, however, that the trabeculae were of the rhipidacanthine type; therefore the assignment of the discussed genus and species to the subfamily Marisastrinae is not certain.

Genus *Debnikiella* gen. n.

Type species: *D. formosa* sp. n; genus monotypic.
Derivation of the name: after Dębnik village near Cracow.

Diagnosis. — Large solitary corallite. Septa numerous, radially arranged with fan-shaped trabeculae of the rhipidacanthine type; dissepimentarium everted, broad, without horseshoe dissepiments; tabulae incomplete, tabularium distally concave.

Occurrence. — Dębnik near Cracow, Silesia-Cracow Upland. Upper Frasnian, stratum with *Phillipsastrea.*

Debnikiella formosa sp. n.

(pl. 3: 12; pl. 4: 16*a*, *b*; fig. 5)

Holotype: UAM No. TcI/15; pl. 4: 16*a*, *b*.
Type horizon: Stratum with *Phillipsastrea.*
Type locality: Dębnik, Żarnówczany Dół, Silesia-Cracow Upland.
Derivation of the name: Lat. *formosus* — shapely, because of its inner regular morphology.

Diagnosis. — As for the genus.

Material. — One fragmentary corallite with well preserved inner structure; 2 thin sections, 8 peels.

Dimensions (in mm):

	L	Dc	sI
the holotype	45	29	33

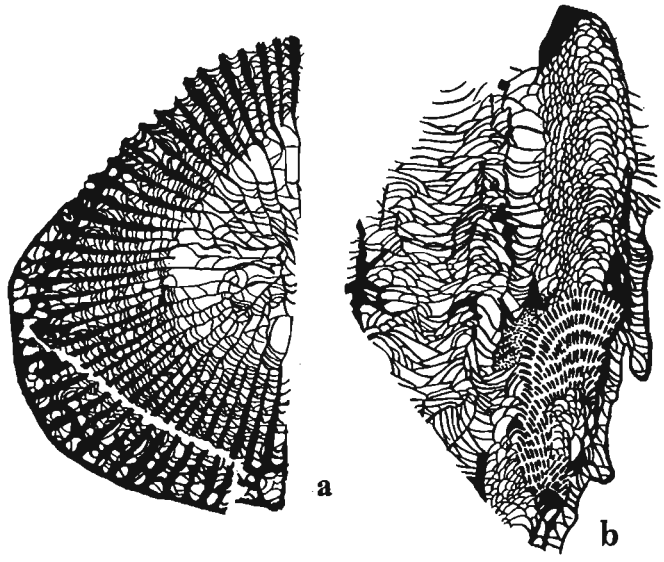

Fig. 5
Debnikiella formosa sp. n. *a* — transverse section, *b* — longitudinal section ×2. Holotype (UAM TcI/15), Dębnik.

Description. — The corallite is subcylindrical with considerably well preserved internal structure; with a deep axial depression and an everted calicular edge. In transverse section sharp peripheral septal ends adhere to a narrow (0.2 mm wide) stereozone. Major septa slightly dilated in the dissepimentarium, attenuated in the tabularium, nearly reach the corallite axis; the counter septum is the longest one; the minor septa are long, contratingent, only reaching the tabularium; there are up to 22 sections of axially concave dissepiments in one septal loculum. In vertical section dissepiments are arranged in steep parabolic rows, forming an everted margin of the calice. In the peripheral row dissepiments are flat, or slightly concave. The rest of the dissepimentarium is formed of globose dissepiments, differentiated in size starting from the longest ones, located on the top of the parabola. The tabularium is divided into distinct periaxial and axial series. The periaxial zone contains densely packed concave tabulae; the axial tabellae are everted at the margin and concave in the central part. The axial zone contains many small globose and flat alternating tabellae of different size.

Fine structure. — Trabeculae of the rhipidacanthine type are arranged in fans up to 5-8 mm in height. Individual trabeculae are of 0.2-0.4 mm in thickness, and are placed in a space of 0.1-0.4 mm apart.

Remarks. — The fragmentary corallite, illustrated on pl. 3: 12 is perhaps a *Debnikiella* sp. Unfortunately only this thin cross section is preserved. *Gurievskiella* ZHELTONOGOVA (1961: 404) is distinguished form *Debnikiella* gen. n. in not having rhipidacanthine trabeculae (HILL and JELL 1970: 55).

Family **Disphyllidae** HILL, 1949
Genus *Aristophyllum* BULVANKER, SPASSKY, KRAVTSOV, 1975
Aristophyllum angustum (GÜRICH, 1896)

(pl. 4: 1*a*, *b*, 2; fig. 6)

1896. *Ceratophyllum angustum* GÜRICH: 166, pl. 4: 2*a-c*.

Material. — Four fragmentary specimens, 3 thin sections, 7 peels.
Dimensions (in mm):

	Dc	sI	d:t:d
UAM Tc. I/19	13	28	2.5:8:2.5

Supplementary description. — Subcylindrical corallites, rounded in cross section, have a broad (2-2.5 mm wide) septo-stereozone with minor septa entirely hidden in it; major septa are shortened, in the tabularium thin and irregularly bent. Dissepimentarium rarely appearing. Tabularium is domed, with incomplete tabulae.

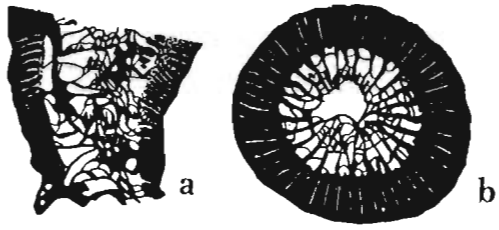

Fig. 6
Aristophyllum angustum (GÜRICH). *a* — longitudinal section, *b* — transverse section, ×2. (UAM TcI/19), Kadzielnia 7.

Fine structure. — The 0.3 mm thick monacanths are pinnately fibrous, directed obliquely inwards and upwards at a low angle to the horizontal.

Variation. — The individual variation is not great. The present author observed it in the length of the major septa and the width of the septo-stereozone.

Remarks. — The Niesiołowice specimen (pl. 4: 2) is in its cross section very similar to GÜRICH's (1896, pl. 4: 2*c*) illustration.

Aristophyllum irenae sp. n.

(pl. 3: 1-6)

Holotype: IG-1429. II. 6; pl. 3: 3*a*, *b*.
Type horizon: Lower or Middle Frasnian, *P. asymmetricus* Zone.
Type locality: Borehole Bąkowa IG-1, depth 1931 m, Lublin region.
Derivation of the name: after the female name Irena.

Diagnosis. — Parricidally offsetting corallites with a narrow, not always continuous stereozone; peripheral septal ends spindleshaped; minor septa locally pierce the inner stereotheca; tabulae incomplete flat-concave; dissepiments rounded, small.

Material. — Five fragmentary specimens, 4 thin sections, 8 peels.

Dimensions (in mm):

	L	Dc	sI
IG-1429. II. 6 the holotype	18	20	28

Description. — The holotype has in its cross section a 1-2 mm wide septo-stereotheca. In the vertical section small rounded dissepiments are hidden nearly entirely in it. The width ratio of d:t:d = 2:14:2. Tabulae are incomplete, plate-like and vesiculose.

Fine structure. — Trabecular centres are densely set, forming a nearly continuous dark line with fibres locally 0.5 mm long, axially concave. In the vertical section the monacants are nearly horizonatal, and the lateral septal margins are denticulated.

Ontogeny. — The parricidal offsets in the holotype exhibit various stages of development (pl. 3: 3*b*). 1) The first offset being on the hystero-neanic stage is elliptical in shape and measures 3 mm in the longer diameter. It possesses two order septa, totally embedded in stereozone. In the late neanic stage with n/d ratio = 16:6 the offset becomes rounded, and the major septa enter the tabularium. 3) In the early ephebic stage with n/d ratio = 22:17 the offset possesses 8 major septa in common with the parent corallite. The minor septa slightly penetrate the inner stereozone.

Variation. — Individual variation is not great. It has been observed in the width of septo-stereozone and its discontinuity, in the structure of tabularium with broad and flat or globose tabulae.

Remarks. — The above described species differs from *A. angustum* (GÜRICH) in having larger dimensions, a discontinuous stereozone and parricidal offsets. It resembles *Temnophyllum inopinatum* HILL and JELL, 1970 in its short septa and broad tabularium, differing from the last one in being of larger size and in producing parricidal offsets.

Family **Mictophyllidae** HILL, 1940
Genus *Mictophyllum* LANG and SMITH, 1939
Mictophyllum guniae sp. n.

(fig. 7*a-c*)

Holotype: U. Wr. D. Sw./K. 5; fig. 7*a-c*.
Type horizon: Middle or Upper Frasnian, stratum with *Tabulophyllum priscum* (MÜNSTER).
Type locality: Mokrzeszów, Daisy Lake, Sudetes.
Derivation of the name: In honour of Professor TADEUSZ GUNIA, University of Wrocław.

Diagnosis. — Small corallites with long, thin, irregularly bent major septa; cardinal septum shortened, lying in a broad "fossula"; minor septa depressed, replaced by 6-8 rows of angulate dissepiments; tabularium broad, tabulae horizontal; dissepiments long, locally lonsdaleoid.

Material. — Four specimens, 6 peels.

Dimensions (in mm):

	L	dc	sI
U. Wr. D. Sw. K5	36	12	25

Description. — Corallites are subcylindrical, slightly bent. Calices are shallow with a horizontal floor. The external walls are thin, penetrated by triangular peripheral septal ends to form a septo-stereozone. Septa are locally separated from the wall by lonsdaleoid dissepiments. Major septa do not reach corallite axis. Minor septa are shortened, locally restricted to the

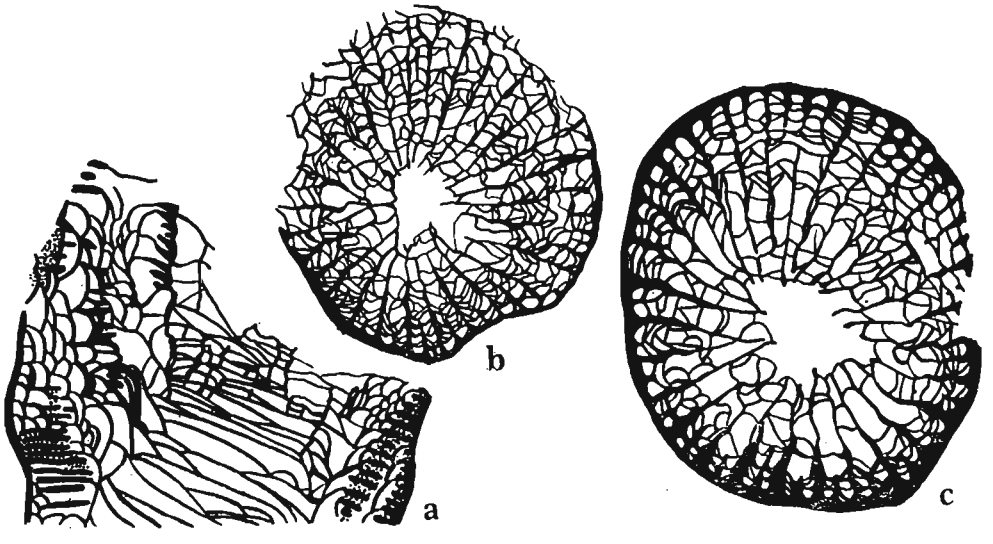

Fig. 7
Mictophyllum guniae sp. n. *a* — longitudinal section, *b* — early ephebic stage, *c* — ephebic stage, ×3.3, Holotype (U. Wr. D. Sw. K5), Mokrzeszów.

stereozone. The zone of angulte dissepiments is of various width and it is broader at the convex side of the corallite. Tabulae are incomplete, horizontal with accessory plates. The width ratio of dissepimentarium and tabularium d:t:d = 2:10:1. The monacanths are subhorizontal, disphylloid, of 0.2-0.3 mm in width.

Remarks. — Hill (1940) introduced the family Mictophyllidae with the type genus *Mictophyllum* LANG and SMITH, 1939. PEDDER (1972:700) found the following characters distinguishing it from *Temnophyllum*: peripherally attenuate septa, fine unflexed trabeculae of the disphylloid type, and commonly elongated dissepiments. Some of SMITH's (1954: 30) species described as appertaining to *Mictophyllum* belong according to PEDDER *(l. c.)* to *Temnophyllum*.

Family **Charactophyllidae** PEDDER, 1972

Remarks. — PEDDER (1972: 698) included to this family the following genera discussed in the present paper: *Temnophyllum* WALTHER, *Charactophyllum* SIMPSON, *Alaiophyllum* GORIANOV. According to the present author's opinion, *Piceaphyllum* gen. n. is also a member of this family. The characteristic features of the charactophyllids are (PEDDER, *l. c.*): charactophylloid trabeculae, septa commonly dilated, dissepimentarium not distinctly separated from the tabularium and well inflated dissepiments.

Genus *Charactophyllum* SIMPSON, 1900
Charactophyllum lotzei ALTEVOGT, 1963

(pl. 4: 3*a*, *b*; 4; fig. 8)

1963. *Charactophyllum lotzei* ALTEVOGT: 17, pl. 1: 2a-c.

Material. — Three silicified specimens and 5 thin sections.
Dimensions (in mm):

	L	Dc	sI	sI:sII
U. Wr. D. Sw./K: 3	17	14	30	3:1

Description. — Major septa dilated and knobby in the dissepimentarium, thin and twisted in the tabularium, nearly reaching the corallite axis. Dissepiments are globose at the periphery,

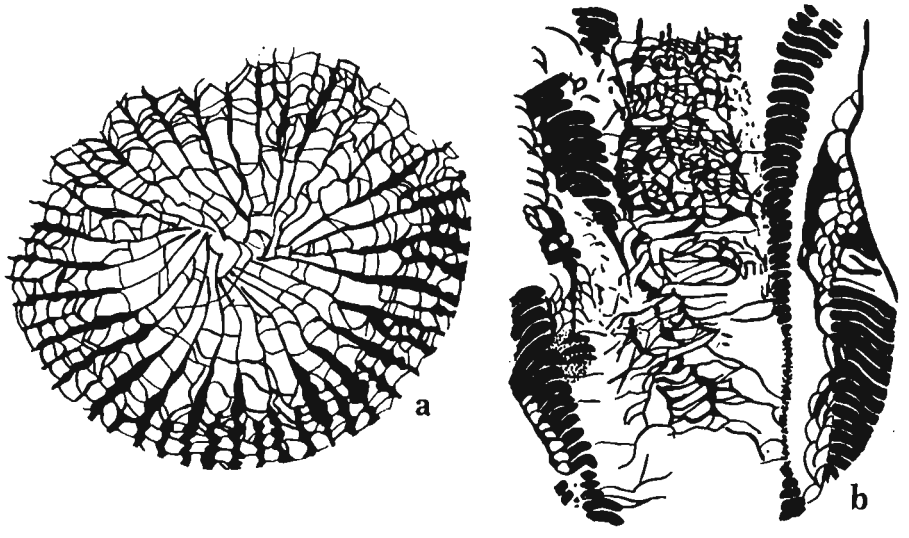

Fig. 8
Charactophyllum lotzei ALTEVOGT. *a* — transverse section, *b* — longitudinal section, ×5, (U. Wr. D. Sw./K3), Witoszów 7 and 10.

elongated and axially inclined near the tabularium. Tabulae incomplete, densely arranged, convex. Charactophylloid trabeculae, 0.3-0.5 mm in width, are in lateral contact. In one corallite (pl. 4: 4) the minor septa terminate in the thickened internal wall.

Remarks. — The described specimens resemble those from the Lower Frasnian of Asturia in its subcylindrical shape, small diameter and the irregular structure of the convex tabularium. ALTEVOGT (1963: 18) also reported an existence of inner stereoplasmatic ring in a cross section of the corallite. The described specimens differ from the photograph of the topotype of *C. nanum* SIMPSON from Iowa, sent to me by Dr. J. E. SORAUF, in having strong carinae and not distinctly separated tabularium with plate-like axial tabellae.

Genus *Alaiophyllum* GORIANOV, 1961

Remarks. — GORIANOV (1961) located that genus in the family Phillipsastraeidae ROEMER; PEDDER (1973: 96) in the family Cyathophyllidae DANA *(sensu lato)*, but he ascertained charactophylloid trabeculae in *Alaiophyllum*. On this basis the present author assigned it to the Charactophyllidae.

Alaiophyllum jarushevskyi GORIANOV, 1961

(pl. 4: 5*a*, *b*; fig. 9)

1961. *Alaiophyllum jarushevskyi* GORIANOV: 71, pl. 8. 1-3.
1973. *Alaiophyllum jarushevskyi* GORIANOV; PEDDER: 96, pl. 11: 1, 3, 5, 6; figs 32-33.

Material. — One incomplete specimen, 2 thin sections.

Dimensions (in mm):

	L	dc	sI
UAM TcI/27	20	20×17	32

Description. — The septa are wedge-shaped with rounded peripheral and sharp axial ends. Dissepiments are elongated, flattened, axially inclined, and hidden in a broad stereozone. The tabulae are mainly complete, highly domed with accessory plates. The monacanths are

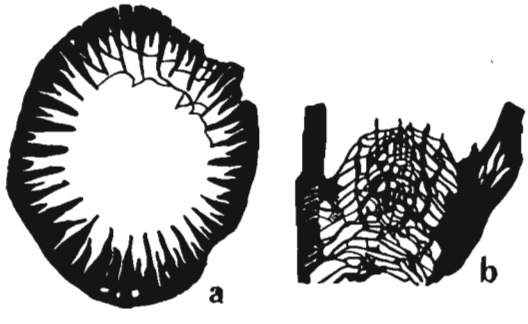

Fig. 9
Alaiophyllum jarushevskyi GORIANOV. *a* — transverse section, *b* — longitudinal section, ×2, (UAM TcI/27), Kadzielnia 9.

thick (0.3-0.4 mm), subhorizontal, inclined with an angle of 10-20° to the horizontal. In cross section of the thickened septa they appear in 2 alternate rows. The fibres are long, and deviate by a large angle from the trabecular centres.

Remarks. — The Polish specimen resembles the type specimen in the length ratio of major and minor septa, in the septal index n/d, but differs in having highly domed tabulae. In spite of that V. B. GORIANOV (personal comm. 1976) expressed the opinion that both specimens are conspecific.

Genus *Temnophyllum* WALTHER, 1928
Temnophyllum isetense (SOSHKINA, 1951)

(pls. 4: 7-15; 5: 1)

1951. *Neostringophyllum isetense* SOSHKINA: 53, pl. 7:1; pl. 8: 1-5.
1968. *Neostringophyllum isetense* SOSHKINA; GUNIA: 150, pl. 4: 13; non pl. 5: 1, 2.

Material. — Twenty seven fragmentary specimens, 32 thin sections, 18 peels.
Dimensions (in mm):

	Dc	sI	sI:sII
UAM TcI/26	17	31	10:6

Diagnosis. — See SOSHKINA 1951: 53.

Description. — Incomplete specimens of this species are common in the Lower and Middle Frasnian bioherms in the Holy Cross Mts. According to SOSHKINA (1951, pl. 8: 4*b*) the species is characterized by charactophylloid trabeculae. The Polish specimens, known mainly in cross sections, have similarly long twisted major septa, partly reaching corallite axis, with peripheral ends dilated. Similarly, as in SOSHKINA's (1951, pl. 7: 1*a*) illustration, the major septa near the boundary of the tabularium are bent and meet the long minor septa (pl. 4: 11). The longitudinal sections, badly preserved (pl. 4: 7*a*, 9) show the broad dissepimentarium and the broad horizontal or slightly convex tabularium with numerous small vesiculous tabellae. The charactophylloid trabeculae, 0.4 mm in width with long fibres, cause distinct trabecular knobs on lateral surfaces of septa (pl. 4: 14).

The ontogenetically youngest corallite (pl. 5: 1) has been found at Kadzielnia (point 9 of RÓŻKOWSKA, 1953). It possesses n/d ratio = 22: 8 and long major septa, some of which reach the corallite axis. The counter septum, lying in an open fossula, is the longest septum of all. This is in agreement with PEDDER's (1972: 692) observation. Minor septa form only small spines on a broad peripheral stereozone.

Variation. — According to SOSHKINA (1951: 55) the intraspecific variability is immense. The present author observed it on cross sections in the length and thickness of septa, in positions of trabeculae, forming sometimes broad knobs and in distintegration of peripheral septal ends (pl. 4: 15). Most variable is the tabularium, as observed on vertical sections. It is broad, vesiculous in specimens from Kadzielnia (pl. 4: 7*a*) and plate-like, horizontal in those from Witoszów (pl. 4: 13).

Temnophyllum elongatum sp. n.

(pl. 4: 6*a*, *b*)

Holotype: UAM No. TcI/28; pl. 4: 6*a*, *b*.
Type horizon: Lower or Middle Frasnian.
Type locality: Sobiekurów, Holy Cross Mts.
Derivation of the name: Lat. *longus* — long, after its elongated, cylindrical shape.

Diagnosis. — Major septa long, thin, reaching the corallite axis, only fainly dilated in the dissepimentarium; minor septa long, contratingent, entering the tabularium; dissepiments globose; tabularium broad horizontal, tabulae incomplete, plate-like.

Material. — One specimen.

Dimensions (in mm):

	L	Dc	sI	sI:sII
The holotype	30	16	28	6:4

Description. — All septa are arranged bilaterally, straight and only slightly dilated in the dissepimentarium. The most elongated counter septum forms a triade with two adhering long minor septa. Nearly all major septa reach the axis. Minor septa thinner and shorter than the major ones, are contratingent. In the loculi between septa there are sections of 5-6 rows of axially concave dissepiments. In the vertical section there is a narrow dissepimentarium built up of globose, axially inclined dissepiments. Tabularium is broad horizontally with blister-like periaxial tabellae, differing from the dissepiments only in their larger size. Axial tabellae are plate-like, locally united into systems.

Remarks. — The above described species resembles *T. isetense* (SOSHKINA) in its cross section exibiting long septa, reaching the corallite axis and the contratingent minor septa. It differs from the latter in having very thin septa and a broad tabularium with plate-like axial tabellae.

Temnophyllum turbinatum HILL, 1954

(pl. 5: 12-15)

1954. *Temnophyllum turbinatum* HILL; HILL: 23, pl. 2: 13, 14.
1970. *Temnophyllum turbinatum* HILL; HILL and JELL: 57, pl. 16: 12-14.

Material. — Fifty badly preserved specimens, 8 thin sections, 28 peels.
Dimensions (in mm):

	L	dc	sI
IG-1429. II. 13	40	18	30

Ontogeny observed in the species discussed:
(1) Neanic stage with n/d = 15/3, all major septa are shortened, the counter septum is the longest one.
(2) Late neanic stage with n/d ratio = 22/6, major septa shortened, minor septa embedded in the peripheral stereozone.
(3) Early ephebic stage with n/d ratio = 26/10. Minor septa enter the corallite lumen, major septa are long, but not reaching the axis. Counter septum is as long as the neighbouring septa.

Remarks. — This species is common in the Lublin region, especially in the Bąkowa IG-1 borehole, where it is locally rockforming. It resembles the Australian species in having major septa spindle shaped, withdrawn from the axis and locally in contact; minor septa entering the tabularium; dissepimentarium with globose dissepiments; tabularium broad, with horizontal tabulae and sporadically appearing angulate dissepiments; they appear only when minor septa become shortened. The Polish specimens differ from the Australian ones in having a subcylindrical shape.

Temnophyllum menyouense HILL and JELL, 1970

(pl. 5: 2-4; fig. 10)

1970. *Temnophyllum menyouense* HILL and JELL: 60, pl. 15: 13, 14-16.

Material. — Six well preserved specimens, 20 thin sections, 2 peels.

Dimensions (in mm):

	L	dc	sI
UM TcI/30	20	16	26

Description. — Subcylindrical corallites; one of them with a parricidal offset (pl. 5: 3). Septa are wedge-shaped; major ones withdrawn from the axis; minor septa are half as long as the major ones or shortened and replaced by angulate dissepiments. In the longitudinal section the dissepimentarium is broad with globose dissepiments, and the tabularium consists of concave, sagging tabulae.

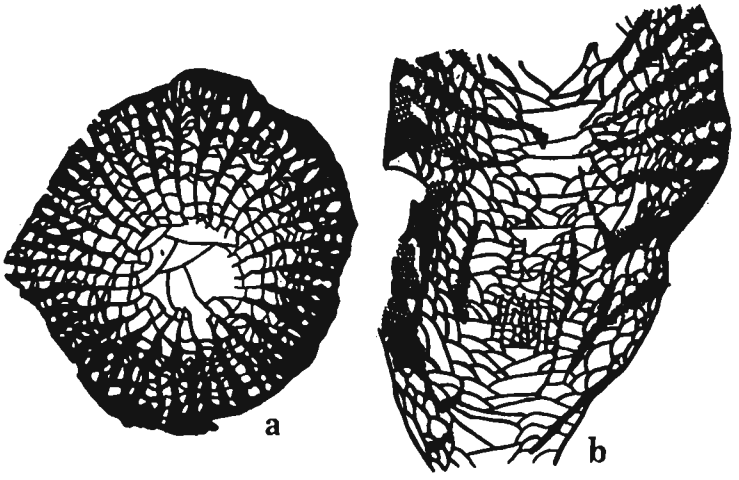

Fig. 10
Temnophyllum menyouense Hill and Jell. *a* — transverse section, *b* — longitudinal section, ×2, (UAM TcI/30), Kadzielnia 9.

Fine structure. — The monacanths (0.3-0.4 mm in width) are nearly horizontal at the periphery, but directed inwards and upwards distally. At the periphery they are adversely set, causing knobs on the lateral sides of septa.

Temnophyllum verum sp. n.

(pl. 5: 7*a*, *b*)

Holotype: UAM No. TcI/29; pl. 5: 7*a*, *b*.
Type horizon: Lower or Middle Frasnian, *P. asymmetricus* Zone.
Type locality: Kielce, Kadzielnia quarry, Holy Cross Mts.
Derivation of the name: Lat. *verum* — certain, that means, a typical *Temnophyllum* species.

Diagnosis. — Subcylindrical corallite with long major septa, nearly reaching the corallite axis; minor septa long, contratingent; broad dissepimentarium, not distinctly separated from the tabularium, which is narrow, axially depressed; trabeculae charactophylloid.

Material. — One well preserved specimen with two thin sections, and one fragmentary specimen with 3 thin sections and 3 peels.

Dimensions (in mm):

	L	Dc	sI	sI:sII
UAM TcI/29	32	13	28	6:4

Description. — The outer stereozone reaches 0.5 mm in width and the inner one is only 0.1 mm thick. Septa triangular in the outer stereozone, dilated in the inner one, are otherwise

threadlike thin. The major septa are long and twisted; the longest is the counter septum, forming a triade with 2 neighbouring long minor septa (infralateral septa of HUDSON 1936: 71). In the longitudinal section 6-8 series of globose, steeply axially inclined dissepiments occur. Periaxial tabellae are arranged in 2-3 series. Short axial tabellae form a deep depression. The charactophylloid trabeculae (0.1-0.3 mm in width) are in lateral contact.

Remarks. — The above described species resembles most closely *T. menyouense* HILL and JELL (1970) in its longitudinal section. It differs in having long major and minor septa, and in not possessing angulate dissepiments.

Temnophyllum miniarense (SOSHKINA, 1939)

(pl. 5: 5, 6)

1939. *Pseudostringophyllum miniarense* SOSHKINA: 38, pl. 10: 85, 86.
1952. *Aulacophyllum miniarense* (SOSHKINA): 69, fig. 99.

Material. — One thin section and 4 peels made from 2 fragmentary specimens. Dimensions (in mm):

	Dc	sI
UAM TcI/33	16	28

Description. — The corallites are characterized by irregular dilations of septa and by irregular stereoplasmatic rings, deposited on septa and dissepiments. The major septa in the tabularium are thin, and do not reach the corallite axis. The length ratio of major and minor septa = 6/2. The minor septa are longer, however, where the interior ring of stereozone is lacking. The monacanths are densely set, forming a single, nearly continuous dark line with pinnately arranged fibres, elongated where the septa dilate.

Remarks. — The specific identification is doubtful, as no vertical section of the Polish specimen is prepared. Besides that, SOSHKINA's (1939: 39) specimens are smaller (n/d = 24/8-11) and have long major septa. SOSHKINA *(l. c.)* joined her species with *Pseudostringophyllum* or *Aulacophyllum*. According to PEDDER (1972: 700) it belongs to *Temnophyllum*.

Genus *Piceaphyllum* gen. n.

Type species: *Neostringophyllum pronini* SOSHKINA, 1951.
Derivation of the name: Lat. *Picea* — spruce, because the peripheral septal ends resemble the twig of a spruce.

Diagnosis. — Subcylindrical corallites having peripheral ends of septa radially split, forming retrosplits; minor septa locally reduced to short ridges, replaced by angulate dissepiments; tabulae horizontal; trabeculae charactophylloid.

Remarks. — The new genus is related to *Temnophyllum*, in having trabeculae charactophylloid and disintegrated peripheral septal ends; this trend had already started in *Temnophyllum isetense* (SOSHKINA), but without reaching the stage of radial retrosplits in the peripheral septal ends.

Species assigned: *Neostringophyllum pronini* SOSHKINA, 1951, *Piceaphyllum breviseptum* sp. n.

Occurrence. — Poland: Holy Cross Mts., Sudetes; USSR: Ural Mts.; Frasnian.

Piceaphyllum pronini (SOSHKINA, 1951)

(pl. 5: 8*a*, *b*, 9; fig. 11)

1951. *Neostringophyllum pronini* SOSHKINA: 61, pl. 10; figs 26, 27.
1952. *Neostringophyllum pronini* SOSHKINA: 89, p. 26: 89.
1968. *Neostringophyllum isetense* SOSHKINA; GUNIA: 150, pl. 4: 13 pl. 5: 1, 2.

Material. — Four fragmentary specimens, 5 thin sections, 4 peels.
Dimensions (in mm):

	dc	sI	sI:sII
U. Wr. D. Sw./K 7	18	36	8:3

Description. — Polish specimens resemble the type specimen in their septal morphology. Major septa are long, but not reaching the corallite axis. They are dilated in the dissepimentarium, but thin and twisted in the tabularium. The minor septa are short and absolete. The dense tissue between the septa in the dissepimentarium is composed of radial retrosplits of

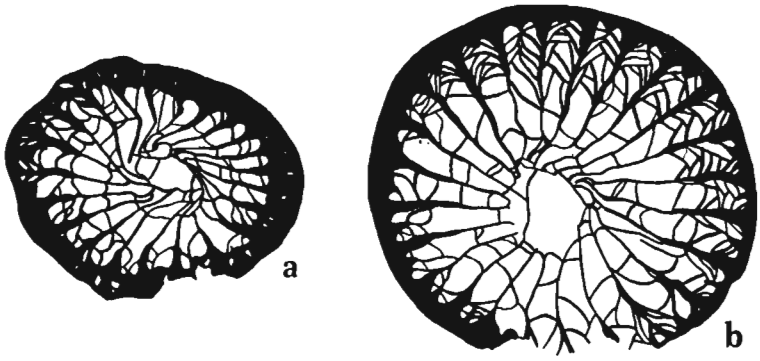

Fig. 11
Piceaphyllum pronini (SOSHKINA). *a* — transverse section of the neanic stage, *b* — transverse section of the early ephebic stage ×5, (U. Wr. D. Sw./K7), Witoszów 10.

septa and of angulate dissepiments. The trabeculae in the thickened part of septa are alternately set, 0.3-0.4 mm in width, versus 0.2 mm of those in the thin parts.

Ontogeny. — The corallite (fig. 11*a*) with n/d ratio = 22 : 6×8 has a broad external stereozone. The minor septa do not enter the corallite lumen. The major septa are long and rotated around the corallite axis, and have characteristic retrosplits.

Piceaphyllum breviseptum sp. n.

(fig. 12)

Holotype: UAM TcI/37; fig. 12.
Type horizon: *Polygnathus asymmetricus* Zone. Lower or Middle Frasnian.
Type locality: Kowala I, railroad-cut, Holy Cross Mts.
Derivation of the name: Lat. *breviseptum* — shortened septa.

Diagnosis. — *Piceaphyllum* with short major septa and obsolete minor ones; dissepimentarium narrow; tabularium broad, horizontal.

Material. — Two fragmentary specimens, 4 peels.
Dimensions (in mm):

	L	dc	sI
UAM TcI/37	12.5	12	24

Description. — The subcylindrical corallite is surrounded by a narrow septostereotheca. Major septa are straight and gradually thinning towards the corallite axis, reaching approximately 1/3 of the corallite radius. The minor septa are reduced to short knobs. The peripheral radial retrosplits are distinct. The dissepimentarium with angulate dissepiments in the cross section exhibits fine and globose ones in the longitudinal section. Tabulae incomplete, horizontal, with accessory plates.

Ontogeny. — On the stage with the septal ratio n/d = 10/3.5 and 16/4 all major septa are long, and minor septa are obsolete (fig. 12*a*, *b*). Later on with n/d ratio = 18/5 major septa become shortened, and minor septa crests.

Remarks. — The species described above differs from *P. pronini* (SOSHKINA) in having short, straight major septa in the ephebic stage. The very similar neanic stage of both the species discussed forms a basis for the generic assignment of the new species.

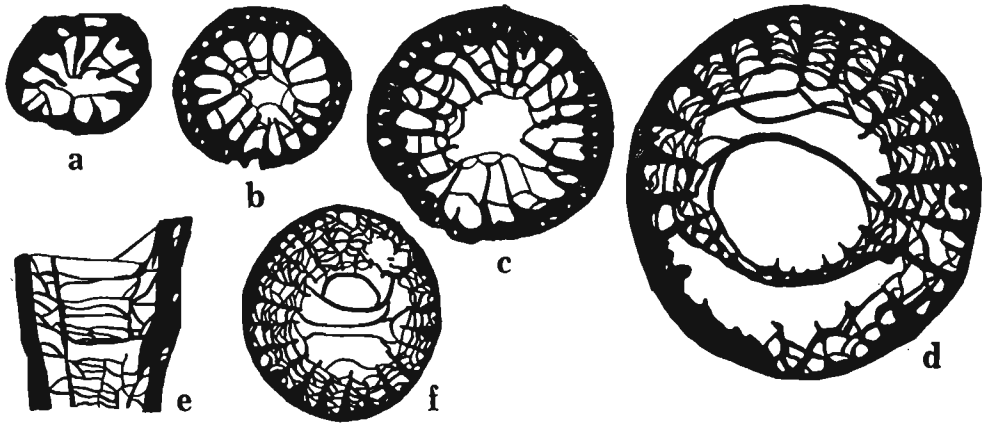

Fig. 12

Piceaphyllum breviseptum sp. n.: *a-c*, *f*, *d* — successive cross sections of a corallite; *e* — longitudinal section; *a-e* ×5, *f*×3: *a* — neanic, *b*, *c* — early ephebic stage, *d*, *f* — ephebic stage; Holotype (UAM TcI/37), Kowala I.

Family uncertain

Genus *Fedorowskicyathus* gen. n.

Type species: *F. similis* sp. n., monotypic.

Derivation of the name: in honour of Dr JERZY FEDOROWSKI, University of Poznań.

Diagnosis. — Solitary corallites with two orders of septa in the lumen; major septa twisted, commonly reaching the corallite axis; minor septa enter the tabularium; dissepiments elongated, flattened, axially inclined; tabularium domed, tabulae arranged in systems.

Occurrence. — Holy Cross Mts., Poland; *Palmatolepis gigas* Zone.

Fedorowskicyathus similis sp. n.

(pls 5: 10, 11; 6: 1-5)

Holotype: UAM TcI/38; pl. 6: 2*a*, *b*.

Type horizon: *Palmatolepis gigas* Zone.

Type locality: Kowala II, road-cut, Holy Cross Mts.

Derivation of the name: Lat. *similis* — resembling. Resembling *Tabulophyllum* FENTON and FENTON, and *Temnophyllum* WALTHER.

Diagnosis. — As for the genus.

Material. — Twenty silicified specimens, 6 thin sections, 5 peels.

Dimensions (in mm):

	L	cd	sI	sI:sII
UAM TcI/38	25	28	36	—
UAM TcI/41	10	14	31	8:4

Description. — Corals gathered in Kowala II are almost completely silicified, while those coming from Jaźwica quarry, have only a narrow peripheral zone silicified. All specimens

have the proximal ends destroyed. The corallites are straight or conical and curved. The calice is cup-shaped, approximately 10 mm deep with sharp edges, steep internal wall, and broad vortex bearing floor. Major septa with dilated peripheral ends are attenuated and coiled in the tabularium. Minor septa are short and thin. Longitudinal section: long and flattened dissepiments are arranged in 2-6 rows. Tabulae are highly domed with many accessory plates, and are arranged in systems. They bend downwards near the boundary of the tabularium.

Variation. — The strong individual variability is manifested in the length of septa and in the structure of tabularium, which may be convex or concave in axial part of a corallite.

Remarks. — The specimens described resembles *Temnophyllum isetense* (SOSHKINA) in the shape of septa, dilated at the periphery and twisted in the corallite axis. They also come close to *Tabulophyllum densum* sp. n. in having dense, highly domed tabularium with tabulae united in systems. However, the corallites have no lonsdaleoid dissepiments, characteristic for *Tabulophyllum*. In contrast to *Temnophyllum*, they possess a dissepimentarium distinctly separated from a tabularium and elongated, flattened dissepiments. The fine septal structure of *F. similis* sp. n. is not known.

Family **Chonophyllidae** HOLMES, 1887
Genus *Chonophyllum* MILNE-EDWARDS and HAIME, 1850

Type species: *C. perfoliatum* MILNE-EDWARDS and HAIME, 1850.

Remarks. — For a long time there was a great confusion in the assignment of species to the genus *Chonophyllum*, as two earlier described species of various morphology *C. perfoliatum* EDW.-H. and *C. patellatum* SCHLOTHEIM were wrongly interpreted as congeneric. The latter has been designated by SMITH (1945) as the type species of *Schlotheimophyllum* SMITH. In Europe only one species of *Chonophyllum*, that is *C. perfoliatum* EWD.-H., is known from the Silurian of Gotland, while in North America SHERZER (1892) described 12 species. According to OLIVER (in lit.) most or all of these species have never been sectioned; therefore their identification is controversial. Only one Upper Devonian (?) *Chonophyllum ellipticum* HALL and WHITFIELD, which has been redescribed by FENTON and FENTON (1924: 29) from Hackberry stage, was recorded by OLIVER *(l. c.)* as probably chonophyllid.

In the Frasnian deposits of Kielce, the present author has found a fragmentary (?) *Chonophyllum* with morphology characteristic for that genus. She placed it in *Chonophyllum* with the question mark. Polish Frasnian species may be a homeomorph of *Chonophyllum*, separated from that Silurian genus by a long stratigraphic gap.

(?) *Chonophyllum dulce* sp. n.

(pl. 7: 1*a*, *b*)

Holotype: UAM TcI/43; pl. 7: 1*a*, *b*.
Type horizon: Upper Frasnian stratum with *Phillipsastrea*.
Type locality: Kielce, Wietrznia quarry, Holy Cross Mts.
Derivation of the name: Lat. *dulce* — soft; because of a rounded outline of the corallite skeleton.

Diagnosis. — Chonophylloid, solitary, turbinate, laterally compressed corallite with a broad lonsdaleoid dissepimentarium; septa naotic in a dissepimentarium, rhopaloid and deflected in a tabularium; tabulae incomplete, flat-domed; fine structure monacanthine.

Material. — One fragmentary corallite, 2 thin sections.

Dimensions (in mm):

	L	n/d
UAM TcI/43	13	30:32×25

Description. — The peripheral-most, naotic septal ends are in lateral contact, forming a 0.6 mm thick septostereotheca. Their inner parts are arranged in 6-8 rows at one side of the corallite. These rows become gradually smaller axially, and are locally in contact. The lonsdaleoid dissepiments vary in length from 1 to 2 mm. Their walls are usually thin and bear short septal cones with saucer-like plates and divergent trabecular rods. The major septa, rhopaloid in the tabularium, are deflected in two directions. The cardinal and counter septa are the longest ones, nearly reaching the axis. Tabulae are incomplete, horizontal. Dissepiments are large, globose, nearly horizontal with short trabecular rods.

Fine structure. — At the periphery the naotic segments are 1.5 mm wide and 0.7 mm high. They bear 4-6 rods of 0.1 to 0.2 mm in width. The monacanths in the dilated parts of septa are arranged in two alternate series, reflected as knobs on the lateral surfaces of septa. Some septa are splitting along the line between series of monacanths.

Genus *Iowaphyllum* STUMM, 1949

Iowaphyllum oliveri sp. n.

(pl. 6: 6-8; pl. 7: 3; fig. 13)

Holotype: UAM TcI/46; pl. 6: 6*a*, *b*; fig. 13.
Type horizon: *Palmatolepis gigas* Zone.
Type locality: Kowala II road-cut, Holy Cross Mts.
Derivation of the name: in honour of Dr. WILLIAM A. OLIVER, Jr., Geological Survey, Washington.

Diagnosis. — Colonial astraeoid and aphroid *Iowaphyllum* with a few large corallites; dissepimentarium wide, lonsdaleoid; tabularium narrow; a small boss in a clice axis.

Material. — Ten fragmentary specimens, 10 thin sections, 6 peels.

Dimensions (in mm):

	dc	dt	sl
UAM TcI/46	30×40	9	44

Description. — Young corallites are cone-shaped (pl. 6: 7) with a broad everted calicular platform foliated at a periphery. An axial part of calice bears a distinct vortex. In the colonial stage specimens are tabular in shape with corallites confluent or separated by lonsdaleoid dissepiments. They have a broad calicular platforms and peripheral foliations (pl. 6: 6*a*-*b*). The long major septa are crowded in the tabularium, where they form a prominent axial boss. They are thickened in the inner dissepimentarium at the boundary of the tabularium, forming a nearly continuous ring. The cardinal septum is the longest one. It lies in a narrow, long "fossula". The thin minor septa enter slightly the tabularium.

In the vertical section there is a broad, everted dissepimentarium with dissepiments of various size elongated, flat, steeply inclined towards the corallite axis. They have walls thickened by sclerenchyme in foliated parts of corallites and bear short trabecular rods on their surfaces. Axial tabellae are highly domed, periaxial ones are concave, forming a trough near the dissepimentarium. The vortex is formed by convex tabulae and crowded septa.

Fine structure. — The septa have uni- and multiserial trabeculae of 0.4 mm in width.

Variation. — The greatest variability is manifested in a form of growth and a shape of corallum. It may be low, plate-like or elongated. Distances between centres of corallites in colonies vary from 12-20 to 30-40 mm. Peripheral ends of septa may be reduced to a different degree in particular colonies and corallites.

Remarks. — The differences in dimensions (in mm) between the Frasnian species of *Iowaphyllum* described so far are as follows:

Number of major septa	Distances between corallite centres	dc	dt

I. rhenanum (SCHLÜTER)	25	7-25	7×12	1.4×4.5
Iowaphyllum sp. COEN-AUBERT, 1974	25	20-25	5	4×5.5
Iowaphyllum oliveri sp. n.	24-44	12-40	32×40	6×10

Iowaphyllum oliveri sp. n. is most similar to *Iowaphyllum* sp. of COEN-AUBERT, 1974. It differs from the latter only in having dominantly astraeoid coralla and long, thin septa. LECOMPTE (1970: 47) observed the influence of the environment on the shape of some *Iowaphyllum specimens*: they are solitary, if living in calm water, i. e. when found in interreef shales. Tabular coralla occur near a margin of a bioherme. The tabular shape of Polish specimens may indicate a marginal reef facies in Kowala.

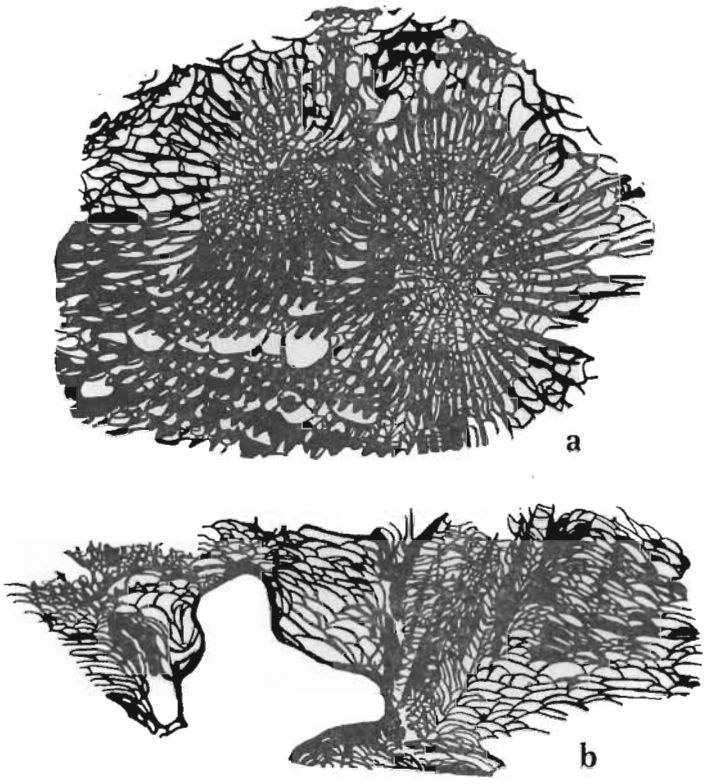

Fig. 13
Iowaphyllum oliveri sp. n. *a* — transverse section, *b* — longitudinal section of a colony, ×2. Holotype (UAM TcI/46), Kowala II.

Genus *Kowalaephyllum* gen. n.

Type species: *K. excelsum* sp. n.
Derivation of the name: after Kowala village.

Occurrence. — Holy Cross Mts., *Palmatolepis gigas* Zone.

Diagnosis. — Chonophylloid corallites with axial bosses, and everted calicular platforms; septa in the lonsdaleoid dissepimentarium interrupted, naotic; in the inner dissepimentarium and in tabularium lamellar, rotated around the corallite axis; dissepiments elongated, flattened; tabulae incomplete, domed; lateral surfaces foliated; monacanths uni- and multiseriate.

Remarks. — The new genus resembles *Chonophyllum* EDW.-H. with its foliations, everted dissepimentarium, lonsdaleoid marginarium and naotic septal structure. It differs in having a prominent axial boss, formed by domed tabulae and twisted septa. *Schlotheimophyllum* SMITH (1945) with its reflexed shoulder of calice, small axial pit, occupied by a boss and with

its foliations, is slightly similar to the new genus *Kowalaephyllum*. It differs in exhibiting patellate shape, septa peripherally dilated and laterally contiguous and suppressed dissepimentarium.

Kowalaephyllum excelsum sp. n.

(pl. 7: 4*a-e*)

Holotype: UAM TcI/47; pl. 7: 4*a-e*.
Type horizon: *Palmatolepis gigas* Zone.
Type locality: Kowala II road-cut, Holy Cross Mts.
Derivation of the name: Lat. *excelsum* — excellent corallite.

Material. — One silicified specimen.
Dimensions (in mm):

	L	c	t	sI
the holotype	62	80	18	50

Diagnosis. — A densely foliated *Kowalaephyllum* with a *Naos*-shape; shoulder of calice everted and externally inclined; dissepimentarium broad, naotic; tabularium narrow with a swirl of major septa in corallite axis.

Description. — The corallite is silicified, with the distal part considerably reduced in diameter. Its everted calice has an externally inclined marginal shoulder and a narrow (10 mm wide) pit with a distinct boss. Septa are lamellar in the inner part of the corallite. Axial parts of major septa thickened and twisted, to form a boss. In the longitudinal section the broad everted dissepimentarium consists of fine elongated and flattened dissepiments. The tabularium is very narrow, convex.

Remarks. — The described species differs from *K. poculum* sp. n. by its *Naos*-like shape, its everted dissepimentarium and its externally inclined marginal shoulder of calice. It differs from *K. mirabile* sp. n. by its *Naos*-like shape and externally inclined dissepimentarium.

Kowalaephyllum poculum sp. n.

(pl. 7: 2*a*, *b*; pl. 8: 2*a*,-*c*)

Holotype: UAM TcI/50; pl. 7: 2*a*, b; pl. 8: 2*a*.
Type horizon: *Palmatolepis gigas* Zone. Stratum with *Phillipsastrea*.
Type locality: Kielce, Wietrznia quarry, Holy Cross Mts.
Derivation of the name: Lat. *poculum* — cup, because of cupshaped calice.

Diagnosis. — Subcylindrical, large corallites with rare foliations; calice broad with a sharp calicular edge; septa wedge-shaped, disrupted in the outer, naotic, lonsdaleoid dissepimentarium, lamellar in the inner one, and twisted in the tabularium; dissepiments elongated, flattened, subhorizontal; tabulae incomplete, convex.

Material. — One well preserved specimen and poorly preserved fragments of another specimen, 4 peels, 2 thin sections.
Dimensions (in mm):

	l	dc	dt	sI
UAM TcI/50	70	65	10×7	34

Description. — The subcylindrical, rarely foliated corallites have regular calicular edges and broad wedge-shaped septa that are 2 mm in width along the length of 18 mm from the periphery, and are lamellar farther on. The minor septa are almost equal in width with the major ones, but they only enter the tabularium, while the major septa are dilated and twisted

there. In vertical section the dissepimentarium is concave with thick-walled dissepiments, which are horizontal in the peripheral dissepimentarium and steeply inclined downwards at the tabularium boundary. Periodically parallel layers of sclerenchyme appear. The tabularium is spongy with domed tabellae and sections of twisted septa. The naotic plates are axially convex, thick-walled, with thin intermediate plates. The trabecular spines are 0.1-0.3 mm in width and are almost parallel. The lamellar parts of septa have uniseriate trabeculae with long laterally parallel fibres.

Ontogeny. — The proximal end of the holotype with n/d ratio = 24/14 is surrounded by 1.5 mm wide septo-stereozone. Septa consist of 4 rows of naotic plates and of divergent trabecular rods. They become lamellar axialwards. The major septa reach the corallite axis and twist.

Remarks. — The discussed species comes very close to *K. excelsum* sp. n. in generic characters, but differs from it in having an elongated subcylindrical shape, wedge-shaped septa, axially convex naotic plates, and concave middle part of the dissepimentarium in the longitudinal section. In the same piece of rock there is a fragment of another corallite (UAM TcI/49) with an irregular calicular margin.

Kowalaephyllum mirabile sp. n.

(pl. 8: 1*a-e*)

Holotype: UAM No. TcI/51; pl. 8: 1*a-e*.
Type horizon: Upper Frasnian, stratum with *Phillipsastrea*.
Type locality: Bolechowice, Holy Cross Mts.
Derivation of the name: Lat. *mirabile* — wonderful, for its strange structure.

Diagnosis. — Turbinate *Kowalaephyllum*, densely foliated, with a broad calicular shoulder and a narrow axial pit; dissepimentarium broad, horizontal; lonsdaleoid dissepiments numerous; trabeculae uni- and multiseriate.

Material. — One partly silicified specimen and 1 thin transverse section.

Dimensions (in mm):

	L	dc	sI
UAM TcI/51	40	40	31

Description. — Corallite broad, conical, with silicified and weathered surface. Calice is broad, patellate with a shallow axial depression rounded by an elevated ring.

In cross section there are two seemingly different structures to be observed: one on the polished surface and the other on the thin section. On the polished surface the septa seem to be lamellar (pl. 8: 1*c*) along nearly whole length, and are 1.5-1.7 mm broad. Lonsdaleoid dissepiments appear only at the periphery. On the thin section taken from the same specimen (pl. 8: 1*e*), the lonsdaleoid dissepimentarium is broad, the septa are interrupted, with wide triangular fragments and multiseriate trabeculae seen as small dots of 0.1-0.2 mm in width. Locally the septa are thin, or only series of trabecular dots are to be seen. Naotic parts of septa consist of axially convex plates with short trabecular rods. In the inner dissepimentarium and in the tabularium (on one side of the section) the septa are lamellar, the trabeculae are multiserial, and the septal ends taper axially and twist, forming a boss. The minor septa are thin, and only enter the tabularium. In the vertical section a broad dissepimentarium consists of elongated, flattened, horizontal dissepiments that steeply bent downwards at the tabularium boundary. They have thickened walls and bear short trabecular rods. The tabularium is narrow. The width ratio of dissepimentarium and tabularium equals 16:7:20. The concave periaxial tabellae form a trough while the convex axial ones join the twisted septal ends to form a 3 mm wide vortex.

Remarks. — The discussed species differs from *K. poculum* sp. n. by its turbinate shape, the numerous foliations, the horizontal calicular shoulder and the structure of dissepimentarium. The polished surfaces of cross sections of both species discussed are quite similar to each other (pl. 7: 2*a*; pl. 8: 1*c*).

Genus *Tabulophyllum* FENTON and FENTON, 1924
Tabulophyllum densum sp. n.

(pl. 9: 10*a-c*)

Holotype: UAM No. TcI/52; pl. 9: 10*a-c*.
Type horizon: Middle Frasnian, *Polygnathus asymmetricus* Zone.
Type locality: Kielce, Wietrznia quarry, Holy Cross Mts.
Derivation of the name: Lat. *densus* — dense, a thick structure.

Diagnosis. — Large *Tabulophyllum* with a bilateral symmetry; major septa long, twisted, minor septa short, interrupted; tabularium broad, highly domed; lonsdaleoid dissepimentarium broad.

Material. — Three fragmentary corallites, 5 thin sections.
Dimensions (in mm):

	L	n/d	d:t:d
UAM TcI/52	25	48/35	8:20:10

Description. — The peripheral septo-stereozone is approximately 1.5 mm thick. Major septa are long, reaching the corallite axis, thickened in the dissepimentarium, thin and twisted in the tabularium with triangular ends, embedded in the external wall. The cardinal septum is long; large, thick-walled dissepiments occupy a peripheral part of dissepimentarium. In the longitudinal section there are 5-7 elongated, steeply inclined rows of dissepiments with periodically dilated walls. The tabulae are densely set, gathered in systems with numerous accessory plates.

Fine structure of septa is trabecular. In cross section there are 0.4 mm long divergent trabecular rods in peripheral parts of septa and, in contrast to the naotic structure, there are no horizontal septal plates. In the dilated parts of septa the monacanths are placed in 1-3 series, causing an irregular bending and locally a radial splitting of septa. In the vertical section the peripheral dilated septa are composed of 0.4-0.5 mm wide subhorizontal trabeculae, that contact laterally, or are joined by a lamellar sclerenchyme.

Ontogeny. — In the neanic stage (pl. 9: 10*a*) with a diameter of 18 mm the minor septa are embedded in 1 mm thick septo-stereozone. The major septa are shortened, wedge-shaped.

Remarks. — The new species resembles *T. mcconnelli* (WHITEAVES) in its bilateral symmetry and large lonsdaleoid dissepiments; it differs from that species by strongly dilated skeletal elements, twisted major septa, highly domed tabularium, and very short minor septa.

Tabulophyllum priscum (MÜNSTER, 1841)

(pl. 9: 1-3)

1841. *Cyathophyllum priscum* MÜNSTER: pl. 9: 26.
1968. *Tabulophyllum priscum* (MÜNSTER); GUNIA: 153, pl. 6: 2-5 *(with synonymy)*.

Remarks. — This species has been adequately described by various authors, and the description is not repeated here. Its characteristic features are illustrated on plate 9: 1-3, and on table 2.

Tabulophyllum mcconnelli (WHITEAVES, 1891)

(pl. 8: 3*a-c*)

1891. *Campophyllum ellipticum* (HALL and WHITFIELD); WHITEAVES: 202, pl. 27: 5, 6.
1945. *Tabulophyllum mcconnelli* (WHITEAVES); SMITH: 59, pl. 2: 1-9; pl. 3: 1-7 (with synonymy).

Material. — One silicified specimen, 4 peels.
Dimensions (in mm):

	L	dc	sI
UAM TcI/54	10	15	34

Remarks. — The Polish specimen resembles most of all the Boulogne specimens described by SMITH (1945: 50, pl. 3: 5-7) in possessing a distinct bilateral symmetry. In Polish specimen this symmetry appears only on neanic stage characterized by a broad cardinal fossula (pl. 8:3*a*).

Table 2

Comparison of the described *Tabulophyllum* species

Species	Symmetry and thickness of septa	n/d ratio	Major septa	Minor septa	Tabularium	Lonsdaleoid dissepiments
T. priscum (MÜNSTER)	elements thin, symmetry radial	32/25	short, interrupted	short, interrupted	horizontal or convex	large and small
T. mcconnelli (WHITEAVES)	elements thin, symmetry bilateral	34/15	long	= 1/2 of major septa	horizontal or convex	large
T. densum sp. n.	elements thick, symmetry bilateral	56/36	long, twisted	= 1/5 of major septa	highly domed, dense	large, thickwalled,
T. irregulare sp. n.	elements thin, symmetry radial	33/26	short, thin, rarely interrupted	= 4/5 of major septa	highly domed, dense	narrow, small, rare

Tabulophyllum irregulare sp. n.

(pl. 9: 4, 5*a-c*)

Holotype: UAM TcI/56; pl. 9: 5*a-c*.
Type horizon: Upper Frasnian, stratum with *Phillipsastrea*.
Type locality: Kielce, Wietrznia quarry, Holy Cross Mts.
Derivation of the name: Lat. *irregularis* — irregular, because of its irregular septa and tabularium.

Diagnosis. — Small, shortly conical corallites; septa of two orders, short and nearly equal in length; dissepimentarium narrow; tabularium dense and highly domed.

Material. — Ten fragmentary specimens embedded in a reef limestone, 9 thin sections.
Dimensions (in mm):

	L	dc	sI
the holotype	17	20	33

Description. — A narrow stereo-septotheca reaches 0.5 mm in width. Major septa are approximately 2.5 mm long, thin, irregularly bent. Minor septa reach 4/5 of length of the

major ones. Rare lonsdaleoid dissepiments occupy a narrow dissepimentarium. In the vertical section the small dissepiments are globose, thin-walled, steeply inclined and arranged in 1-5 rows. The tabulae are mainly incomplete, gathered in systems with many accessory plates.

Variation. — Variability range is especially great in length and width of septa and in their spacing. Tabularium may be highly domed or flattened (pl. 9: 4) with 9-19 tabulae on 5 mm.

Ontogeny. — In the neanic stage with 6 mm in diameter the septa are short, irregular with thickened peripheral ends, embedded in the 0.4-0.6 mm thick stereozone. No dissepiments.

Remarks. — According to GORIANOV (personal comm., 1976) the new species resembles closely *T. gorskii* (BULVANKER 1958); but in the present author's opinion it differs from the latter in having rare lonsdaleoid dissepiments, short and thin septa nearly equal in length and by its strongly domed tabularium.

Family **Ptenophyllidae** WEDEKIND, 1923
Genus *Acanthophyllum* DYBOWSKI, 1873
Acanthophyllum frasniense sp. n.

(pl. 10: 1*a*, *b*; 2)

Holotype: Specimen IG-1429. II. 16; pl. 10: 1*a*, *b*.
Type horizon: Lower or Middle Frasnian, *P. asymmetricus* Zone.
Type locality: Bąkowa IG-1borehole, depth 1829-1835 m, Lublin region.
Derivation of the name: *Acanthophyllum* occurring in the Frasnian.

Diagnosis. — Solitary corallite with continuous major and minor septa in the subtabular section; major septa rotated around corallite axis; rare lonsdaleoid dissepiments in calice; calicular edge sharp; tabularium concave; fibro-normal fine structure of septa.

Material. — Three fragmentary specimens, 4 thin section, 8 peels.

Dimensions (in mm):

	L	Dc	sI	sI:sII
IG-1429. II. 16 (holotype)	25	21	24	4:3

Description. — A thin stereozone surrounds the sharp peripheral septal ends. Some of major septa reach the corallite axis. The cardinal septum is the longest one. The axially concave cross sections of dissepiments and tabellae form 14-15 densely arranged rows. The axial tabellae in longitudinal section form a deep depression, only locally having flat horizontal plates.

Fine structure is fibro-normal with closely set crystallization centres, forming a continuous dark line with long, pinnately arranged fibres. In places, where the middle lines of septa bend, deflections arise. In the longitudinal section the very fine fibres are set in half "fans", being nearly horizontal in inner and vertical in peripheral parts of septa. They cross the fine growth lines.

Ontogeny. — In the smallest known section with n/d ratio = 24/15 all septa are dilated, rhopaloid and in lateral touch through the whole dissepimentarium. The corallite increases its diameter and widens interseptal loculi, but not the number of septa. The index of septa of the longest specimen is 25/24.

Remarks. — No one similar Frasnian species of *Acanthophyllum* has been described till now. WALTHER (1928) introduced 3 species of *Neostringophyllum* (= *Acanthophyllum* after BIRENHEIDE 1972: 411) from the Givetian-Frasnian boundary, but none of them is either conspecific or more closely comparable with the afore described one.

Genus *Grypophyllum* WEDEKIND, 1922
Grypophyllum unduliseptatum IVANIA, 1965

(pl. 9: 6-9)

1965. *Grypophyllum unduliseptatum* IVANIA: 152, pl. 77: 333-334.

Material. — Thirty fragmentary specimens, 33 thin sections, 6 peels.
Dimensions (in mm):

	L	Dc	sI	d:t	sI/sII
UAM TcI/58	15	10	20	5:5:3	6:1

Description. — Thick peripheral septal ends spindle-shaped or triangular are embedded in 1 mm thick stereozone. Septa are attenuated in the lumen. Major septa long, undulated along their length, partly reaching the corallite axis. The cardinal septum is the longest one. Minor septa are of various length. Lonsdaleoid dissepiments are rare. In the longitudinal section dissepiments of various length are elongated, flattened, steeply inclined, and arranged in 2-5 rows. Tabellae are narrow, horizontal or concave, locally with a deep depression.

Fine structure of septa is fibro-normal. The centres of calcification form a continuous wavy dark line.

Variation. — The external wall varies from 0.7 to 1.5 mm in thickness; the major septa reach the corallite axis or are shortened; the minor septa are of 1/2 to 1/6 of the length of the major septa; they may be sometimes totally reduced in the lumen; the number of tabellae varies from 5 to 11 on the stretch of 5 mm.

Remarks. — The species described resembles *G. gorskyi* BULVANKER (1934: 11) and *G. salairicum* BULVANKER (1958: 145) in having similarly undulated septa. It differs from the former in its larger size, and from the latter in possessing a different septal index (20: 10 versus 36: 11) and in lack of lonsdaleoid dissepiments. According to PEDDER (1967: 2) both the Russian species should be excluded from *Grypophyllum*, because of their flanged septa.

Family **Cystiphyllidae** MILNE-EDWARDS and HAIME, 1850
Genus *Rachaniephyllum* gen. n.

Type species: *Rachaniephyllum andreae* sp. n., monotypic.
Derivation of the name: found in Rachanie in the Lublin region.

Diagnosis. — Phaceloid, laterally offsetting coralla with underdeveloped septa of 2 orders located on the external wall and on horizontal elements; spine-like monacanths; dissepiments elongated, flattened, deeply inclined exially; tabulae globose or platelike, mainly concave.

Stratigraphic and geographic range. — Lublin region, Poland; Upper Frasnian.

Remarks. — The specimens described from Rachanie are slightly similar to the Russian species *Tabellaephyllum mosquense*, *T. livnense* and *T. rosiformae* (all SOSHKINA 1952) from the Frasnian and Famennian on the Russian Platform and from the Ural Mts. However, the type species of *Tabellaephyllum*, *T. peculiare* STUMM, is a Mississippian tabulate coral *Michelinia* from the USA (OLIVER and SANDO 1977). The Russian species, described by SOSHKINA *(l. c.)* may be representatives of the genus *Utaratuia* CRICKMAY that have a spongophylloid character with cerioid coralla and spine-like septa located on wall and on horizontal structural elements. The dissepimentarium is there clearly distinguished from the tabularium. Polish specimens are not congeneric with the Canadian or with the Russian species, having phaceloid coralla, a dissepimentarium, not separated distinctly from a tabularium, spine-like monacanthine septa of two lengths and a lateral offsetting.

Rachaniephyllum andreae sp. n.

(pl. 10: 3-6)

Holotype: Ig-1429. II. 21; pl. 10:5.
Type horizon: Lublin region, borehole Rachanie IG-1, depth 1805 m.
Derivation of the name: after the Polish name Andrzej.

Diagnosis. — A phaceloid, laterally offsetting corallite with monacanths present as short spine-like projections, with elongated dissepiments and with horizontal or concave tabellae.

Material. — Seven fragmentary coralla and 9 thin sections.

Dimensions (in mm):

	L	dc
IG-1429. II. 21	20	10-15

Description. — Calices cup-shaped, 8 mm in depth with sloping walls and flat or concave floors. Trabecular spines (0.3-0.6 mm long) deeping slightly into the 0.3 mm thick external stereozone, and then are projected axially on surfaces of dissepiments and tabellae. Dissepiments are elongated, flattened, deeply inclined, and arranged in 1-3 rows. The tabellae are blister-like or concave. Septal spines are pinnately fibrous, 0.2 mm in width.

Variation. — Variation is shown only in the arrangement and size of dissepiments and tabellae.

Blastogeny. — Blastogeny has been observed in 3 corallites. (1) The parent corallite, 15 mm in diameter, has 4 vertical lateral daughter corallites in contact. With the diameter of 1.5-2.0 mm they have complete tabulae and 2.5 mm long, vertical septa in common with the parent corallite; dissepiments appear approximately 3 mm higher up (pl. 10: 3*b*).

(2) The youngest corallite, 3 mm in diameter, has closely set monacanths of equal length; no dissepiments and large sections of tabellae (pl. 10: 6).

(3) The parent corallite, 14 mm in diameter, has one offset in vertical section closely connected with the protocorallite (pl. 10: 2*a*), and arising from its dissepimentarium. Its proximal end is diaphragmatophoric with first tabula complete, and increased as a prolongation of the parent's dissepiment. Together with the incomplete next tabula a row of small dissepiments appears along the offset's exterior wall. The new wall between the offset and the parent corallite is composed of two stereozones with one epitheca between them.

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REFERENCES

ALTEVOGT, G. 1963. Die oberdevonischen rugosen Korallen von der asturischen Küste (Cabo Penas, Nordspanien). — *N. Jb. Geol. — Paläont.Abh.*, **117** 9-38.

AUBERT, M. 1968. Observations sur le Frasnien de Pépinster et de Trooz. — *Ann. Soc, Géol. Belgique*, **91**, 347-360.

BIERNAT, G. and SZULCZEWSKI, M. 1975. The Devonian brachiopod *Phlogoiderhynchus polonicus* (Roemer, 1866) from the Holy Cross Mountains, Poland. — *Acta Palaeont. Polonica*, **20**, 2, 199-217.

BEZPROZVANNYCH, N. I., DUBATOLOV, V. N., KRAVTSOV, A. G., LATYPOV, Yu. Ya., SPASSKY, N. Ya. (Беспрозванных Н. И., Дубамолов, В. Н., Кравцов, А. Г. Ламынов, Ю. Я. Спасскии, Н. Я.) 1975. Девонские ругозы Таймыро-Колымской провинций. — "Наука", **228**, 1-116, Москва.

BIRENHEIDE, R. 1972. Ptenophyllidae (Rugosa) aus dem Westdeutschen Mitteldevon. — *Senckenberg Lethaea*, **53**, 5, 405-437.

BRICE, D. and ROHART, J. C. 1974. Les Phillipsastraeidae (Rugosa) du Dévonien de Ferques (Boulonnais, France). — *Ann. Soc. Géol. du Nord*, **94**, 1, 47-62.

BULVANKER, E. Z. (Бульванкер, Э. З.) 1934. Средне-девонские кораллы гр. Rugosa зап. склона Урала Кизеловскго р-на. — *Тр. ЦНИГРИ*, **10**, 1-18.

— (Бульванкер, Э. З.) 1958. Девонские четырелучевые кораллы окраин Кузнецкого бассейна. — *Тр. ВСЕГЕИ*, 1-212.

— GORIANOV, V. B., IVANOVSKY, A. B., SPASSKY, N. Ya., SCHUKINA, V. Ja. (Бульванкер, Э. З., Горянов, В. Б., Ивановский, А. Б., Спасский, Н. Я., Щукина, В. Я. (1968. Новые виды древных растений и беспозвоночных СССР. — *ВСЕГЕИ*, **2**, 14-55.

CHOROWSKA, M. 1975. Konodonty franu i femanu dolnego Antykliny Krakowa (Frasnian and Lower Famennian Conodonts of the Cracow Anticline). *Biul. Inst. Geol.*, **282**, 13, 69-100.

COEN, M. 1972. Facies, Conodontes, et stratigraphie du Frasnien de l'est de la Belgique, pour servir à une révision de l'étage. — *Ann. Soc. Géol. Belgique*, **95**, 2, 239-253.

— and COEN-AUBERT, M. 1976. Conodontes et coraux de la partie supérieure du Frasnien. — *Bull. Inst. r. Sci. nat. Belg.*, **50**, 8, 1-7.

—, — and CORNET, P. 1976. Distribution et extension stratigraphique des récifs à „*Phillipsastrea*" dans le Frasnien de l'Ardenne. — *Ann. Soc. Géol. Nord.*, **96**, 325-331.

Coen-Aubert, M. 1970. Le Givétien et le Frasnien Inférieur de Pepinster. — *Ann. Soc. Géol. Belgique*, **92**, 3, 383-395.

— 1974. Représentants des genres *Phillipsastrea* d'Orbigny A., 1849, *Billingsastraea* Grabau, A. W. 1917, et *Iowaphyllum* Stumm, E. C., 1949, du Frasnien du Massif de la Vesdre et de la bordure orientale du Bassin de Dinant. — *Bull. Inst. R. Sci. Nat. Belg.* **49**, 8, 1-38.

— 1976. Distribution stratigraphique des Rugueux massifs du Givétien et du Frasnien de la Belgique. — *Ann. Soc. Géol. Nord.* **97**, 49-56.

CZARNOCKI, J. 1948. Przewodnik XX Zjazdu P. T. Geol. w Górach Świętokrzyskich w 1947 r. — *Roczn. P. T. Geol.*, **17**, 238-299.

DYBOWSKI, W. N. 1873. Beschreibung zweier aus Oberkunzendorf stammenden Arten der Zoantharia Rugosa. — *Ztschr. Deutsch. Geol. Ges.*, **25**, 402-408.

FEDOROWSKI, J. 1967. A revision of the genus *Ceratophyllum* Gürich, 1896 (Tetracoralla). — *Acta Palaeont. Polonica*, **12**, 2, 213-222.

FENTON, C. L. and FENTON, M. A. 1924. The stratigraphy and fauna of the Hackberry stage of the Upper Devonian. — *Contr. Mus. Geol. Univ. Michigan*, **1**, 1-260.

FOERSTE, A. F. 1909. Preliminary notes on Cincinnatian fossils. — *Bull. Sci. Lab. Denison Univ.*, **14**, 208-232.

FRECH, F. 1885. Die Korallenfauna des Oberdevons in Deutschland. — *Ztschr. Deutsch. Geol. Ges.*, **37**, 21-130.

GORIANOV, V. B. (Горянов, В. Б.) 1961. Новый род ругоз из среднедевонских отложений Южной Ферганы. — *Палеонтол. журнал.* **1**, 70-74.

GUNIA, T. 1962. Fauna otoczaków wapieni a zagadnienie wieku zlepieńców Witoszowa (Dolny Śląsk). (The fauna of limestone pebbles and the problem of age of the Witoszów conglomerates (Lower Silesia)). — *Roczn. P. T. Geol.*, **32**, 4, 493-522.

— 1966. Fauna i wiek otoczaków z kulmu Książa. (Fauna and age of limestone pebbles in the Culm of Książ). — *Geol. Sudetica*, **2**, 297-321.

— 1966. Nowe wyniki badań nad stratygrafią i paleogeografią górnego dewonu Depresji Świebodzic (New investigations of the stratigraphy and palaeogeography of the Upper Devonian of the Świebodzice Depression). — Sesja naukowa dwudziestolecia polskich badań geologicznych 1945-1965. Zagadnienia geologii Podstawowej i Stosowanej, 169-183, Wrocław.

— 1968. Fauna, stratygrafia i warunki sedymentacji górnego dewonu Depresji Świebodzic (On the fauna, stratigraphy and conditions of sedimentation of the Upper Devonian in the Świebodzice Depression (Middle Sudetes)). — *Geol. Sudetica*, **4**, 116-220.

GÜRICH, G. 1896. Das Palaeozoicum im Polnischen Mittelgebirge. — *Russ. Kais. Min. Ges.*, **2**, 32, 1-539, St. Petersburg.

— 1900. Nachtrage zum Palaeozoicum des Polnischen Mittelgebirges. — *N. Jb. Min. Geol. Palaeont. B. B.*, **13**, 331-388.

HILL, D. 1939. The Devonian Rugose Corals of Lilydale and Loyola, Victoria — *Proc. Roy. Soc. Victoria*, **51** (N. S.), 22, 2, 219-256.

— 1940. The Lower Middle Devonian Rugose corals of the Murrumbigee and Goodradgbee Rivers, N. S. W. — *J. Proc. Roy. Soc. N. S. W.*, **74**, 247-276.

— 1954. Coral faunas from the Silurian of New South Wales, and the Devonian of Western Australia. — *Commonw. Australia, Dep. Nat. Devel., Geol., Geophys.*, **23**, -51.

— and JELL, S. 1970. Devonian corals from the Canning Basin Western Australia. — *Geol. Surv. West. Australia, Bull.* **121**, 1-103.

IVANIA, V. A. (Ивания, В. А.) 1965. Девонские кораллы Rugosa Саяано-Алтайской горной области. — Изд. Томского Унив, 3-398, Томск.

IVANOVSKY, A. B. (Ивановский, А. Б.) 1976. Указатель родов ругоз. — Ак. Н. СССР С. От. "Наука", 17-254, Москва.

JELL, J. S. 1969. Septal microstructure and classification of the Phillipsastraeidae. — *In*: CAMBELL (ed.),Stratigraphy and Paleontology. Essays in honour of Dorothy Hill, 50-73, Canberra.

— and HILL, D. 1969. Devonian corals from Ukalunda. — *Geol. Surv. Queensland. Publ. 340, Palaeont.* **16**, 1-27, Brisbane.

— 1970. The Devonian coral fauna of the Point Hibbs Limestone, Tasmania. — *Proc. Roy. Soc. Tasmania*, **104**, 1-16.

LANG, W. D. 1926. *Naos pagoda* (Salter) the type of a new genus of Silurian corals. — *Quart. J. Geol. Soc.*, **82**, 428-435.

— 1939. On new generic names for Palaeozoic corals. — *Ann. Mag. Nat. Hist.*, **2**, 3, 152-156.

— and SMITH, S. 1935. *Cyathophyllum caespitosum* Goldfuss, and other Devonian corals considered in a revision of that species. — *Ibidem*, **91**, 538-590.

—, Smith, S. and THOMAS, H. D. 1940. Index of Palaeozoic coral genera. — British Museum, 1-231, London.

LECOMPTE, M. 1952. Madréporaires paléozoiques. *In*: PIVETEAU, J. (*éd.*). — Traité de Paléontologie, 419-501, Paris.

— 1970. Die Riffe im Devon der Ardennen und ihre Bildungsbedingungen. — *Geologica Palaeontol.* **4**, 25-71.

LIAO WEIHUA, 1977. On the Middle and Upper Devonian boundary by tetracorals in Dushan District, Southern Guizhou. — *Acta Paleont. Sinica*, **16**, 37-51.

MAŁKOWSKI, K. 1971. Stratygrafia górnego dewonu okolic Górna na podstawie konodontów. — Arch. Inst. Geologii Podstawowej Uniwersytetu Warszawskiego.

MERRIAM, C. W. 1973. Middle Devonian Rugose corals of the Central Basin. — *Geol. Surv. Professional Paper*, **799**, 1-53.

MIŁACZEWSKI, L. 1975. Tomaszów Lubelski IG-1, Jarczów IG-2. Dewon. *In:* A. Żelichowski (ed.), Profile głębokich otworów wiertniczych Instytutu Geologicznego, **24**, 54-83, Warszawa.

OLIVER, W. A. 1976. Noncystimorph colonial rugose corals of the Onesquethaw and Lower Cazenovia stages (Lower and Middle Devonian) in New York and adjacent areas. — *Geol. Surv. Professional Paper*, **869**, 1-156.

— and GALLE, A. 1971. Rugose corals from the Upper Koneprusy Limestone (Lower Devonian) in Bohemia. — *Sbornik Geol. Ved. Paleontologie*, **14**, 35-106.

— and SANDO, W. J. 1977. *Tabellaephyllum* Stumm is a *Michelinia* (Carboniferous, Tabulata). — *J. Paleont.* **51**, 2, 422-423.

PAJCHLOWA, M. *et al.* 1968. Budowa geologiczna Polski, 1, Stratygrafia, 1, prekambr i paleozoik. — Inst. Geol. 313-362, Warszawa.

— and STASIŃSKA, A. 1965. Formations récifales du Dévonien des Mts de Sainte Croix (Pologne). — *Acta Palaeont. Pol.*, **10**, 2, 249-260.

PEDDER, A. E. H. 1967. *Lyrielasma* and a new related genus of Devonian tetracorals. — *Proc. Roy. Soc. Victoria*, **80**, 1, 1-30.

— 1965. A revision of the Australian Devonian corals previously referred to *Mictophyllum*. — *Ibidem*, **78**, 2, 201-220.

— 1965. The Devonian tetracoral *Haplothecia* and new Australian Phacellophyllids. — *Proc. Lin. Soc. N. S. W.*, **90**, 2, 181-188.

— 1972. Species of the tetracoral genus *Temnophyllum* from Givetian /Frasnian boundary beds on the District of Mackenzie, Canada. — *J. Paleont.*, **46**, 5, 696-710.

— 1973. Description and biostratigraphical significance of the Devonian coral genera *Alaiophyllum* and *Grypophyllum* in Western Canada. — *GSC Bull.* 222: *Contr. Canadian Paleont.* 93-116.

PICKETT, J. 1967. Untersuchungen zur Familie Phillipsastreidae (Zoantharia Rugosa). — Inaugural-Dissertation, 1-88, Frankfurt.

REED, F. R. C. 1922. Devonian fossils from Chitral and the Pamirs. — *Palaeont. Indica.* (n. ser.), **6**, 4, 1-134.

ROEMER, F. A. 1855. Beiträge zur Kenntnis des nordwestlichen Harzgebirges. — *Palaeontographica*, **3**, 1, 1-52.

RÓŻKOWSKA, M. 1953. Pachyphyllinae et Phillipsastraea du Frasnien de Pologne — *Palaeont. Pol.*, **5**, 1-89.

— 1957. Considerations on Middle and Upper Devonian Thamnophyllidae in Poland. — *Acta Palaeont. Polonica*, **2**, 2-3, 81-153.

— 1960. Blastogeny and individual variations in tetracoral colonies from the Devonian of Poland. — *Ibidem*, **5**, 1, 3-64.

— 1965. Marisastridae n. fam. and *Marisastrum* n. gen. Devonian corals. — *Ibidem.* **10**, 2, 261-266.

— and FEDOROWSKI, J. 1972. Genus *Disphyllum* de Fromentel (Rugosa) in the Devonian of Poland and its distribution.— *Ibidem*, **17**, 3, 265-340.

SCHINDEWOLF, O. H. 1924. Bemerkungen zur Stratigraphie und Ammoneenfauna des Saalfelder Oberdevons. — *Senckenbergiana*, **6**, 1/2, 95-113.

SCHLÜTER, C. 1881. Über einige Anthozoen des Devon. — *Zeitschr. Deutsch. Geol. Ges.*, **33**, 75-108.

SCHOUPPÉ, A. v. 1965. Die Mittel — bis oberdevonische Korallenfauna von Kuragh (Chitral). — Ital. Expedition to Karakorum and Hindukush. Scient. reports. IV — Paleontology, 13-53, Leiden.

SCRUTTON, C. T. 1967. Marisastridae (Rugosa) from south-east Devonshire, England. — *Palaeontology*, **10**, 2, 266-279.

— 1968. Colonial Phillipsastraeidae from the Devonian of southeast Devon, England. — *Bull. Brit. Mus. (Nat. Hist.), Geology*, **15**, 5, 183-281.

SHERZER, W. H. 1892. Revision and monograph of the genus *Chonophyllum*. — *Bull. Geol. Soc. Amer.*, **3**, 253-282.

SIMPSON, G. B. 1900. Preliminary descriptions of new genera of Palaeozoic rugose corals. — *Bull. New York State Mus.*, **8**, 39, 199-222.

SMITH, S. 1945. Upper Devonian corals of the Mackenzie River Region, Canada. — *Geol. Soc. Amer., Spec. Pap.* **59**, 1-126.

ŚLÓSARZ, J. and ŻAKOWA, H. 1975. Dewon antykliny Krakowa (The Devonian of the Cracow Anticline). — *Inst. Geol. Biul.*, **282**, 1-68.

SOBOLEV, D. (Соболев, Д.) 1909. Средний девон Келецко-Сандомирского Кряжа. — Мат. Геол. Росс., 24, Ст. Петерсбург.

SORAUF, J. E. 1967. Massive Devonian Rugosa of Belgium. — *Univ. Kansas Paleont. Contr.*, **16**, 1-41.

— 1971. Microstructure in the exoskeleton of some Rugosa (Coelenterata). — *J. Paleont.*, **45**, 1, 23-31.

SOSHKINA, E. D. (Сошкина, Э. Д.) 1939. Верхнедевонские кораллы Rugosa, Урала. — *Тр. Пал. Инст. А. Н. СССР*, **9**, 2, 5-88.

— (Сошкина, Э. Д.) 1951. Позднедевонские кораллы Rugosa, их систематика и еволюция. — *Ibidem*, **34**, 3-124.

— (Сошкина, Э. Д.) 1952. Определитель девонских четырёхлучевых кораллов. — *Ibidem*, **39**, 3-128.

— (Сошкина, Э. Д.) 1954. Девонские четырёхлучевые кораллы Русской платформы. — *Ibidem*, **52**, 1-74.

SPASSKY, N. Ya. (Спасский, Н. Я.) 1960. Девонские четырёхлучевые кораллы Рудного Алтая. — Госгеолмехиздат, 3-143, Москва.

STRUCZ, D. L. 1965. Disphyllidae and Phacellophyllidae from the Devonian Garra Formation of New South Wales. — *Palaeontology*, **8**, 3, 518-571.

STUMM, E. C. 1948. Upper Devonian compound tetracorals from the Martin Limestone. — *J. Paleont.*, **22**, 1, 40-47.

— 1949. Revision of the families and genera of the Devonian tetracorals. — *Mem. Geol. Soc. Amer.*, **40**, 1-91.

— 1965. Silurian and Devonian corals of the falls of the Ohio. — *Ibidem*, **93**, 1-184.

SZULCZEWSKI, M. 1971. Upper Devonian conodonts, stratigraphy and facial development in the Holy Cross Mts. — *Acta Geol. Polonica*, **21**, 1, 1-129.

WALTHER, C. 1928. Untersuchungen über die Mitteldevon-Oberdevongrenze. — *Ztschr. Deutsch. Geol. Ges.*, **80**, 97-152.

WATKINS, J. L. 1959. On the identity of the Devonian rugose coral *Diversophyllum* with *Tabulophyllum*, and notes on the genus *Charactophyllum*. — *J. Paleont.*, **33**, 1, 81-82.

WEDEKIND, R. 1924-1925. Das Mitteldevon der Eifel. — *Schriften Ges. Beförd. Naturwiss.*, **14**, 3-4, 1-85, 1-93.

WRZOŁEK, T. 1976. Koralowce Rugosa górnego franu kamieniołomu Jaźwica (Góry Świętokrzyskie). — Unpublished reports U. W., album 78822, 1-40, Warszawa.

YOH, SEN-SHING, 1937. Die Korallenfauna des Mitteldevons aus der Provinz Kwangsi, Südchina. — *Palaeontographica*, **87**, A, 45-76.

ZHELTONOGOVA, V. A. and IVANIA, V. A. (Желтоногова, В. А., Ивания, В. А.) 1960. Подкласс Tetracoralla (Rugosa), Тетракораллы 368-408. Биостратиграфия Палеозоя Саяна-Алтайской Горной области (ред. Халфин Л. Л.). — *Тр. СНИИГГИМС*, **20**, 2, 3-600.

EXPLANATION OF THE PLATES

Depths of boreholes are indicated by numbers in parentheses

PLATE 1

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(?) *Breviphrentis* sp. 16

1. *a* — transverse section, *b* — longitudinal section, ×2.
Specimen IG-1429. II. 1, Bąkowa IG-1 (1829-1835 m); Frasnian.

Smithicyathus lubliniensis sp. n. 18

2. Transverse section of fragment of a colony, ×2. Specimen IG-1429. II. 2, Korczmin IG-1 (2024-2040 m); Frasnian.
3. *a* — transveres section, *b* — longitudinal section, ×2. *c* — transverse section, ×5. Holotype specimen IG-1429. II. 5; Korczmin IG-III (1891-1897 m); Frasnian.

Heliophyllum proliferum (FRECH, 1885 *non* ROEMER, 1855) 18

4. Transverse section of offsetting corallite, ×3. Specimen U. Wr. D. Św. K-1, Lubiechów; Frasnian.

Pterorrhiza multizonata (REED) 20

5. Longitudinal section, ×1.5. Specimen IG-1429. II. 4, Bąkowa IG-1 (1829-1835 m); Frasnian.
6. *a* — cross section, *b* — longitudinal section, ×2. Specimen IG-1429. II. 3, Niesiołowice IG-1 (1130-1336) m; Frasnian.

Pseudopetraia devonica SOSHKINA 16

7. *a* — transverse section, *b* — longitudinal section, ×5. Specimen UAM TcI/1, Sobiekurów; Frasnian.

Craterophyllum (?) *humile* sp. n 17

8. *a* — view of the lateral side, *b* — transverse section of a polished surface, ×2. Specimen UAM TcI/2, Kowala II; Frasnian *(Palmatolepis gigas* Zone).

Phillipsastrea plantana sp. n. 19

9. Longitudinal section, ×5. Specimen UAM TcI/3, Sobiekurów; Frasnian.

PLATE 2

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Phillipsastrea plantana sp. n. 19

1. *a* — cross section, ×2, *b* — longitudinal section, ×3. Holotype specimen UAM TcI/4, Sobiekurów; U. Frasnian

Peneckiella szulczewskii sp. n. 21

2. *a* — cross section, ×2, *b* — cross section of an offsetting corallite ×3, *c*, *d*, *e* — longitudinal sections of a phaceloid corallum, ×2. Holotype specimen UAM TcI/6, Górno; Frasnian (*Polygnathus asymmetricus* Zone).

Peneckiella fascicularis (SOSHKINA) 21

3. *a* — offsetting corallite in cross section, *b* — offsetting corallite in longitudinal section, ×4. Specimen UAM TcI/7, Chojnice 3 (2879-2883 m); Frasnian (*Polygnathus asymmetricus* Zone).
4. Transverse section ×2. Specimen UAM TcI/8, Karniowice 4 (294 m); Frasnian (*Polygnathus asymmetricus* Zone).

Haplothecia aff. *filata* (SCHLOTHEIM) 22

5. *a* — view of an upper surface of the colony, *b* — cross section, ×2. Specimen UAM TcI/5, Kadzielnia 7; Frasnian (*Polygnathus asymmetricus* Zone).

Trigonella sandaliformis sp. n. 24

6. *a* — transverse section, *b* — longitudinal section, ×2, *c* — exterior view of the corallite, ×1.2. Holotype specimen UAM TcI/13, Kowala II; Frasnian (*Palmatolepis gigas* Zone).

PLATE 3

Aristophyllum irenae sp. n. 27

1. Longitudinal section with an offset, ×2. Specimen IG-1429. II. 7, Bąkowa IG-1 (1931-1937 m); L. or M. Frasnian.
2. Cross section ×2. Specimen UAM TcI/18, Kowala II; Frasnian (*Palmatolepis gigas* Zone).
3. *a* — longitudinal section, *b* — transverse section, ×2. Holotype specimen IG-1429. II. 6, Bąkowa IG-1 (1931-1937 m); Frasnian.
4. Cross section, ×2. Specimen IG-1429. II. 8, Bąkowa IG-1 (1889-1907 m); Frasnian.
5. Cross section, ×2. Specimen IG-1429. II. 5, Bąkowa IG-1 (1909-1915 m); Frasnian.
6. External view of a corallite, ×1. Specimen UAM TcI/17, Kowala II; Frasnian (*Palmatolepis gigas* Zone).

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Ceratophyllum kielcense sp. n. 22

7. Longitudinal section ×2. Specimen UAM TcI/12, Karniowice 4 (293 m); Frasnian (*Polygnathus asymmetricus* Zone).
8. Cross section ×3. Specimen UAM TcI/11, Psie Górki; Frasnian.
9. Cross section ×3. Specimen UAM TcI/10, Wietrznia 22; Frasnian (U. *Polygnathus asymmetricus* Zone).
10. *a* — longitudinal section ×2, *b* — cross section ×2. Holotype specimen UAM TcI/9, Wietrznia 13; age as above.

Ceratophyllum heterophylloides (FRECH) 23

11. *a* — cross section ×2. *b* — longitudinal section ×2. Specimen UAM TcI/14, Wietrznia 13; Frasnian as above.

Debnikiella formosa sp. n. 25

12. Cross section ×2. Specimen UAM TcI/16, Wietrznia; U. Frasnian (*Ancyrognathus triangularis* Zone).

PLATE 4

Aristophyllum angustum (GÜRICH) 26

1. *a* — longitudinal section ×2, *b* — cross section ×2. Specimen UAM TcI/19, Kadzielnia 7; Frasnian (*Polygnathus asymmetricus* Zone).
2. Cross section ×2. Specimen IG-1429. II. 9, Niesiołowice IG-1 (1330-1336 m); Frasnian.

Charactophyllum lotzei ALTEVOGT 29

3. *a* — longitudinal section ×2. Specimen U. Wr. D. Sw./K3, Witoszów 7, *b* — cross section ×2. Specimen U. Wr. D. Sw./K3, Witoszów 10; Frasnian (*Polygnathus asymmetricus* Zone).
4. Cross section ×5. Specimen U. Wr. D. Sw./K4, Witoszów 10; age as above.

Alaiophyllum jarushevskyi GORIANOV 30

5. *a* — longitudinal section ×2, *b* — cross section ×2. Specimen UAM TcI/27. Kadzielnia 9; Frasnian (*Polygnathus asymmetricus* Zone).

Temnophyllum elongatum sp. n. 31

6. *a* — cross section ×2, *b* — longitudinal section ×2. Holotype specimen UAM TcI/28, Sobiekurów; Frasnian.

Temnophyllum isetense (SOSHKINA) 31

7. *a* — longitudinal section ×2, *b* — cross section ×2. Specimen UAM TcI/21, Kadzielnia 7; Frasnian (*Polygnathus asymmetricus* Zone).

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8. Cross section ×2. Specimen U. Wr. D. Sw./K5, Witoszów 10; age as above.
9. Longitudinal section ×2. Specimen UAM TcI/22, Kadzielnia 7; age as above.
10. Longitudinal section ×2. Specimen UAM TcI/24, Wietrznia 16; age as above.
11. Cross section ×2. Specimen UAM TcI/26, Wietrznia 16; age as above.
12. Cross section ×2. Specimen IG-1429. II. 10, Bąkowa IG-1 (1968-1975 m); L. or M. Frasnian.
13. Longitudinal section ×2. Specimen U. Wr. D. Sw./K6, Witoszów 10; Frasnian (*Polygnathus asymmetricus* Zone).
14. Oblique section ×2. Specimen UAM TcI/20, Wietrznia 13; age as above.
15. Cross section ×3. Specimen UAM TcI/25, Kadzielnia 21; age as above.

Debnikiella formosa sp. n. 25

16. *a* — transverse section ×2, *b* — longitudinal section ×2. Holotype, specimen UAM TcI/15, Dębnik; Frasnian (*Palmatolepis gigas* Zone).

PLATE 5

Temnophyllum isetense (SOSHKINA) 31

1. Cross section of a young corallite ×2. Specimen TcI/23, Kadzielnia 9; Frasnian (*Polygnathus asymmetricus* Zone).

Temnophyllum menyouense HILL and JELL 32

2. *a* — transverse section ×2, *b* — longitudinal section ×2. Specimen UAM TcI/30, Kadzielnia 9; Frasnian (*Polygnathus asymmetricus* Zone).
3. Longitudinal section ×2. Specimen UAM TcI/32, Kadzielnia 3; age as above.
4. *a* — transverse section ×2, *b* — longitudinal section ×2. Specimen UAM TcI/30, Kadzielnia 9; age as above.

Temnophyllum miniarense (SOSHKINA) 34

5. Transverse section ×2. Specimen UAM TcI/33, Wietrznia 13; Frasnian (*Polygnathus asymmetricus* Zone).
6. Transverse section ×2. Specimen UAM TcI/34, Wyszebórz IG-1 (2385-2389 m); age as above.

Temnophyllum verum sp. n. 33

7. *a* — longitudinal section ×2, *b* — transverse section ×2. Holotype specimen UAM TcI/29, Kadzielnia; Frasnian (*Polygnathus asymmetricus* Zone).

Piceaphyllum pronini (SOSHKINA) 34

8. *a* — longitudinal section ×2, *b* — transverse section ×2. Specimen UAM TcI/35, Kowala II; U. Frasnian.
9. Transverse section ×4. Specimen U. Wr. D. Sw./K7, Witoszów; L. or M. Frasnian.

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Fedorowskicyathus similis sp. n. 36

10. Transverse section ×2. Specimen UAM TcI/39, Kowala II; Frasnian (*Palmatolepis gigas* Zone).
11. Longitudinal section ×2. Specimen UAM TcI/36, Kowala II; age as above.

Temnophyllum turbinatum HILL 32

12. *a* — longitudinal section ×2, *b* — transverse section ×2. Specimen IG-1429. II. 13, Bąkowa IG-1 (1877-1883 m); Frasnian.
13. Transverse section ×2. Specimen IG-1429. II. 11, Bąkowa IG-1 (1877-1883 m); Frasnian.
14. Oblique transverse section ×2. Specimen IG-1429. II. 14, Bąkowa IG-1 (1895-1901 m); Frasnian.
15. Longitudinal section, ×2 (mounted upside-down). Specimen IG-1429. II. 12, Bąkowa IG-1 (1895-1901 m); L. or M. Frasnian.

PLATE 6

Fedorowskicyathus similis sp. n. 36

1. *a* — transverse section, *b* — longitudinal section, ×2. Specimen UAM TcI/41.
2. *a* — longitudinal section, *b* — transverse section, ×2. Holotype specimen UAM TcI/38.
3. Exterior view of a corallite ×1.5. Specimen UAM TcI/40.
4. *a* — view of the calice, *b* — view of the lateral side ×2. Specimen UAM TcI/42.
5. *a* — transverse section, *b* — longitudinal section ×2. Specimen UAM TcI/38.
All specimens from Kowala II, Frasnian (*Palmatolepis gigas* Zone).

Iowaphyllum oliveri sp. n. 38

6. *a* — longitudinal section, *b* — transverse section, ×2. Holotype specimen UAM TcI/46.
7. View of the calice ×2. Specimen UAM TcI/45.
8. View of the exterior surface ×1.3. Specimen UAM TcI/44. All specimens from Kowala II; Frasnian (*Palmatolepis gigas* Zone).

PLATE 7

Chonophyllum dulce sp. n. 37

1. *a* — transverse section, *b* — longitudinal section, ×2. Holotype specimen UAM TcI/43, Wietrznia 15; Frasnian *Palmatolepis gigas* Zone).

Kowalaephyllum poculum sp. n. 40

2. *a* — transverse section of the polished surface ×1, *b* — transverse thin section ×1.3. Holotype specimen A, UAM TcI/50, Wietrznia 15; Frasnian (*Palmatolepis gigas* Zone).

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Iowaphyllum oliveri sp. n. 38

3. Transverse section of a fragmentary corallite ×2. Specimen UAM TcI/48, Karczówka; Frasnian (*Palmatolepis gigas* Zone).

Kowalaephyllum excelsum sp. n. 40

4. *a* — lateral view of the corallite, ×1, *b* — longitudinal section ×1, *c* — transverse section ×1, *d* — fragment of transverse section ×2, *e* — fragment of transverse section ×1; all sections from the polished surfaces. Holotype specimen UAM TcI/47, Kowala II; Frasnian (*Palmatolepis gigas* Zone).

PLATE 8

Kowalaephyllum mirabile sp. n. 41

1. *a* — view of the weathered calicular surface, *b* — lateral side of the corallite ×1, *c*, *d* — transverse and longitudinal sections of polished surfaces ×1, *e* — transverse thin section ×2. Holotype specimen UAM TcI/51, Kowala II; Frasnian (*Palmatolepis gigas* Zone).

Kowalaephyllum poculum sp. n. 40

2. *a* — longitudinal section of the polished surface ×1. Holotype specimen A, UAM TcI/50, Wietrznia; Frasnian (*Palmatolepis gigas* Zone).
b — a fragment of the transverse section of the polished surface ×2, *c* — transverse thin section ×2. Specimen B, UAM TcI/49, Wietrznia; age as above.

Tabulophyllum mcconnelli (WHITEAVES) 43

3. *a* — transverse section of the neanic stage, *b* — transverse section of the ephebic stage, *c* — longitudinal section all ×3. Specimen UAM TcI/54, Kowala II; Frasnian (*Palmatolepis gigas* Zone).

PLATE 9

Tabulophyllum priscum (MÜNSTER) 42

1. *a*, *b* — transverse sections of a young corallite ×2. Specimen UAM TcI/53, Sobiekurów; Frasnian.
2. Transverse section, ×2. Specimen U. Wr. D. Św./K7, Mokrzeszów; Frasnian (*Palmatolepis gigas* Zone).
3. Longitudinal section, ×2. Specimen U. Wr. D. Św./K8, Mokrzeszów; age as above.

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Tabulophyllum irregulare sp. n. 43

4. Transverse section of a young corallite ×2. Specimen UAM TcI/55, Wietrznia 19; Frasnian (*Palmatolepis gigas* Zone).
5. *a* — incomplete transverse section ×2, *b* — transverse section ×2, *c* — longitudinal section ×2. Holotype specimen UAM TcI/56, Wietrznia 19; age as above.

Grypophyllum unduliseptatum IVANIA 45

6. *a* — longitudinal section, *b* — transverse section ×2. Specimen UAM TcI/57, Wietrznia 10; Frasnian (*Polygnathus asymmetricus* Zone).
7. Cross section ×2. Specimen UAM TcI/58, Wietrznia 10; age as above.
8. Cross section ×2. Specimen IG-1429. II. 15, Bąkowa IG-1 (1913-1911 m); Frasnian.
9. Longitudinal section of two corallites ×2. Specimen UAM TcI/59, Wietrznia 10; Frasnian (*Polygnathus asymmetricus* Zone).

Tabulophyllum densum sp. n. 42

10. *a* — transverse section near the proximal end ×2, *b* — transverse section, *c* — longitudinal section ×2. Holotype specimen UAM TcI/52, Wietrznia 13; M. Frasnian.

PLATE 10

Acanthophyllum frasniense sp. n. 44

1. *a* — longitudinal section, *b* — transverse section, ×2. Holotype specimen IG-1429. II. 16, Bąkowa IG-1 (1829-1835 m); L. or M. Frasnian.
2. Supratabular transverse section ×2. Specimen IG-1429. II. 17, Bąkowa IG-1 (1829-1825 m); L. or M. Frasnian,

Rachaniephyllum andreae sp. n. 46

3. *a* — oblique section of a colony ×2. Specimen IG-1429. II. 19, Tyszowce IG-2 (2026-2053 m); Upper Frasnian, *b* — offsetting corallite of the same colony ×2, *c* — transverse section of the same colony ×2.
4. *a* — transverse section, *b* — longitudinal section of corallites of phaceloid corallum ×2; specimen IG-1429. II. 20, Korczmin IG-1 (2056-2080 m); Upper Frasnian.
5. Transverse section of corallites ×2. Holotype specimen IG-1429. II. 21, Rachanie IG-1 (1805-1821 m); Upper Frasnian.
6. Transverse section of young corallites ×3. Specimen IG-1429. II. 18, Tyszowce IG-2 (2036-2053 m); Upper Frasnian.


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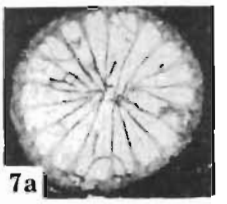
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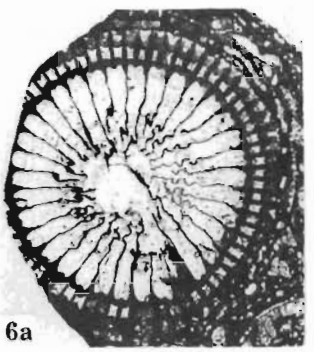
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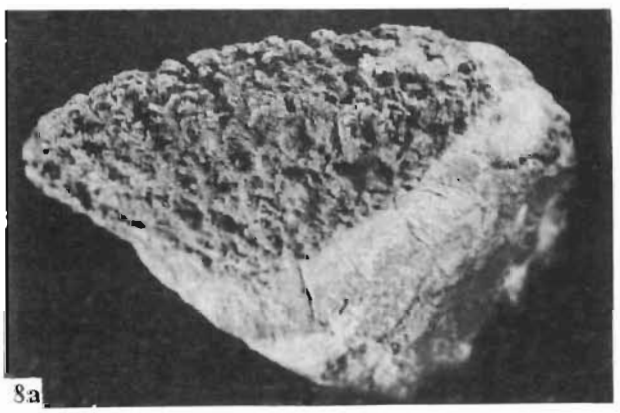
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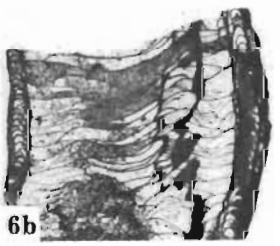
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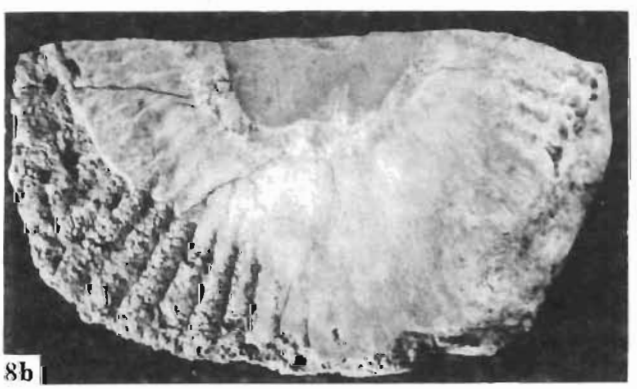
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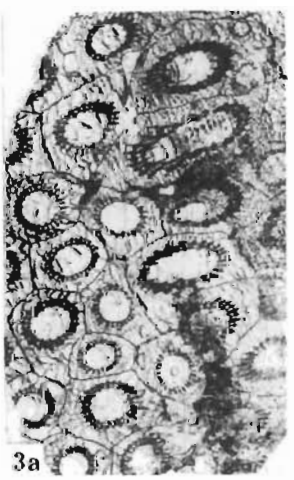
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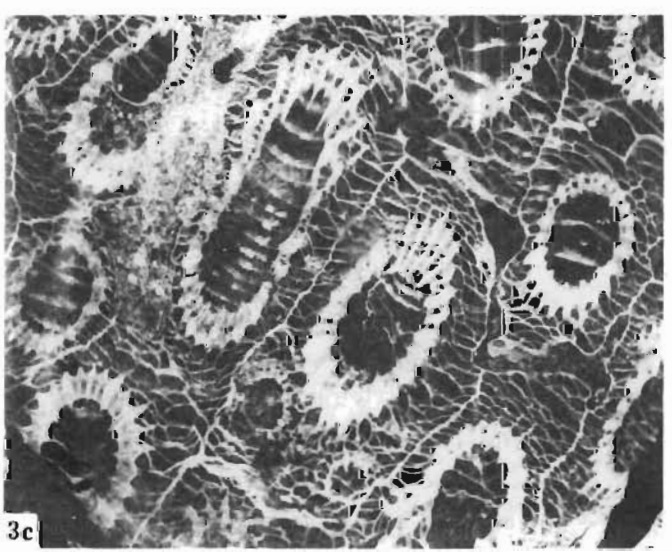
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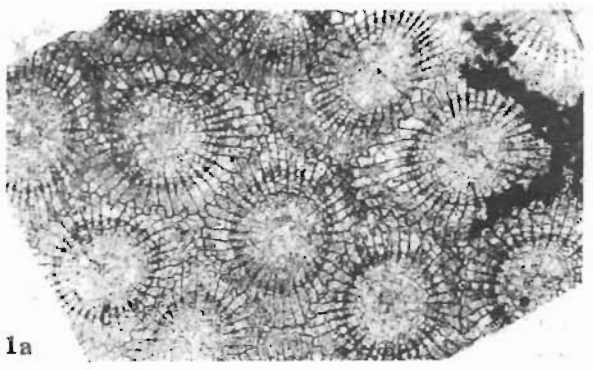
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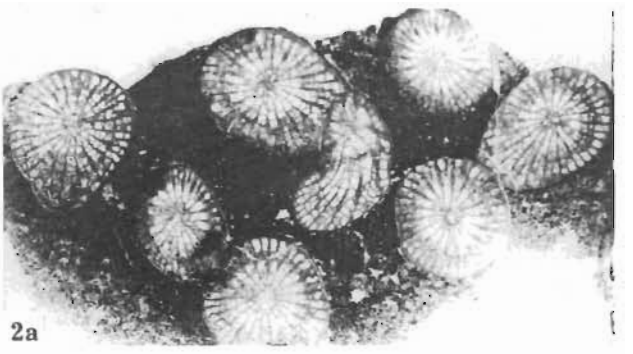
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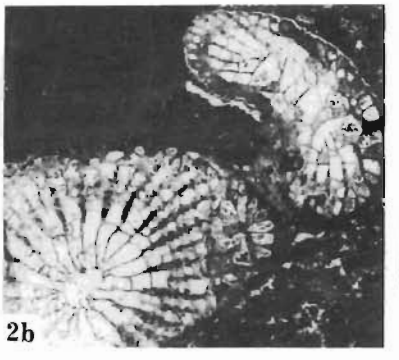
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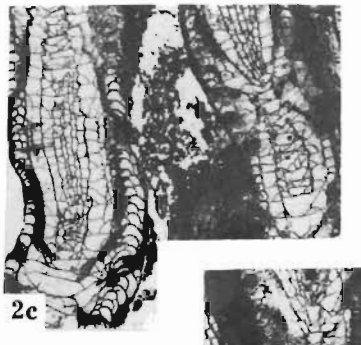
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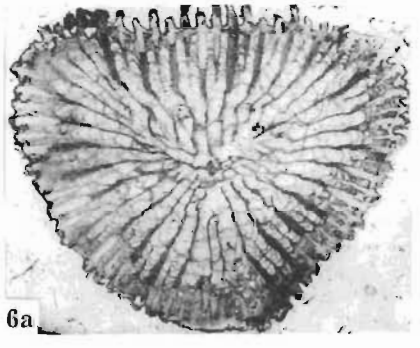
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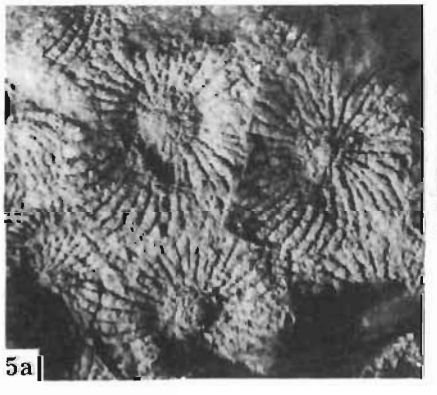
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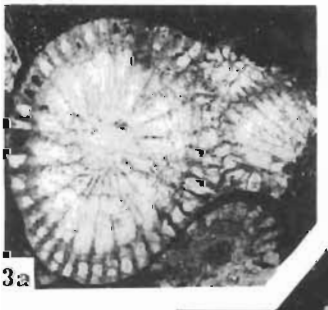
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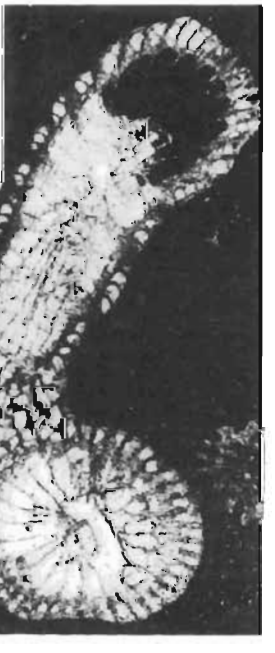
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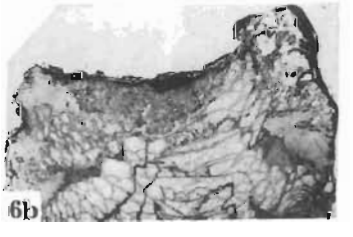
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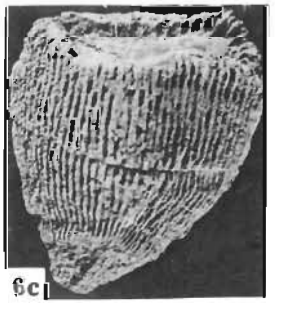
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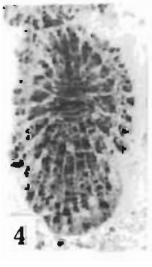
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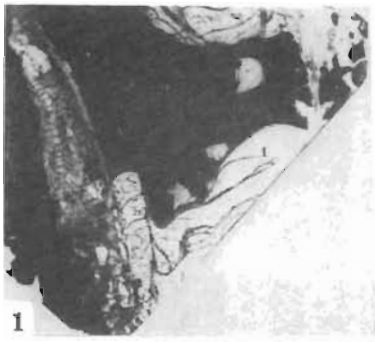
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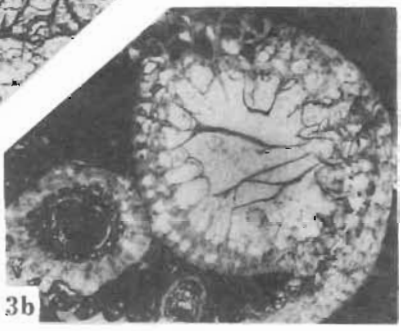
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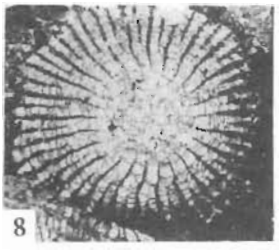
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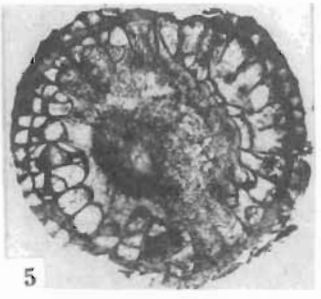
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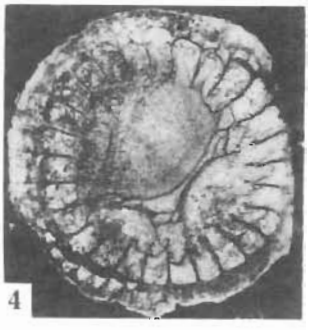
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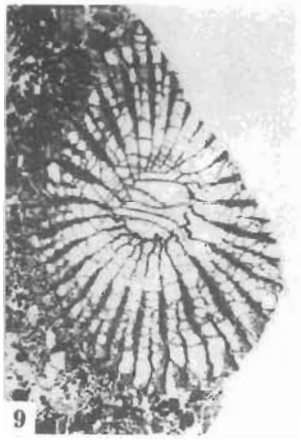
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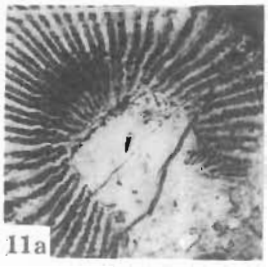
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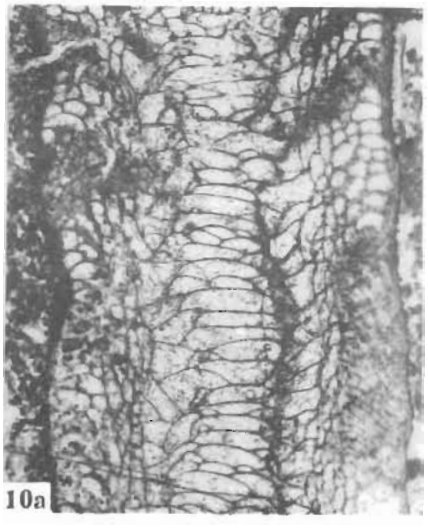
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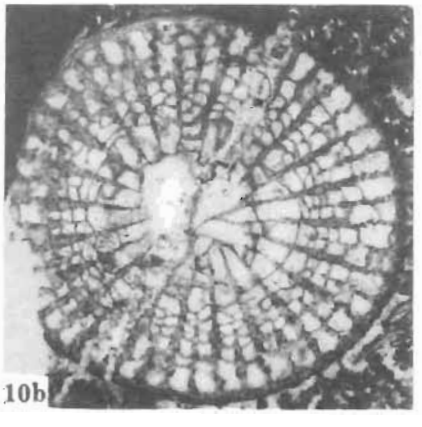
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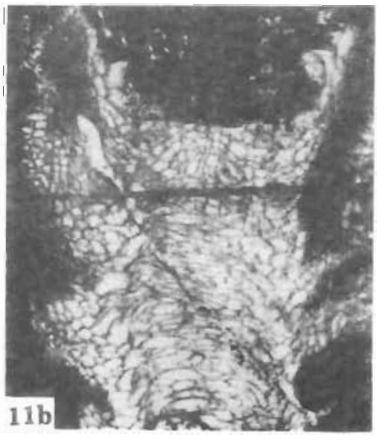
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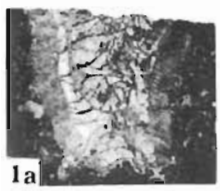
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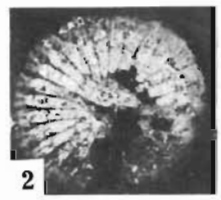
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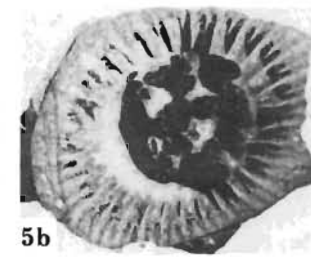
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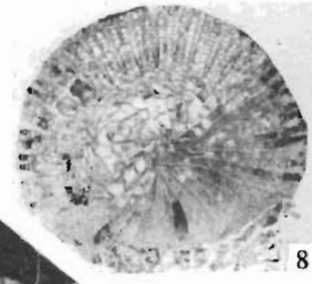
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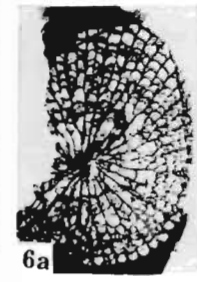
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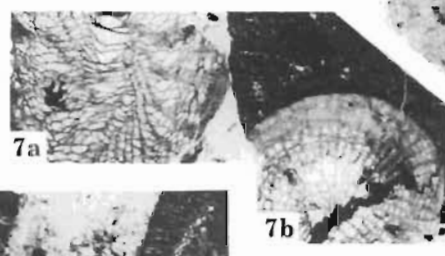
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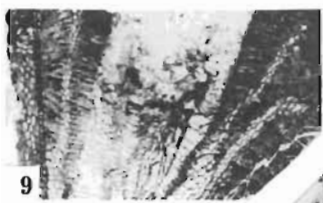
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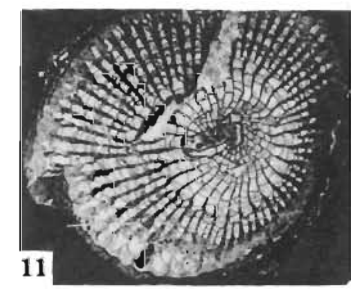
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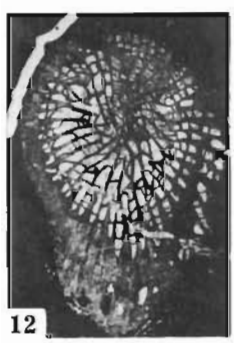
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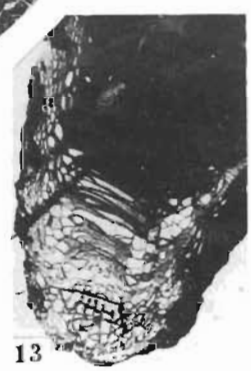
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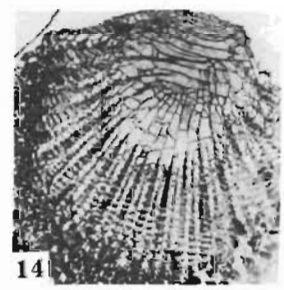
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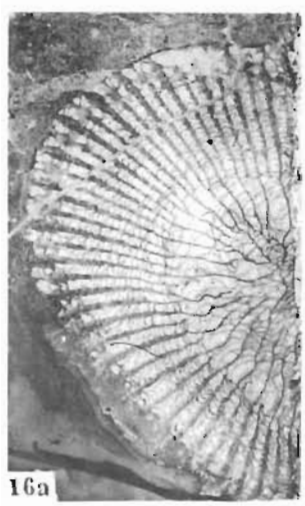
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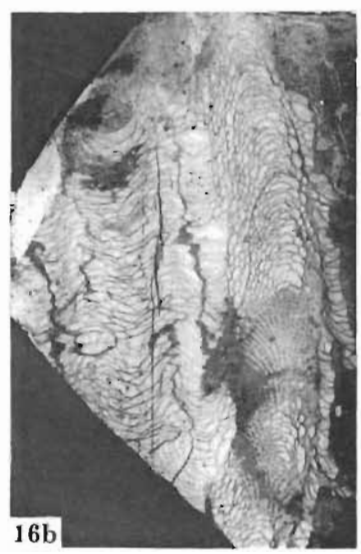
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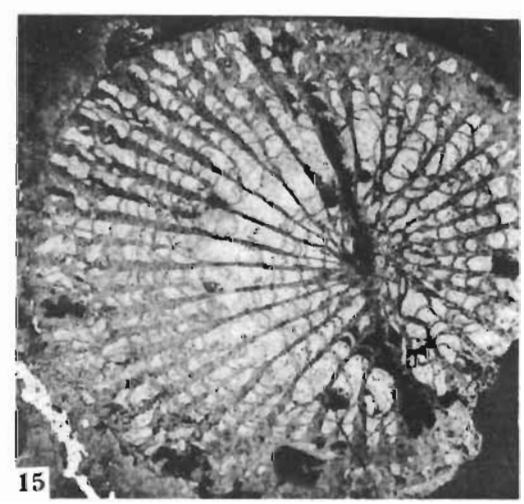
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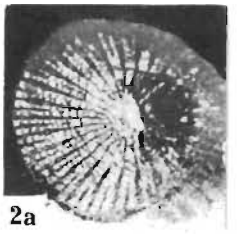
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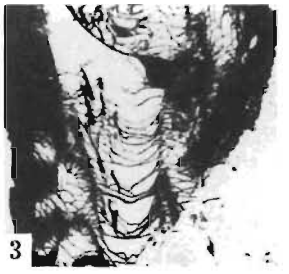
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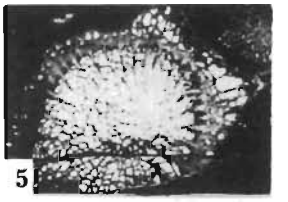
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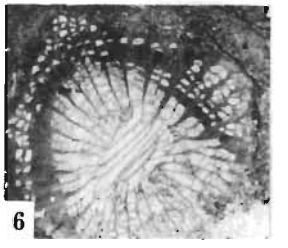
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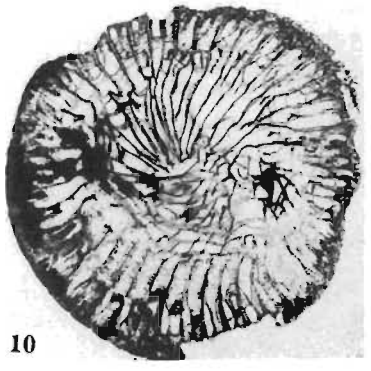
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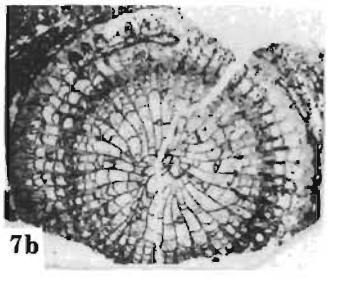
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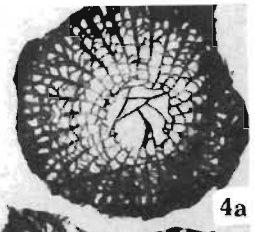
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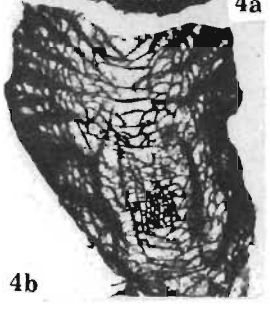
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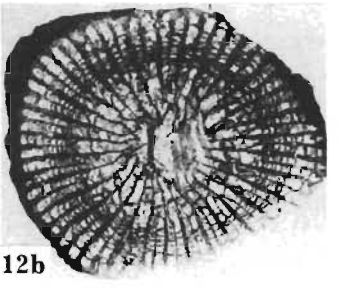
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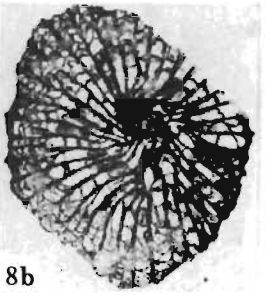
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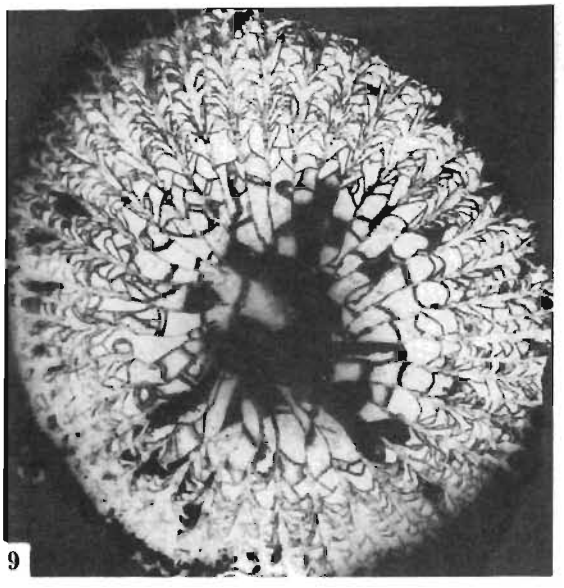
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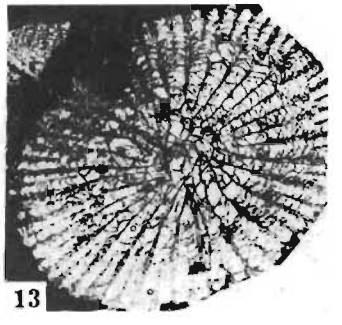
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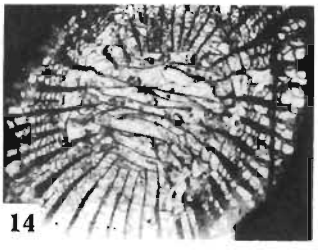
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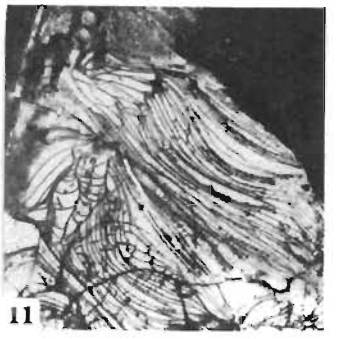
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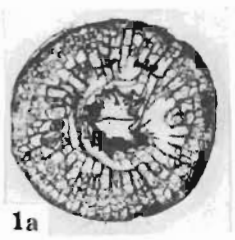
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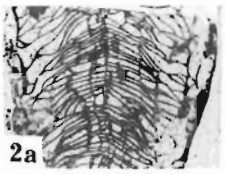
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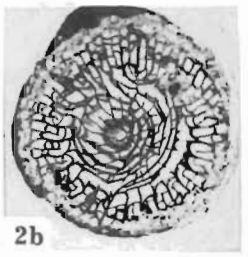
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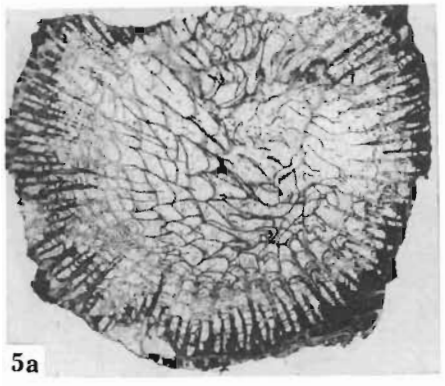
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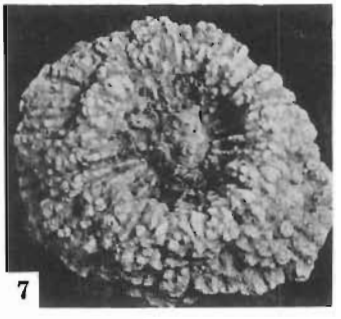
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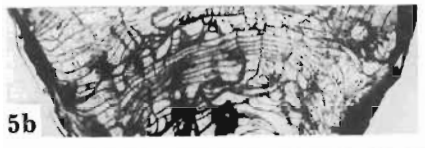
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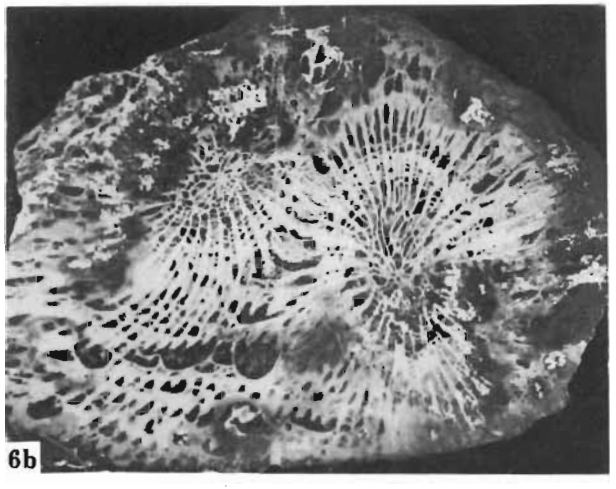
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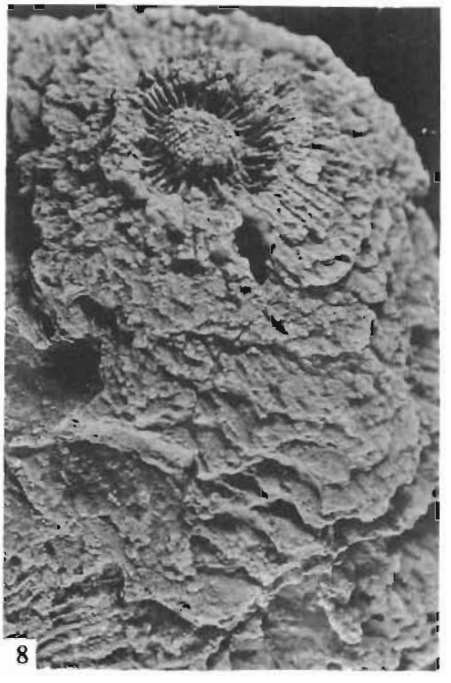
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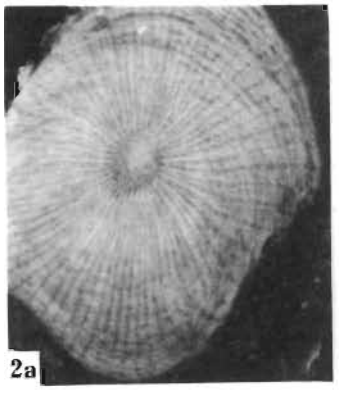

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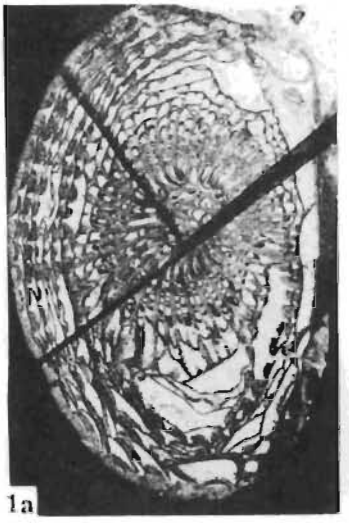

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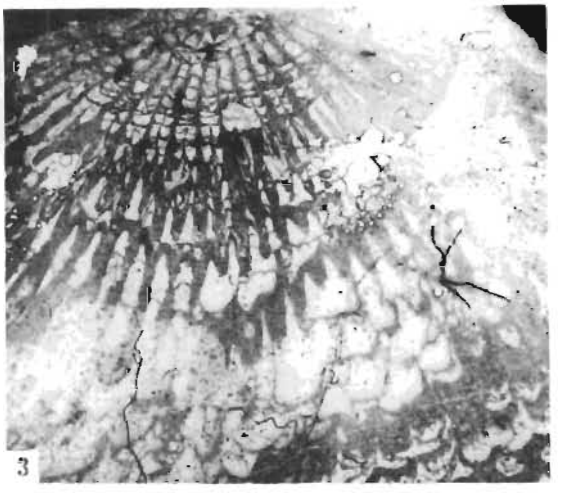

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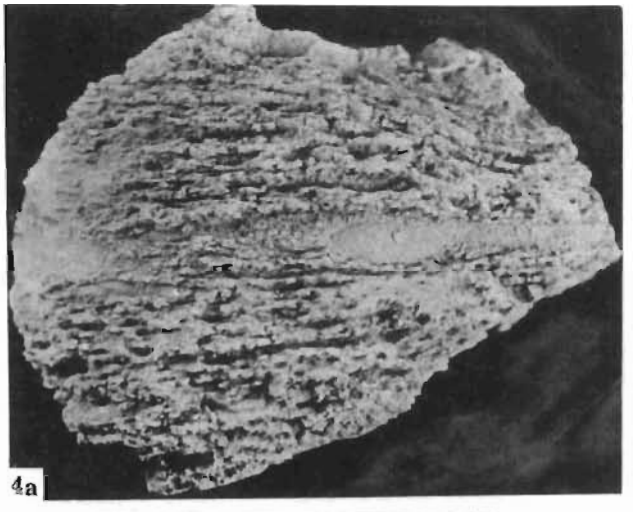

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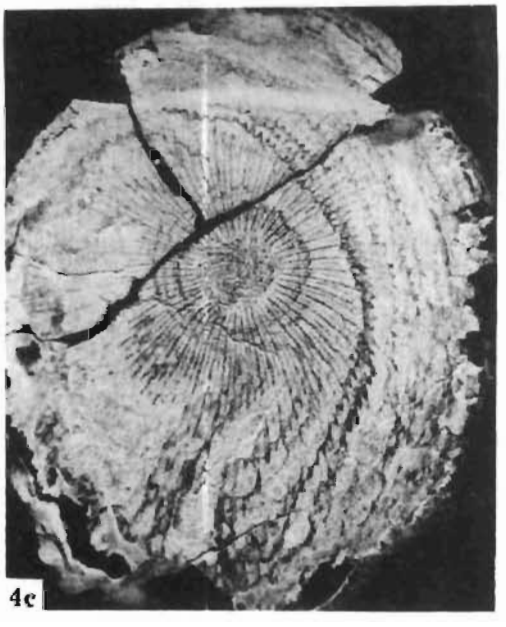

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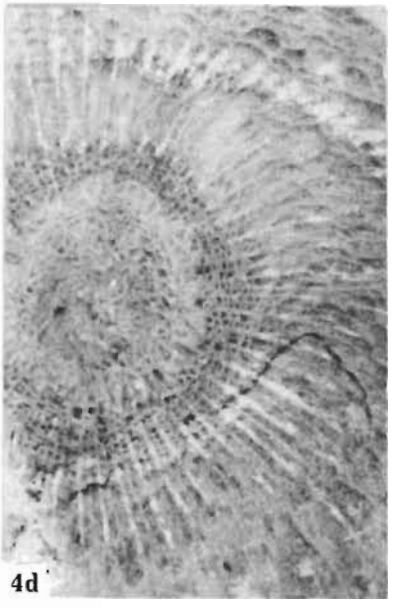

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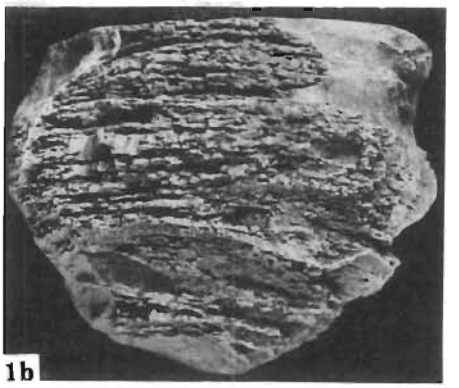
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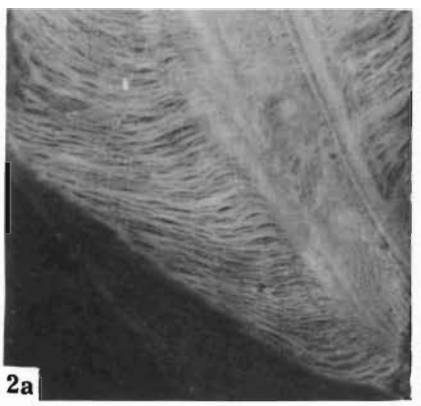
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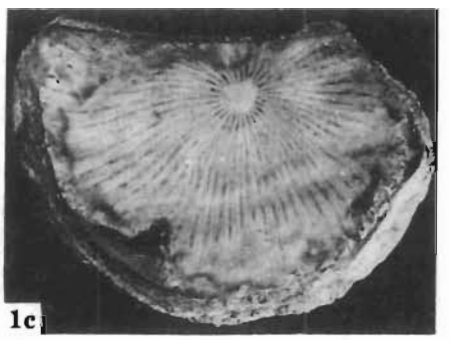
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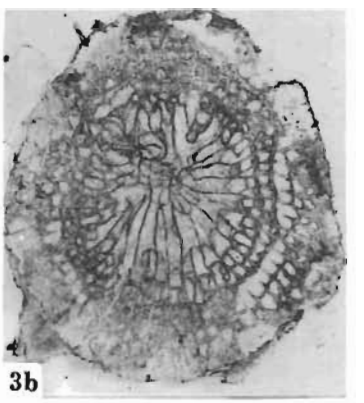
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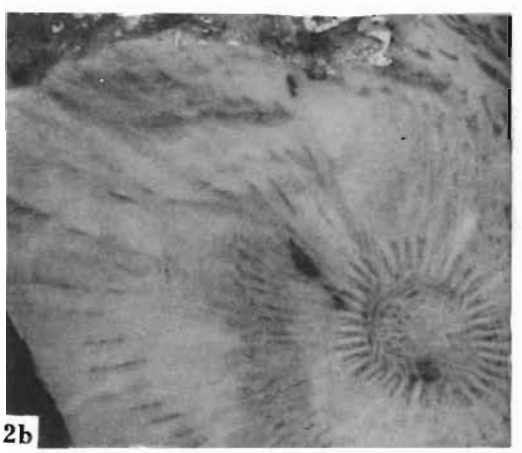
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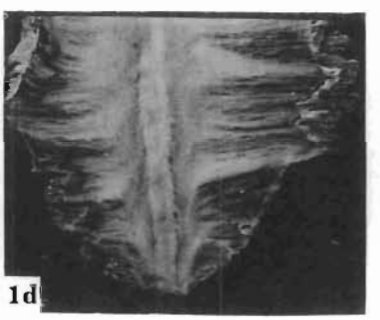
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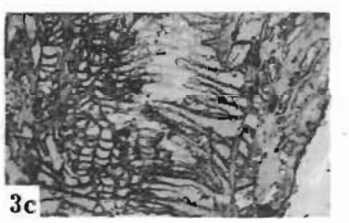
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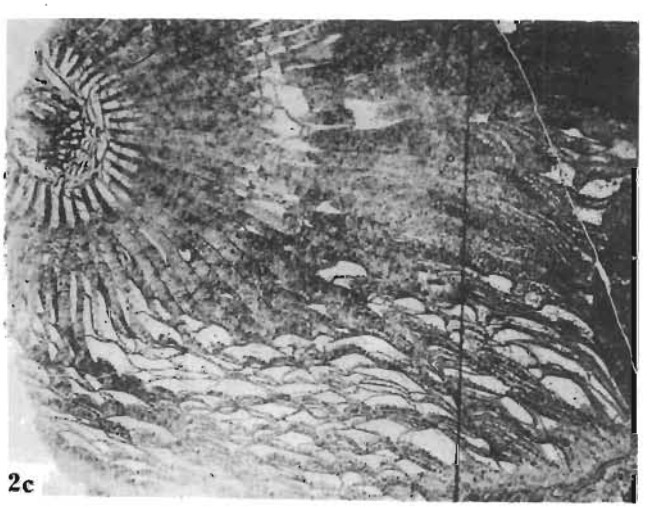
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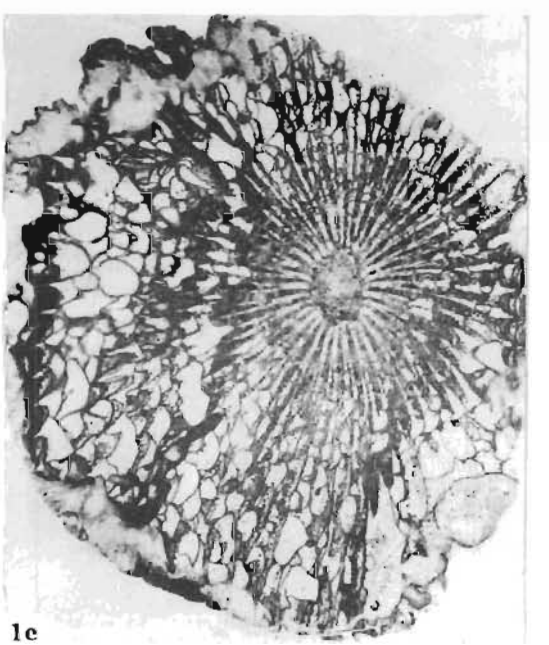
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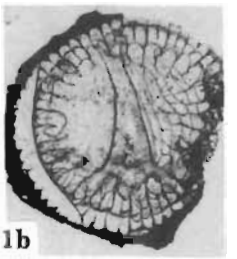
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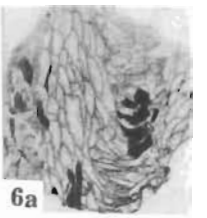
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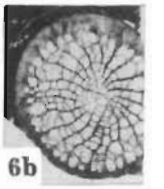
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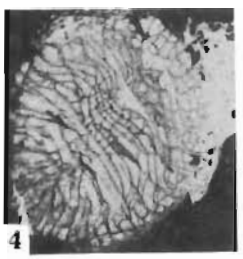
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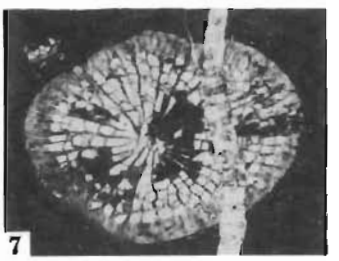
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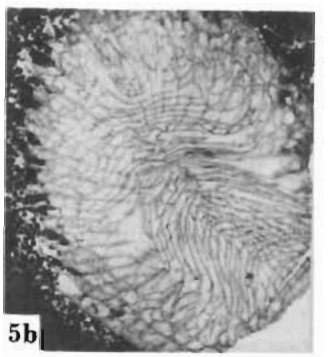
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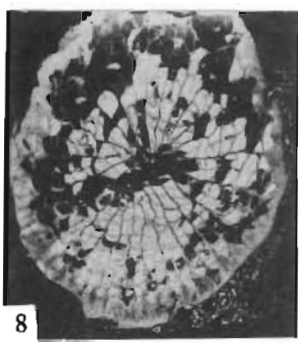
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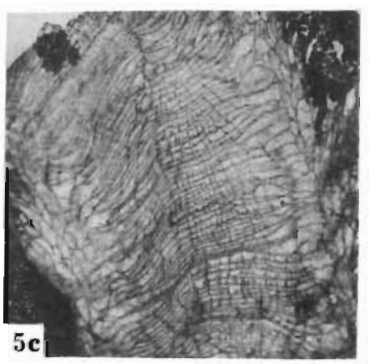
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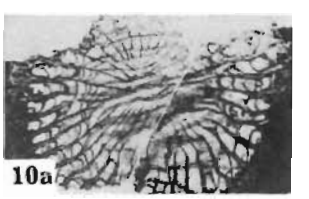
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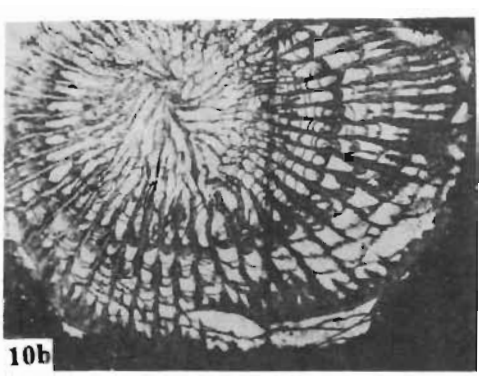
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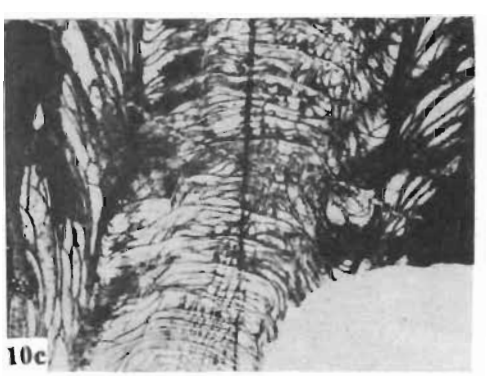
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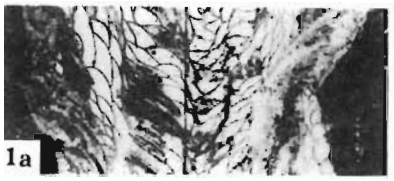
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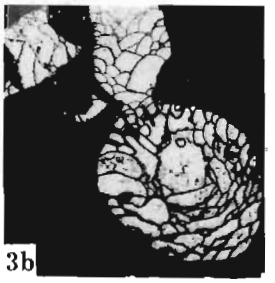
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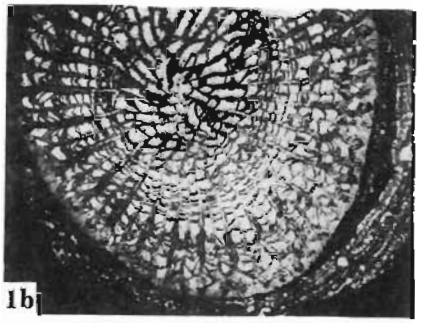
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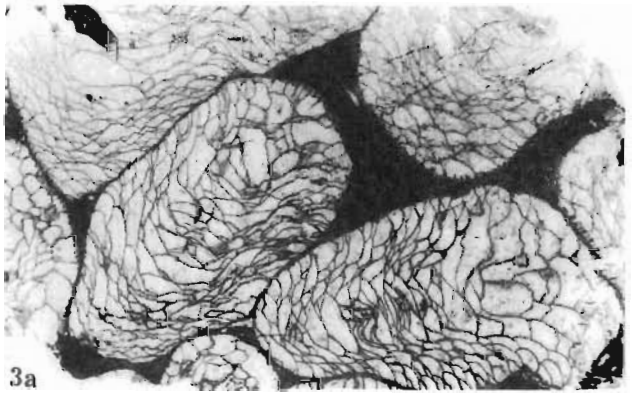
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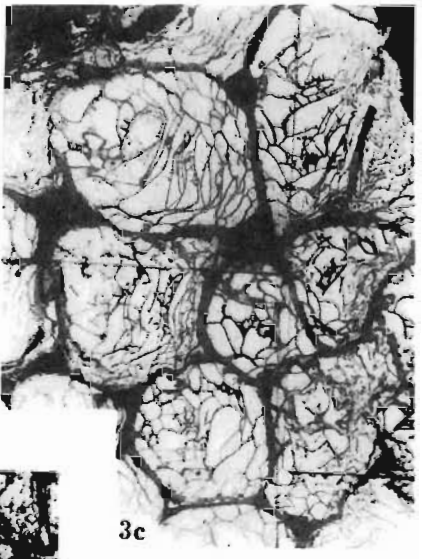
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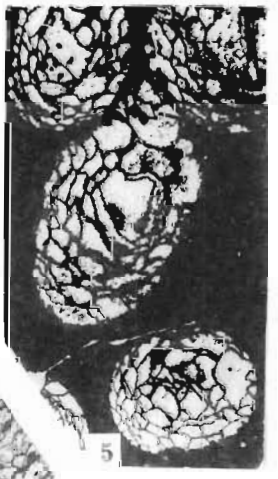
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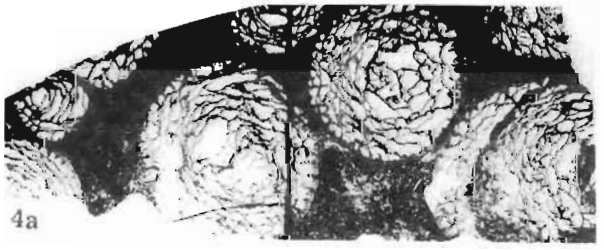
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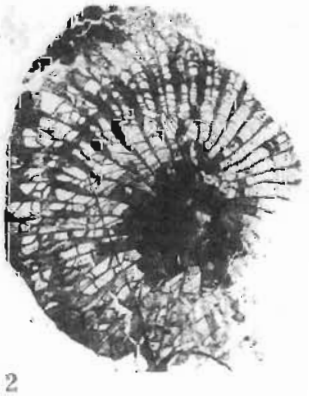
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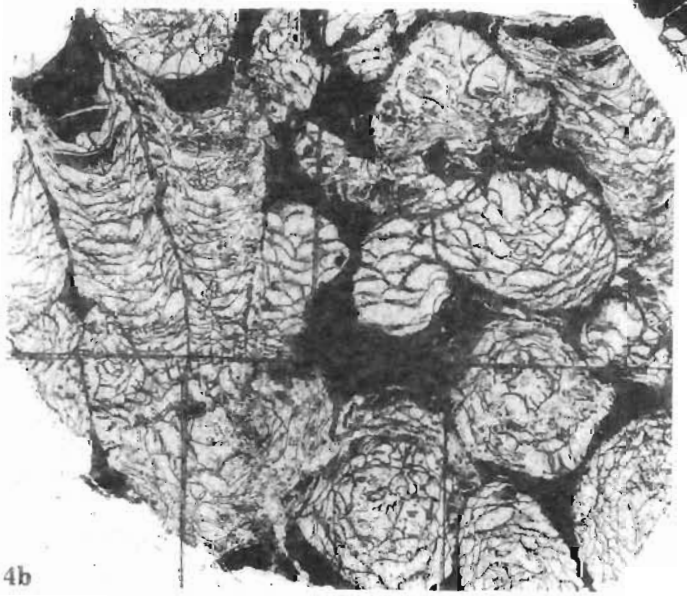
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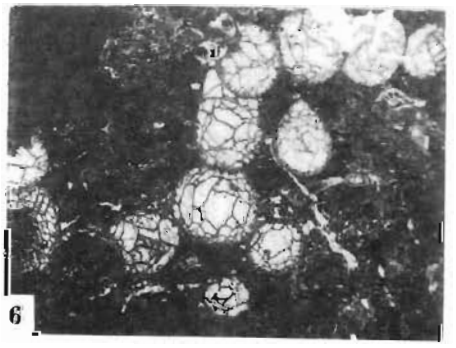
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