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CALCISPONGEA FROM THE JURASSIC OF POLAND

Abstract. — Thirty seven species of Calcispongea are described from the Middle and Upper Jurassic of Poland; 35 of them represent the order Pharetronida Zittel and the remaining two — the order Thalamida Laubenfels. The analyses performed involved microstructure and spicular composition in parenchymal and cortical skeletons, external morphology, and structure of water system.

INTRODUCTION

The paper represents a successive, third part of a monographic study of fossil sponges from Poland (previous parts: Hurcewicz 1966, 1968) and deals with Calcispongea from Middle and Upper Jurassic limestones of extra-Carpathian Poland (Text-fig. 1). The species described here primarily represent the order Pharetronida. Fossils of this group are particularly common in the Jurassic and Cretaceous strata. The fossils were not hitherto the subject of detailed studies in Poland. Some forms from the Dogger of Balin nearby Cracow were described by Reuss (1867) and some from the Cenomanian of Podolia — by Dunikowski (1883). Moreover, some references concerning occurrences of Pharetronida were given by Wiśniowski (1889). External and partly internal morphology of 23 species of Pharetronida from the Malm of the southern Poland were the subject, of the study by Siemiradzki (1913).

The suborder Chalarina Laubenfels (part Inozoa Steinmann 1882) of the order Pharetronida Zittel is represented in the material gathered by the present author by the families Lelapiidae Dendy & Row (4 genera), Elasmostomatidae (2 genera), Sestrostomellidae Laubenfels (4 genera), Discocoelliidae Laubenfels (2 genera). The order Thalamida Laubenfels (Sphinctozoa Steinmann) is here represented by 2 genera of the family Cryptocoellidae Steinmann. The paper presents descriptions of 37 sponge species (including 13 new species and 2 new subspecies) belonging to 14 genera (including one new genus).

The genera represented by the largest number of species include (the number of species given in brackets): *Peronidella* (9), *Corynella* (6), *Holcospongia* (5), and *Myrmecium* (4). Their species are particularly numerous in the Upper Oxfordian limestones from the Działoszyn area, Polish Jura Chain (Text-fig. 2). The collection includes 348 specimens gathered by the present author and supplemented by Professor W. Krach of the Institute of the Geological Sciences, Polish Academy of Sciences, Cracow (presumed collections of the late Dr. Eugeniusz Panow), Dr. Halina Pugaczewska and Dr Ewa Roniewicz.

The specimens are generally well preserved. Usually, pattern of fibres, course of canals, ostia and postica are preserved. Several specimens display cortical and parenchymal spicules in their original arrangement and size. Microstructure and spicular composition were analysed in thin sections.

The fossil material was compared with Recent sponges from the seas of the U.S.S.R. during the stay of the present author in the Institute of Zoology in Leningrad in 1967—1968. The comparisons were greatly enhanced by fruitful advice of Dr. W. M. Koltun of that Institute. The stay at the Institute of Paleontology of the Academy of Sciences in Moscow made it possible to compare the author's material with the sponge fauna described in the "Osnovy Paleontologii", housed in the latter institute.

Thin sections used in the present study were made by Mrs. M. Nowińska. Photos were taken by Lotar Jędrasik, M.Sc. (Institute of Geography in Łódź) and by Lidia Łuszczewska, M.Sc. (Laboratory of Micropaleontology, Warsaw University).

The collection described here is housed at the Laboratory of Paleontology, Institute of Geography, Łódź University in (abbr. UŁ).

REMARKS ON THE OCCURRENCE OF THE SPONGE FAUNAS

In the extra-Carpathian Poland, Calcispongea-bearing localities are concentrated in four regions:

I — areas of Działoszyn and Częstochowa, Wieluń—Częstochowa part of the Polish Jura Chain,

II — Cracow part of the Polish Jura Chain (sponge fauna described by Siemiradzki, 1913, and partly here by the present author),

III — areas of Bałtów and Przepaść nearby Ćmielów, eastern part of Mesozoic margins of the Holy Cross Mts,

IV — area of Inowrocław in Kujawy (Text-fig. 1; Table I).

Wieluń—Częstochowa part of the Polish Jura Chain. The sponge-bearing rocks are exposed along right bank of Warta river in the vicinities of Trębaczów, Wydrzynów and Grądy—Łazy villages, SEE of Działoszyn. The rocks are exposed in large quarries of "Warta" cement-plant and in several small peasant quarries. They are represented by chalky, white

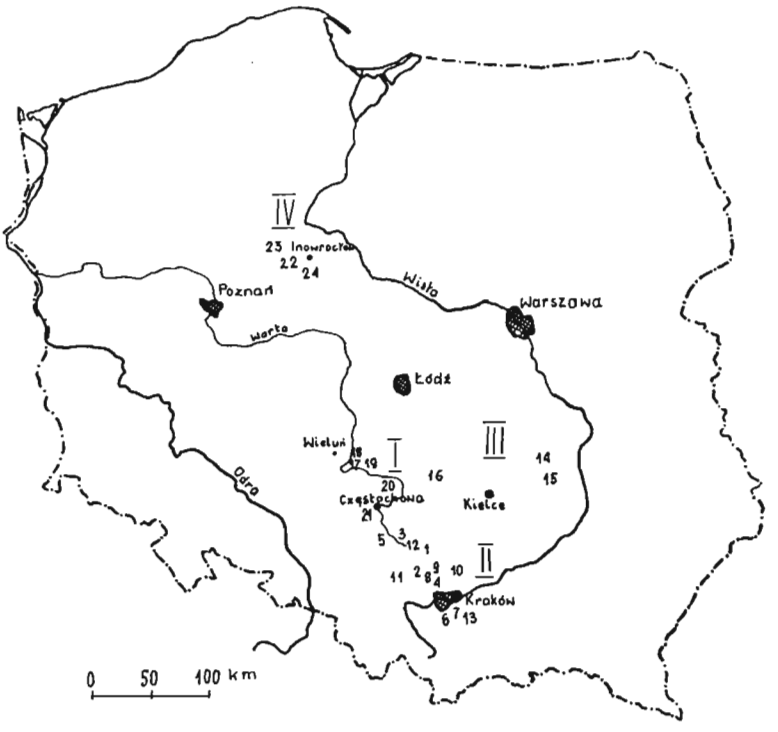


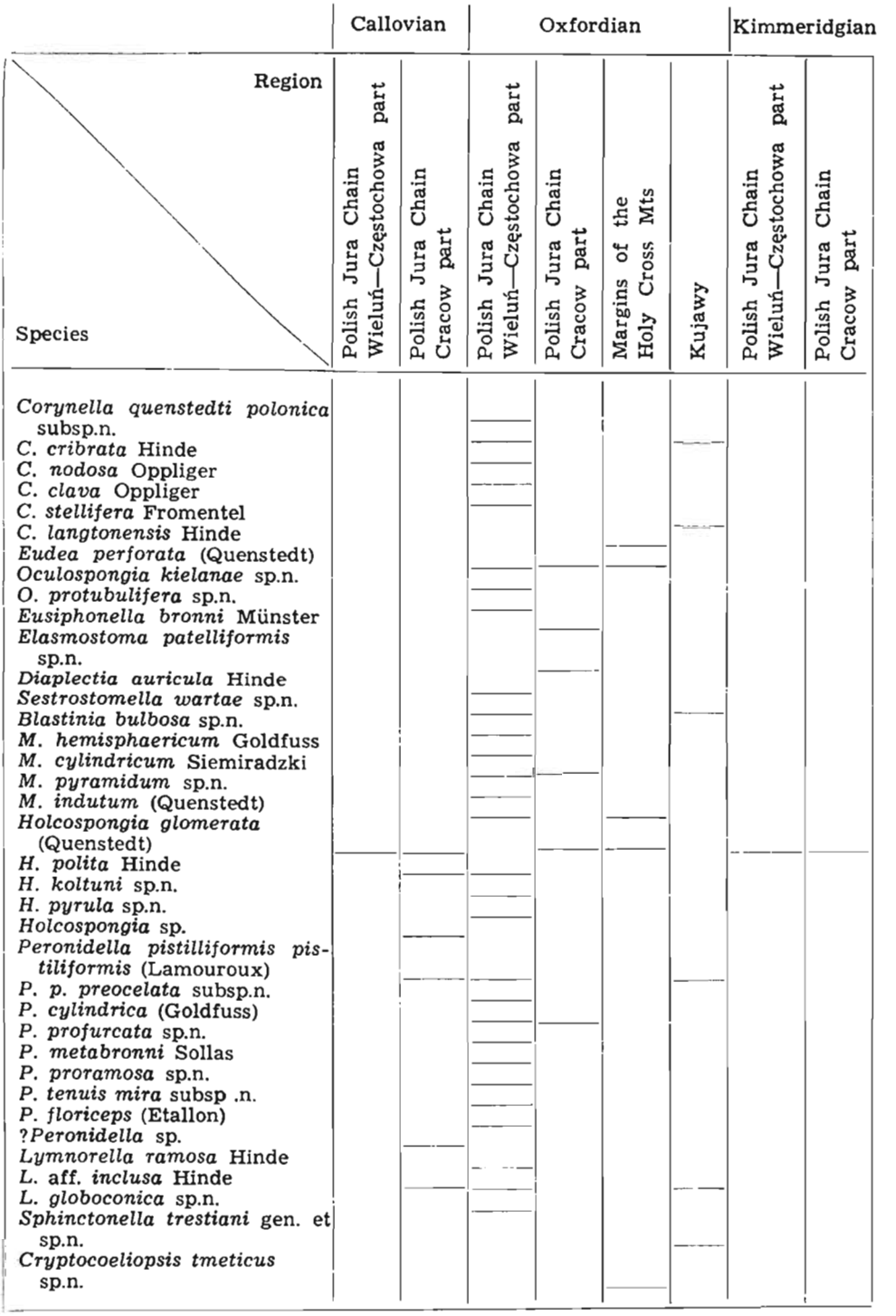
Fig. 1. Location map: *I* — Wieluń-Częstochowa part of the Polish Jura Chain, *II* — Cracow part of the Polish Jura Chain, *III* — Holy Cross Mts, *IV* — Kujawy region; *1* Pomorzany, *2* Balin, *3* Blanowice, *4* Czerna, *5* Dobrogoszyce, *6* Kraków, *7* Krzemionki, *8* Paczółtowice, *9* Minogi, *10* Ojców, *11* Wodna, *12* Włodowice, *13* Podgórze, *14* Bałtów, *15* Przepaść nearby Ćmielów, *16* Przedbórz, *17* Niwiska Dolne, *18* Działoszyn, *19* Wydrzynów, *20* Rudniki, *21* Wrzosowa, *22* Wapienno, *23* Piechcin, *24* Bielawa.

to lightyellow, platy, soft to massive limestones. They yield Calcispongea and Demospongea, fragments of crinoid stems, spines of regular echinoids and fragments of plates of *Cidaris coronata*, numerous brachiopods, some pelecypods and occassional gastropods, cephalopods, serpulids and bryozoans. Pelecypods are represented by the genera *Chlamys*, *Pseudomonotis* and *Isocardia*, and brachiopods — by *Terebratulina substriata*, *Monticlarella rollieri* Wiśniewska, *Terebratula* sp., and *Septaliphoria astieriana* (d'Orbigny). According to Wierzbowski (1966, 1970) the limestones may be dated at the Upper Oxfordian, Idoceras planula Zone. Some sponges found here display wellpreserved cortical spiculation as well as parenchymal spicules in fibres. Distribution of the sponges in the limestones does not suggest their biohermal nor biostromal accumulation.

Cracow part of the Polish Jura Chain. In this area Oxfordian sponges occur in limestones similar to those from the Wieluń—Częstochowa area and, similarly, they do not form any larger accumulations (see Bukowy 1956, Siewniak 1967). Single specimens were found in several

Table 1

Occurrence of the described species of Calcispongea in Poland



localities (see Text-fig. 1 and Table I). Sponges from Balin and Pomorzany are dated at the Callovian after Różycki (1953).

Eastern margin of the Holy Cross Mts. In Bałtów, sponges are found in limestones of the Middle Oxfordian, Gregoryceras transversarium Zone (see description of exposures in Roniewicz & Roniewicz, 1971). Specimen *Cryptocoelioposis tmeticus* sp. n. is derived from Upper Callovian limestones from Przepaść nearby Ćmielów (see Malinowska 1963).

Kujawy. The Calcispongea and Demospongea occur in light-coloured fine-grained massive limestones exposed by Piechcin and Bielawa quarries. The sponge-bearing limestones form a part of sedimentary complex comprising pelitic, fine-grained, zoogenic (i.e., sponge and crinoid) and dolomitic limestones and dolomites. According to Dembowska (1957) and Czekalska (1962), the sponge and crinoid limestones are of the Lower and Middle Rauracian (= Upper Oxfordian) age. The fauna collected in the quarries also includes echinoids, terebratulids — *Lacunosella trilobate-*

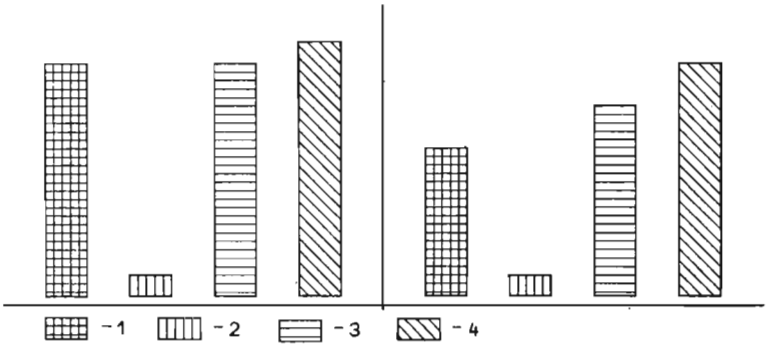


Fig. 2. Contribution of families of the order Pharetronida in the sponge spectrum: *left* in the whole area, *right* in the Polish Jura Chain. Families: *1* Lelapiidae, *2* Elasmostomatidae, *3* Sestromellidae, *4* Discocoeliidae. The smallest field corresponds to 2 species.

formis Wiśniewska, *L. cracoviensis* (Quenstedt), *Septaliphoria moravica* (Uhlig) and *S. pinguis* (Roemer), and simple corals. Calcispongea are here scarcer and poorer preserved than in the Działoszyn area.

STRUCTURE OF SKELETON OF CALCISPONGEA

Cortical and parenchymal skeletons of fossil sponges may consist of triactines, tetractines, monactines and diactines. Contributions of particular types of spicules may be more or less equal or one of the types may be predominant or even the only component of the skeletons (Text-fig. 3). Diactines and monactines may differ in size and shape. Skeleton of an individual of a given species may yield one or more types of oxes usually

differing in size. The oxes result in thorny appearance of sponges. The role and importance of these spicules are variable (in Stellispongia they are the principal component of parenchymal skeleton).

Triactines are differentiated in size and shape. They are subdivided into regular and irregular, depending on the length and shape of rays

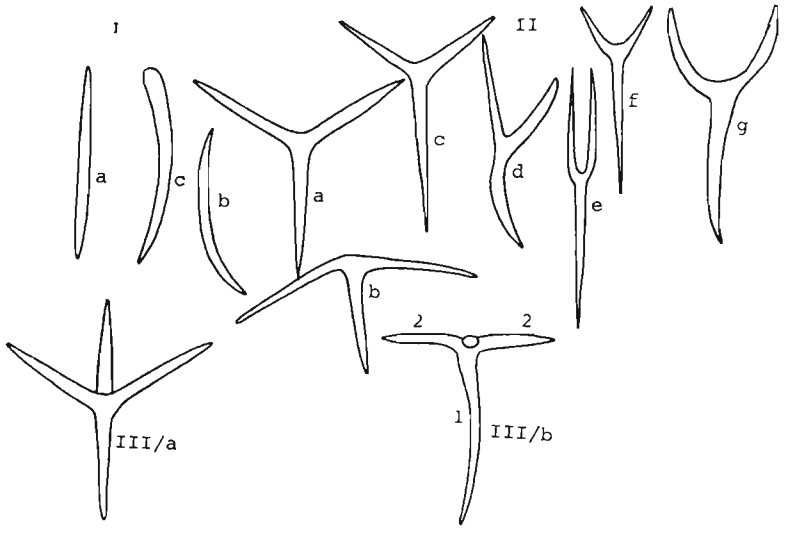


Fig. 3. Principal types of spicules of fossil Calcispongea: *I* oxes: *a* diactine, *b* amphioxe, *c* monactine; *II* triactines: a regular, *b* regular tripod; *c*—*f* irregular triactines: *c* sagittal, *g* tuning-fork, *e* diaposone, *f* Y-shaped; *III* tetractines: *a* regular, *b* sagittate uniaxial with *1* axial ray, *2* facial rays in tangential arrangement (not to the scale).

and magnitude of angle between the rays. They are principal or accessory components of cortex and parenchymal skeleton. Among regular triactines, tripodial spicules are particularly common. Tetractines display similar differentiation and significance as the triactines.

Rays of Recent sponges are occassionally longer than 0.3 mm, and oxes are up to 30 mm long (Koltun 1968, Vacelet 1968). Rays of sponges studied by Hinde (1883, 1893) were 0.16 to 0.6 mm long and 0.005 to 0.08 mm thick. Rays analysed by the present author appeared to be 0.06 to 0.7 mm long and 0.02 to 0.1 mm thick. The spicules are here subdivided according to their length into: 1) long, with ray or only apical ray 0.3—0.6 mm long or longer, 2) medium, 0.1 to 0.3 mm long, 3) short, less than 0.1 mm long, and 4) very short, less than 0.06 mm long.

In the sponges studied, spicules occurring in fibres display ray ends not bind with calcareous cement. Observable distal parts of actines are entangled or closely adjoin one another (Text-fig. 4). Spicules are distributed on the surface or inside the parenchymal skeleton fibres. The present mineral composition of spicules and fibres of Oxfordian sponges

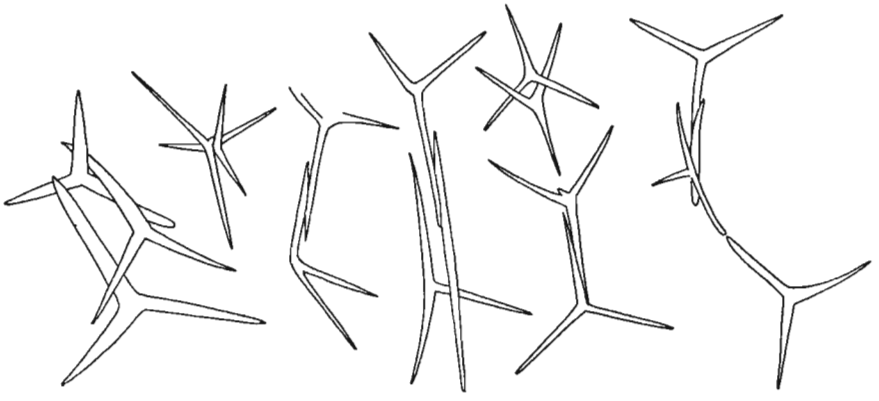


Fig. 4. Junction of spicules of fossil Calcispongea, similar to that found in Recent forms.

appears uniform, calcareous; however, the mass of fibres is more translucent than the spicules. According to Ziegler & Rietschel (1970, p. 30) skeleton of typical pharetrons is built of spicules and mesogloea and the fibres consist of separate spicules or spicules united with organic fibres matter or with mesogloean membrane embedding them. Taking into account the above point of view the present author assumes that the parenchymal skeleton of Upper Oxfordian pharetrons of Poland is built of spicules set in the form of fibres or of bands of diagenetically calcified mesogloean membrane uniting the spicules. *Eudea, Elasmostoma* and several other genera represent the latter case. The spicules were presumably uncemented during the life of a sponge as the thin sections do not

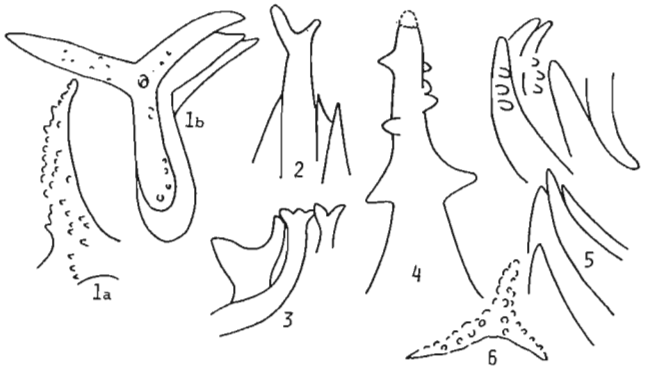


Fig. 5. Ornamentation and endings of triactine and tertractine rays: *1a, b Peronidella profurcata* sp. n., Oxfordian (UŁ Sp VII/63), *a* ornamentation of spicule from cortical skeleton, *b* blunt-ended spicules of principal skeleton; *2 Holcospongia* sp., Callovian (UŁ Sp VII/58), rays sharpended and branching; *3 Corynella clava* Oppliger (UŁ Sp VII/7), branching rays; *4 Oculospongia kielanae* sp.n. (UŁ Sp VII/38), rays ended with conical projections; *5 Peronidella proramosa* sp.n. (UŁ Sp VII/5), sharp-pointed rays with innumerous conical projections; *6 Holcospongia koltuni* sp.n. (UŁ Sp VII/13a), warty (knobbed) spicules, Figs 1—2 and 4—5 — ×250, Figs 3 and 6 — ×140.

show any calcareous coatings uniting them and distal parts of rays are distinct and free (Text-fig. 5) [1].

The majority of sponges investigated have sharp-ended spicules. A single individual may have both smooth and warty spicules in its parenchymal and cortical skeletons. Warts are more or less densely spaced along the whole length of ray (as e.g. in *C. clava* Oppliger and *P. profurcata* sp. n.) or are limited to distal parts of the rays (as in *P. proramosa* sp. n. and *O. kielanae* sp. n.). Diversity of these microelements may be noted at the magnifications 500 times (Text-fig. 5). In some sponges they are represented by prickles non-uniform in length (e.g. *O. kielanae* sp. n.), and in others — by rounded projections (e.g., in *M. indutum* (Quenstedt), usually larger on outer side of spicule. Spicules from cortex of *P. profurcata sp.n.* and *P. floriceps* (Etallon) have a highly specific appearance thanks to the fact that their microelements are partly ordered.

Three out of 37 species of Oxfordian sponges from Poland resemble some Recent species in structure of skeletal fibres, i.e. (cf. Burton, 1963; Vacelet, 1964):

1) *Lymnorella globoconica* sp. n. resembles *Sycettusa* Polejaeff (= *Vosmeropsis sassaki* Hozawa);
2) *Corynella nodosa* Oppliger — *Aphroceras* sp. Gray (= *Leucaltis impressa* Hozawa);
3) *Elasmostoma patelliformis* sp. n. — *Grantessa poculum* Polejaeff (assigned by Burton to *Sycetusa bathybia* Haeckel).

TAXONOMIC SIGNIFICANCE OF MORPHOLOGICAL FEATURES

It is more difficult to identify families, genera and species of Calcispongea than Desmospongea. This results from incomplete preservation of skeleton and still disputable taxonomic importance of particular features. The present author analysed particular morphological and structural features from the point of their applicability to taxonomy. The analysis primarily involved better preservable features of external morphology and internal macro- and microstructure. The studies showed that the structure of parenchymal fibres as well as the type of spicules and spiculation (spiculation exclusively consisting of monactines, triactines, te-

[1] According to Seilacher (1961) and Reid (1967), parenchymal skeleton was rigid during the life of sponge, which is indicated by epifauna (bryozoans, serpulids, brachiopods, and other organisms requiring solid substratum) incrusting the sponge surface. *Peronidella proramosa* sp. n., *Peronidella* sp., and *Eudea perforata* described previously (Hurcewicz, 1972) display the overgrowing epifauna but their spicules do not evidence permanent cementation with calcareous coatings. The sufficient rigidity as substratum for the settlement of epifauna achieved by the sponges may be explained by numerous cortical and parenchymal spicules arranged in layers.

tractines or involving all types of spicules) are important for identification of the families.

Features of the generic rank include the mode of development of water system, as well as the character of primary network, its density and orientation of pattern of fibres. It should be emphasized that Calcispongea do not show any interdependance between composition of spiculation and development of water system. The criteria of specific rank primarily include the general shape and dimension of an individual, morphology of its apex, and external features related to the structure of skeleton and water system, i.e., character of cortex and dermal skeleton, and arrangement and size of pores and furrows.

REMARKS ON SYSTEMATICS

A special attention should be paid to the two out of several papers dealing with the systematic of Calcispongea, namely those of Laubenfels (1955) and Burton (1963). The views expressed by their authors are diverse, as they accept diverse criteria. Burton (1963), in contrary to several other researchers, accepts points of view of Polajaeff (1883) and distinguishes only two families of Calcispongea — Homocoelidae (with 3 genera and 6 species) and Heterocoelidae (with 19 genera and 41 species) — on the basis of principal types of sponge structure. Laubenfels's (1955) point of view also appears controversial as he reject widely used names and introduces new ones and he places genera in families on the basis of outer morphology (primarily shape) and not the structure of skeleton. Other authors such as Wagner (1964), Ziegler (1964, 1965) and Vacelet (1964, 1967) made several suggestions concerning particular families or genera which will be discussed in the systematic part.

The present author accepted the systematic proposed by Laubenfels (1955) with some necessary modifications. On the basis of differences in the internal structure namely in: (a) composition of parenchymal spiculation, b) development of water system, c) mode of development of individuals, the author placed:

1) the genera *Corynella, Enaulofungia, Eudea, Oculospongia* and *Eusiphonella* in the family Lalapiidae,
2) *Elasmostoma* and *Diaplectia* — in Elasmostomatidae Laubenfels,
3) *Sestrostomella, Blastinia, Myrmecium* and *Holcospongia* — in Sestrostomellidae Laubenfels,
4) *Peronidella* and, with reservation, *Lymnorella* — in Discocoeliidae,
5) *Sphinctonella* gen. n. and *Cryptocoeliopsis* — in Cryptocoeliidae.

The families described here are characterized by uniform or complex composition of spiculation. "Uniform" composition here refers to pa-

renchymal fibres and cortex composed of spicules of the same, single type, which, however, may be accompanied by randomly distributed monactines or diactines.

Laubenfels (1955) placed several genera in the family Stellispongidae on the basis of occurrence of furrows distributed in star-like fashion around osculum or postica. Analysis of the structure of skeletons and composition of spicules showed that it is necessary to exclude at least some of them — the genera *Enaulofungia, Blastinia,* and *Lymnorella* from this family (see Systematic Part). The genus *Lymnorella* is assigned to the family Discocoeliidae with some reservation as its parenchymal skeleton in comparison with that of typical representative of this family, *Peronidella*, yields only tetractines and the triactines are confined to the cortical skeleton. Therefore it seems that *Lymnorella* may represent a new family. The genus *Eusiphonella* is very rare in the Oxfordian of Poland. Its familiar affiliation is still the subject of controversy (see Wagner, 1964; and Laubenfels, 1955). Wagner (1964) placed it in the family Discocoeliidae whereas the present author, taking into account the present knowledge of structure of its parenchymal skeleton and the type of spiculation, places it in Lelapiidae.

The systematic position of the genus *Myrmecium* was also treated as debatable by Laubenfels (1955). This genus is represented in Poland by four species. Numerous well-preserved specimens made it possible to revise its diagnosis, find differences in respect to other genera and especially to the genus *Eusiphonella,* and to establish its systematic position. On the basis of spicular composition and the pattern of water canal system the genus *Myrmecium* may be placed in the family Setrostomellidae. Analysis of representatives of the genera *Holcospongia* and *Enaulofungia* described elsewhere and from the author's collection has shown that, contrary to the point of view of Wagner (1964), these generic names are not synonyms. The genera markedly differ in the microstructure of the principal skeleton as well as in the structure of water system (see page 259).

Stratigraphic range of some species such as *Corynella quenstedti, Eudea perforata* and *Peronidella cylindrica,* appears to be confined to the Upper Oxfordian. Wider stratigraphic ranges are shown by *Peronidella pistilliformis* and *Holcospongia polita,* known from the Dogger and Oxfordian of Poland and other countries, and still wider — by *Holcospongia glomerata* and *Lymnorella inclusa,* recorded from the Dogger, Oxfordian and Kimmeridgian.

Calcispongea were forming moderately large communities in some sheltered parts of the Late Oxfordian marine basin. Shape of sponges of several species from this area indicates that they were burried in situ, in the course of fairly rapid deposition of pelitic calcareous material.

SYSTEMATIC PART

Order **Pharetronida** Zittel, 1878
Suborder **Chalarina** Laubenfels, 1955
Family **Lelapiidae** Dendy & Row, 1913

Diagnosis (after Dendy & Row, 1913, and Vacelet, 1964): parenchymal skeleton consisting of triactines accompanied by diactines. Cortical skeleton present or lacking. Paragaster cavity with more or less distinct canal system.

Genus *Corynella* Zittel, 1878

Type species: *Scyphia foraminosa* Goldfuss, 1931.

This genus comprises thick-walled sponges occurring separately or in clusters. Paragaster cavity, ostia and canals are differentiated. According to Zittel (1878), fibres are built of simple, rod-like spicules (termed by him as "Stabnadel"), separated by single triactines; whereas, according to Hinde (1893, p. 220), the fibres consist of tuning-fork triactines with best developed apical ray and, sometimes, with auxiliary sagittal tetractines. Wagner (1964) confirmed the composition of spiculation as suggested by Zittel (1878), assuming further that the triactines are cemented with calcareous matter into the form of a rigid network. A detailed analysis of skeletons of all the *Corynella* species described below has shown that the tetractines are missing and that the parenchymal fibres are primarily built of regular and sagittal triactines and diactines not cemented with calcareous matter. *Corynella* resembles *Peronidella* in morphology and the majority of authors consider them as close genera primarily differing in the structure of water system. The analysis of the two genera showed that they also differ in the microstructure of fibres and spicular composition (see page 266).

Italian researchers (Dieci, Antonaci, Zardini, 1968, p. 28) revised the representatives of the genus *Corynella* from the Triassic, Jurassic and Cretaceous of the northern Italy. They placed Triassic forms characterized by the paragaster cavity lacking and by a set of apochetes entering the oscular depression in a separate genus *Precorynella*.

Corynella quenstedti polonica subsp. n.

(Pl. XXIX, Fig. 2; Pl. XXXII, Fig. 1; Pl. XXXVI, Fig. 1; Pl. XXXIX, Figs 5—6, 17; Text-figs 6. 7)

1964. *Corynella* aff. *quenstedti* Zittel; Wagner, p. 31.

Holotype: UŁ Sp VII/45; Pl. XXXIX, Fig. 6.

Type horizon: Upper Oxfordian.

Type locality: Wydrzynów nearby Działoszyn, Wieluń—Częstochowa part of the Polish Jura Chain.

Diagnosis. — *Corynella* irregularly conical or club-like. Apical surface delineated with a margin. Water canals irregular in development. Spicular composition of parenchymal and cortical skeletons uniform: regular and sagittal triactines accompanied by diactines.

Material. — Twenty three specimens.

Dimensions (in mm):	height	thickness maximum	thickness in basal part
	8—30	13×19	2—3

Description. — Corynella solitary or occurring in clusters. Apical surface wide, flat to gently convex, delineated by a margin. Lower part of

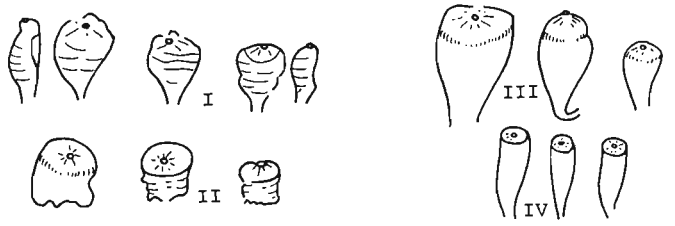


Fig. 6. Individual variability of *Corynella quenstedti polonica* subsp.n.: type I — irregularly club-shaped (specimens UŁ Sp VII/41—51), type II — stout (UŁ Sp VII/57—60), type III — regularly club-shaped (UŁ Sp VII/52—56), type IV — slender, club-shaped (UŁ Sp VII/61—64).

variable dimensions. Shape of lateral walls determined by the position of an individual in a cluster. Individuals are covered with cortex completely, in part, or not at all. Osculum ovate, 1—5 mm wide, situated in a depression or on small elevation. Ostia undiscernible on the cortex. Canals nonuniform in development, long, curved and branching, better developed in the upper part than in the lower. Paragaster cavity tubular, varying in depth. Cortex laminar, varying in thickness, built of regular tripods with rays 0.06—0.1 mm long, sharp-pointed, finely warty and densely spaced one above another.

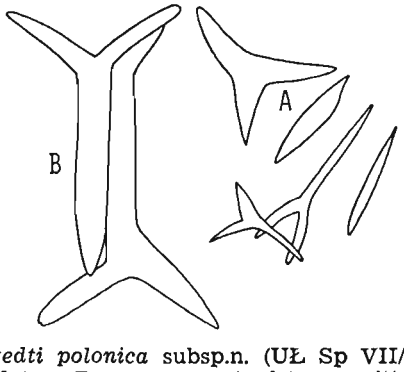


Fig. 7. *Corynella quenstedti polonica* subsp.n. (UŁ Sp VII/60): *A* types of spicules from principal skeleton, *B* arrangement of two sagittal triactines: ×165.

Parenchymal skeleton consisting of fibres uniformly spaced and anastomosing in the net-like manner. The fibres are 0.06 mm thick and 0.24 mm long in deeper parts of walls, becoming flattened, elongated and radially spaced on the outer surface and especially on the apex. They contain regular tripods, occassional Y-shaped triactines, sagittal triactines and small curved filliform diactines. Surface of spicules sometimes warty. Among the spicules, tripodial triactines with rays 0.06—0.1 mm long and 0.02 mm thick are predominant. Sagittal triactines have apical rays 0.16 mm long and 0.02 mm thick whereas the facial ones display rays 0.08 mm long.

Variability marked in the size and shape of sponge, distribution of cortex over the surface, outline of apex, position of osculum, and development of basal part. All these features are related to the development of individuals under different microenvironmental conditions and they make it possible to distinguish four morphological types: 1) club-like forms with variable outline, indicating growth in dense clusters, 2) — short tubular forms with wide basal part, 3) regular, stocky, club-like forms, and finally 4) slender, club-like forms.

Remarks. — The representatives of *C. quenstedti polonica* subsp. n. differ from *C. quenstedti* Zittel described by Oppliger (1929) in smaller size, thinner fibres narrower canals and smaller total height. Moreover, the former yield only triactines with straight rays and no triactines with curved rays. Some of the specimens from the author's collection resemble the forms described by Wagner (1964, p. 31) as *C.*aff *quenstedti* Zittel, differing in thicker fibres and triactines with shorter rays. The new subspecies differs from *C. aspera* from in larger triactines and the lack of furrows.

Occurrence. — Poland: Upper Oxfordian of Wydrzynów. Germany: Upper Jurassic. Switzerland: Sinemurian — Oxfordian.

Corynella cribrata Hinde, 1893

(Pl. XXXVI, Fig. 3; Pl. XXXIX, Figs. 2—4, 7; Text-fig. 8)

1893. *Corynella cribrata* Hinde; J. G. Hinde, p. 224, Pl. 16, Fig. 4.
1913. *Corynella cribrata* Hinde; J. Siemiradzki, p. 31, Pl. 8, Figs. 115—116.

Material. — Twenty one well-preserves specimens.

Dimensions (in mm):

height	wall thickness	maximum thickness at the base	diameter of osculum
12—32	3—9	8—18 2—3	2—6

Description. — Thick-walled, cylindrical or conical *Corynella*. Hypophare short, thick. Apical surface flat, smooth, with rounded, smooth or

somewhat furrowed margins. Wall surface smooth, nonuniformly covered with cortex. Osculum with gently sloping margins, circular, flat, centrally located. Paragaster cavity tubular, deep, almost so wide as osculum. Ostia differentiated, poorly marked on the cortex, irregularly ovate, funnel-shaped and wider than epirrhyses, under the cortex. Postica ovate, marked on surface or elevations of paragaster. Water canals short, poorly distinct; their course is irregular in the lower part of the sponge, becoming well-oriented from the middle. Epirrhyses oriented downwards, aporrhyses — upwards.

Cortical skeleton is of nonuniform thickness, being 0.035—0.07 mm thick. It covers regularly or eccentrically the basal part of the sponge. It consists of tripodial triactines with rays oriented to the center of the sponge; between triactines, traces of diactines may be noted; the diactines were forming prickled surface during the life of the sponge. Pseudocortex net-like, covering a major part of the sponge surface. It shows differentiated incurrent pores.

Parenchymal skeleton. Fibres 0.15—0.25 mm thick, and nonuniform in length, forming a loose network with irregular structure. They consist

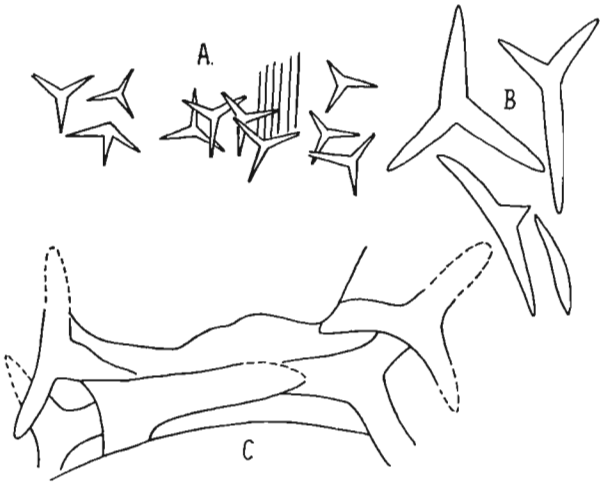


Fig. 8. *Corynella cribrata* Hinde (UŁ Sp VII/49): *A* triactines and diactines from independent cortex, *B* types of spicules from parenchymal skeleton, ×165, *C* arrangement of sagittal triactines in fibres.

of sagittal, regular, T-shaped, lowstem, and tuning-fork triactines and numerous diactines. Apical rays of triactines variable in length and often situated outside the surface of the fibres. Diactines and T-shaped triactines usually occur in marginal parts of the fibres, and regular triactines — in the center.

Variability moderate, marked by the occurrence of club-like and cylindrical forms.

Remarks. — The morphology of the sponges studied matches the description given by Siemiradzki (1913). The structure of cortical skeleton and composition of the parenchymal skeleton closely resemble those of *C. quenstedti* (see Laubenfels, 1955, p. 98; Hinde, 1893, p. 224). The Polish specimens differ from those from the Great Oolite of England, 10 cm in height, in having wider osculum and thicker fibres. According to Hinde (1893), rays of triactines of *C. cribrata* are 0.16—0.25 mm long. Taking into account the fact that some differences may be attributed to differences in size and age of the sponges, as well as the similarity in shape and microstructure, the Polish forms may be assigned to *C. cribrata* Hinde.

Occurrence. — Poland: Callovian (Balin), Upper Oxfordian (Wydrzynów, Wrzosowa, Niwiska Dolne, Bielawa). England: Middle Oxfordian, Arisphinctes plicatilis Zone.

Corynella nodosa Oppliger 1929

(Pl. XXXII, Fig. 2; Pl. XXXVI, Fig. 2; Pl. XXXIX, Figs 11—12, 20; Text-Figs 9—10)

1929. *Corynella nodosa* Oppliger; F. Oppliger, p. 16, Pl. 2, Fig. 8a-i.

Material. — Ten well-preserved specimens.

Dimensions (in mm):

height	thickness		
	maximum	apex	hypophare
11—20	4—5	3.0—4.5	ca. 2.5

Description. — *Corynella* solitary, subcylindrical, slender, gradually thinning out to the form of a short hypophare ended with small projections. Wall surface equal, without cortex, with transversal growth rings. Osculum 1,75—2.10 mm in diameter, with rounded margins, situated in depression. Paragaster tubular, deep. Ostia ovate, nonuniform in diameter. Epirrhyzes 0.5 mm long and 0.175 mm wide, tubular, oriented obliquely downwards. Aporrhyzes crooked and poorly distinct.

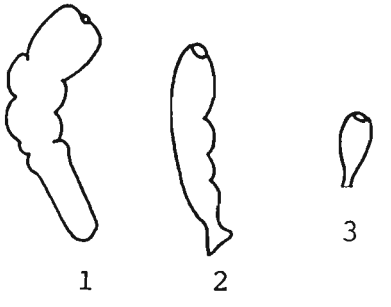


Fig. 9. *Corynella nodosa* Oppliger: variability in shape during the ontogeny, *1—2* mature stage, *3* juvenile stage, ×1.5.

Cortical skeleton dependent and independent. The former, represented in upper part of the sponge, consists of flattened fibres 0.17—0.20 mm wide; small triactines may be noted. The latter, covering lower part of the sponge, is built on fine, densely spaced triactines.

Parenchymal skeleton. Uniformly dense network with meshes ovate to polygonal, 0.15 mm in diameter. Fibres short, 0.4 mm long and 0.1 mm thick, longitudinal section displays repeated thickenings of the network

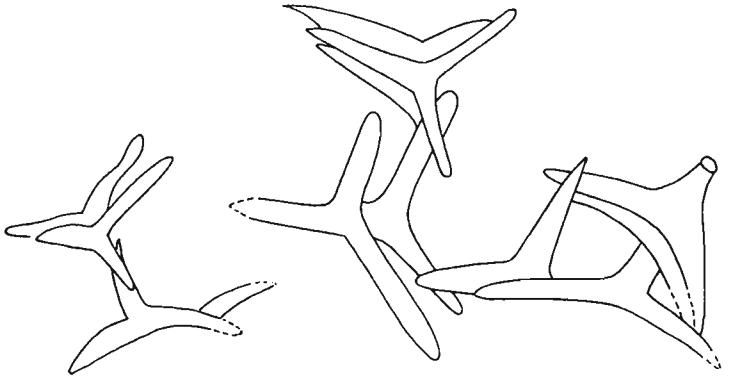


Fig. 10. *Corynella nodosa* Oppliger (UŁ Sp VII/74); arrangement of triactines in fibres from distal part of the sponge; longitudinal cross-section; ×85.

which reflect successive location of the apex during the development of the individual. Sagittal triactines with apical rays 0.07 mm long; they are accompanied by tripodial, Y-shaped and low T-shaped triactines. Differences may be found between the structure of fibres from lower and upper parts of the sponge. In the upper part larger triactines with rays 0.07—0.25 mm long predominate, whereas smaller triactines predominate in the fibres from the basal parts.

Comparisons. — The Polish specimens most closely resemble *C. nodosa* Oppliger from the Dogger of Switzerland, differing in generally more slender shape and in somewhat thinner fibres (0.1 and 0.1—0.16 mm thick, respectively). The Swiss forms are characterized by tractines with rays 0.13 mm long and 0.03 mm thick.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów). Switzerland: Dogger.

Corynella clava Oppliger, 1929

(Pl. XXXV, Fig. 1; Pl. XXXIX, Figs. 1, 8, 9; Text-fig. 11)

1893. *Corynella elegans* Hinde; J. G. Hinde, p. 221, Pl. 15, Fig. 4.
1913. *Corynella elegans* Hinde; J. Siemiradzki, p., Pl. 8, Fig. 94.
1929. *Corynella clava* Oppliger; F. Oppliger, p. 16, Pl. 2, Fig. 7.

Material. — Five calcitized and two well-preserved specimens. Dimensions (in mm):

height	thickness	
	maximum	pedunculus
8—16	6—14	2—3

Description. — *Corynella* egg-shaped to globular in shape, thick-walled, with shord hypophare ended with knobs or flaky. Apex rounded; walls smooth; osculum 1—1.5 mm in diameter, situated centrally in a small depression. Ostia ovate, better differentiated in the upper than in lower part. Paragaster tubular, with depressions arranged in rings on its surface. Aporrhyses irregular in width, obliquely stretching and irregularly extending towards the apex. Epirrhyses shorter and finer than the aporrhyses. Postica ovate, distributed all over the cavity or on the surface of its elevations.

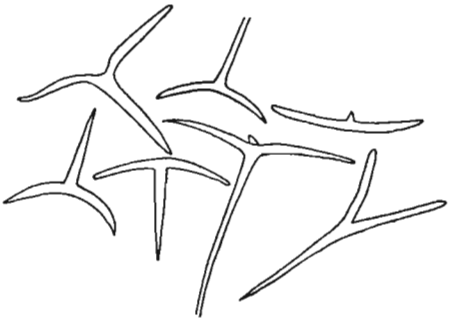


Fig. 11. *Corynella clava* Oppliger; types of triactines forming parenchymal fibres.

Cortical skeleton well-developed, laminar, covering hypophare, built of triactines with facial rays bend arcuately outwards. Apical ray straight, sharp-pointed, oriented outwards. Irregular, tuning-fork triactines are occasionally found.

Parenchymal skeleton of uniform density; fibres 0.09. mm thick and 0.18—0.20 mm long, with rough surface. Canal meshes noticeable in the network. Triactines variable in shape; Y-shaped triactines with apical rays 0.06 mm long are occasionally found. Irregular diactines resembling ?tetractines are sometimes noted.

Comparisons. — The Polish specimens are close to *C. nodosa* and *C. clava* Oppliger. They differ from *C. nodosa* in more massive, stocky shape and in better developed water system. The Polish forms seem generally closer to *C. clava,* differing in smaller size (the latter attains 25 mm in height and 15 mm in thickness) and in thinner fibres; however, the difference in thickness of fibres may result from differences in size of individuals. According to Oppliger (1929), both triactines and diactines are represented in *C. clava*. The Polish forms also somewhat resemble *C. bacca*

Počta (Počta, 1885, p. 21) from the Cenomanian of Czechoslovakia in shape and distribution of ostia.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów). Switzerland: Dogger.

Corynella langtonensis Hinde, 1893
(Pl. XXXVIII, Fig. 15; Text-fig. 12)

1893. *Corynella langtonensis* Hinde; J. G. Hinde, p. 222, Pl. 16, Fig. 2.

Material. — Five individuals in a cluster; three well-preserved fragments.

Dimensions (in mm):

height	thickness		osculum
	base	maximum	diameter
5—16	5—16	4.5—9	1.5—2.5

Description. — *Corynella* solitary or forming clusters characterized by basal butting and a tendency to lateral expansion. Individuals more or less massive, subcylindrical, thick-walled. Apex rounded; wall surface smooth. Maximum thickness close to the apex. Osculum circular, terminal, relatively wide and surrounded by excurrent furrows of nonuniform depth; diameter of osculum equalling one-third of diameter of apical surface. Paragaster tubular, deep. Postica ovate, wide, funnel-like, loosely spaced in rings above the surface of paragaster cavity. Ostia differentiated and well-marked, numerous, randomly distributed. Excurrent system better developed that the incurrent. Furrows on apex and distribution of postica suggest that the aporrhyses follow an irregular course running parallel to the apical surface and becoming wider towards the cavity where they attain 0.5—0.75 mm in diameter.

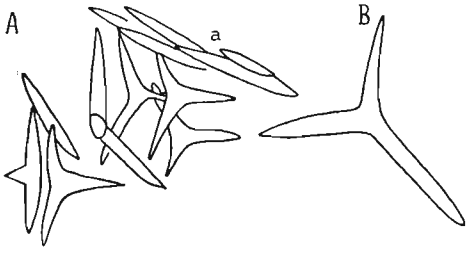


Fig. 12. *Corynella langtonensis* Hinde (UŁ Sp VII/66): *A* triactines and diactines (*a*) from peripheral part of fibres, *B* triactine of fibres from the inside of principal skeleton; ×165.

Independent cortical skeleton is lacking.

Parenchymal skeleton uniformly dense with regularly ovate meshes. Fibres usually uniform in thickness, 0.12—0.16 mm thick and 0.32—

0.42 mm long. Regular triactines poorly differentiated in size predominate; they are accompanied by occasional sagittal triactines larger from them, as well as by diactines. Parenchymal fibres formed of regular triactines.

Comparisons. — The structure generally matching the description given by Hinde (1893). The Polish specimens resemble *C. trumanni* Oppliger (1929, p. 20) from the Rauracian of Switzerland, differing in smaller dimensions of the body as well as of osculum and ostia. However, the general similarity and the Rauracian age of the Oppliger's (1929) form suggest that it may be conspecific with those described here.

Occurrence. — Poland: Middle Oxfordian (Bałtów). England: Middle Oxfordian, the Arisphinctes plicatilis Zone.

Corynella stellifera (Fromentel, 1864)
(Pl. XXXIX, Fig. 21; Text-fig. 13)

1929. *Corynella stellifera* (From.); F. Oppliger, p. 18, Pl. 2, Fig. 2a-d (here synonymy).

Material. — Four complete well-preserved specimens.

Dimensions (in mm):

height	thickness		osculum
	apex	base	diameter
12—20	8—14	4—6	2.5—4

Description. — *Corynella* solitary, conical. Apex with rounded margin. Wall surface smooth. Subcortical ostia well-differentiated in the network. Osculum about 3—5 mm wide, situated centrally in a small depression and surrounded by shallow radial furrows. Typical ostia small, ovate, more or less regularly distributed over the cortex. Postica fissure-like, elongated towards the principal axis, marked on paragaster surface.

Cortical skeleton consisting of two layers and covering the whole sponge. Internal layer built of densely spaced sagittal spicules; the external layer consisting of triactines separated by diactines; the later spicules resulted in thorny appearance of the sponge.

Parenchymal skeleton consists of fibres 0.15 mm long anastomosing in the form of regular network. In the fibres, regular triactines with rays 0.25 mm long and 0.05 mm thick predominate; they are accompanied by sagittal triactines and occasional diactines. Triactines with thorny surface (noticeable at the magnification $\times$ 500); ends of rays sharp-pointed or blunt. The triactines are markedly densely and regularly spaced. Fibres consist of seven rows of regular triactines; anastomoses comprise sagittal triactines with apical rays set parallel to the fibres. Longitudinal section displays some regularities in the structure of fibres; regular tractines prevail in fibres close to the apex and sagittal triactines — in fibres from the basal side.

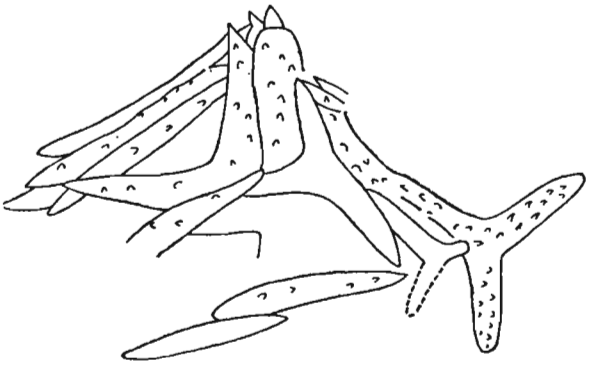


Fig. 13. *Corynella stellifera* Fromentel (UŁ Sp VII/108): ornamented triactines occuring close to the apex; ×335.

Comparisons. — The Polish specimens assigned to *C. stellifera* resemble the silicified forms described by Oppliger (1929), differing in smaller thickness of fibres (0.15 mm and 0.05—0.2 mm thick, respectively) and larger dimensions of the body. *Corynella stellifera* appears to be most closely affined with *C. cribrata*, differing in the course of canals, occurrence of furrows and in composition of spiculation.

Occurrence. — Poland: Upper Oxfordian (Bielawa and vicinities of Wieluń). Switzerland: Oxfordian.

Genus *Eudea* Lamouroux, 1821

Type species: *Eudea clavata* Lamouroux, 1821.

Eudea perforata (Quenstedt, 1856)

1856. *Spongites perforatus* Quenstedt; Quenstedt, p. 698.
1971. *Eudea perforata* (Quenstedt); M. Wiśniewska-Żelichowska, p. 16, Pl. 6, Fig. 4a-b.
1972. *Eudea perforata* (Quenstedt); H. Hurcewicz, p. 254, Pl. 36, Fig. 1/9 (here synonymy).

Remarks. — The specimen figured by Wiśniewska-Żelichowska (1971) was bent during his life in such a way that osculum occurs close to hypophare and the sponge has apparently globular shape. This phenomenon evidences high elasticity of the sponge body and skeleton, as well as the fact that spicules were not united with cement during the life of the sponge.

Occurrence. — Poland: Oxfordian (Wodna, Bałtów, Działoszyn, Rudniki). Germany: Upper Jurassic. Switzerland: Oxfordian.

Genus *Oculospongia* Fromentel, 1895

Type species: *Oculospongia neocomiensis* Fromentel, 1860.

Two new species of this genus, *Oculospongia kielanae* sp. n. and *O. protubulifera* sp. n., were found in Poland. Analysis of structure of their ske-

letons made it possible to emend generic diagnosis given by Hinde (1893, p. 240) as follows: parenchymal fibres comprising sagittal triactines almost uniform in size; cortex comprising sagittal and regular triactines and accompanying diactines. The structure of skeleton gives further support to allocation of the genus *Oculospongia* in the family Lelapiidae.

Oculospongia kielanae sp. n.
(Pl. XXXIV, Fig. 5; Pl. XL, Fig. 1; Text-fig. 14)

Holotype: UŁ Sp VII/180; Pl. XL, Fig. 1.
Type horizon: Upper Oxfordian, the Idoceras planula Zone.
Type locality: Częstochowa—Wieluń part of the Polish Jura Chain, Wydrzynów.
Derivation of the name: Named in honour of Professor Zofia Kielan-Jaworowska.

Diagnosis. — *Oculospongia* subspherical, thick-walled, with somewhat flattened apex. Ostia very small. Paragaster cavity singular, well-developed. Parenchymal network dense, regular, built of sagittal triactines and accompanying diactines.

Material. — Three well-preserved specimens.

Dimensions (in mm):

height	maximum thickness
8—22	7—15

Description. — *Oculospongia* subspherical, thick-walled. Lower part variable in outline, sometimes terminated with a short hypophare. Wall

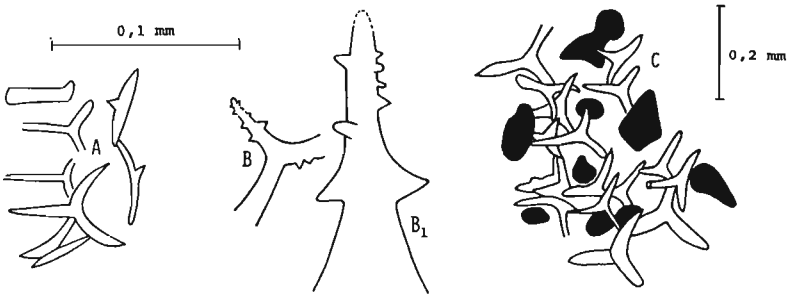


Fig. 14. *Oculospongia kielanea* sp.n. (UŁ Sp VII/38): *A* types of spicules of principal skeleton; *B* a larger triactine with pickly rays; B_1 end of ray of the triactine from the figure *B*; *C* fragment of the arrangement of triactines in principal skeleton; network meshes painted black.

surface flat, porous, covered with pseudocortex. Osculum ovate, 0.12—0.25 mm wide, even or furrowed. Ostia minute, circular, well-differentiated, 0.06 mm wide, loosely spaced. Postica elongated in the vertical. Paragaster narrow, tubular, of the same width as osculum. Aporrhyses fine, sinuos, moderate in length, better developed in apical part. Cavedia numerous, 0.15—0.18 wide, irregularly distributed.

Cortical skeleton uniform in development, laminar in the basal part, crimpled, composed of densely spaced triactines; pseudocortex developed in the upper part of the sponge. Surface of paragaster cavity is covered with gastral skeleton consisting of two layers. Surface layer built of modified triactines with shorter ray oriented to the interior of the cavity. The second layer consists of fibres comprising sagittal triactines larger and more densely spaced than those of parenchymal skeleton fibres.

Parenchymal skeleton net-like, uniformly dense, consisting of uniform fibres 0.12—0.15 mm long and 0.06 mm thick. Triactines uniform in size predominate here; they are accompanied by diactines and large thorny triactines. Apical ray of sagittal triactines 0.1—0.13 mm long, and facial ray — 0.09—0.1 mm long. Thin sections show that the ends of rays are sharp-pointed, ornamented, and overlap one another.

Comparisons. — *O. kielanae* sp. n. differs from other species of this genus in knobby microornamentation of spicules and in structure of water system. The new species is close to *C. minuta* known from the Inferior Oolite, Parkinsonia Zone, of England, differing in larger size and finer structure of the skeleton, singular osculum (narrower than "oscular aperture" of *O. minuta*) and in smaller dimensions of triactines.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów).

Oculospongia protubulifera sp. n.

(Pl. XXXIV, Fig. 4; Pl. XL, Fig. 2; Text-fig. 15)

Holotype: UŁ Sp VII/184; Pl. XL, Fig. 2.

Type horizon: Upper Oxfordian.

Type locality: Quarry at Trębaczów near Działoszyn, Wieluń—Częstochowa part of the Polish Jura Chain.

Derivation of the name: from the similarity of the new species to *Oculospongia tubulifera* (Goldfuss).

Diagnosis. — *Oculospongia* of the form of reversed cone. Apex shield-like; lateral walls transversally constricted. Paragaster cavity deep, becoming wider upwards. Parenchymal network almost regular.

Material. — One complete and three fragmentary specimens.

Dimensions (in mm):

	height	width at apex	number of crips
Specimen UŁ Sp VII/184			
total	14	8×16	5
I stage	6	5×7	2

Description. — *Oculospongia* solitary, of the form of reversed cone. Apex flat, shield-like, ovate, without cortex. Wall surface regularly transversally wrinkled which results in the fact that the sponge looks like for-

med of ring-like segments becoming wider upwards. Osculum ovate, 1.75 mm wide, located eccentrically close to the margin. Paragaster deep, set oblique, becoming wider upwards. Ostia circular, 0.075 mm wide, losely distributed on the cortex. Postica numerous, about 0.1 mm wide, uniformly distributed on the apex. Aporrhyses meandering and anastomosing, wider upwards, more strongly developed than epirrhyses.

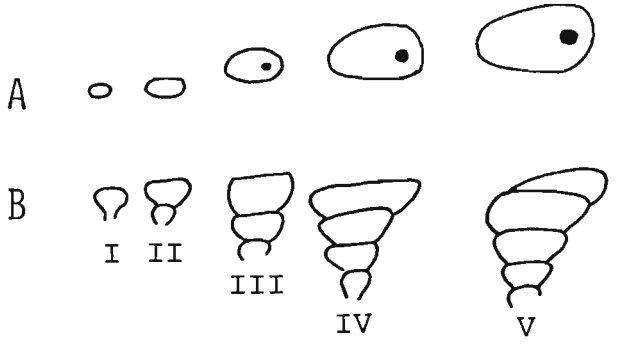


Fig. 15. *Oculospongia protubulifera* sp.n. (UŁ Sp VII/184): *A* shape of apical surface, *B* side view on the sponge in successive stages of ontogeny.

Cortical skeleton differentiated into pseudocortex covering the apex and independent cortex covering lateral walls. Independent cortex consisting of two layers differing in spacing, arrangement and size of triactines. Surface layer consisting of small regular triactines densely spaced and set oblique; they resulted in the fine thorny surface of the sponge during its life. Deeper-seated layer consists of larger and more loosely spaced triactines.

Parenchymal skeleton consists of fibres over 0.1 mm long and 0.06—0.08 mm thick, forming almost regular network. The fibres are built of regular and sagittal, smooth and finely knobbed triactines. Apical ray 0.23 mm long, and facial ray — about 0.15 mm long.

Remarks. — The morphology of the holotype distinctly displays four growth stages (Text-fig. 15).

Comparisons. — The holotype closely resembles *O. tubulifera* (Goldfuss) kown from the Maestrichtian of Germany (Zittel 1878, 1924), differing from the latter in structure of water system (and primarily in having paragaster cavity) and in finer skeletal network. These differences as well as the difference in age seem sufficient for establishing a separate species for the Polish form.

Occurrence. — Poland: Upper Oxfordian (vicinities of Cracow and Działoszyn).

Genus *Eusiphonella* Zittel, 1878

Type species: *Scyphia bronni* Muenster, 1833.

The familiar affiliation of the genus *Eusiphonella* was the subject of controversis (cf: Laubenfels, 1955, and Wagner, 1964). On the basis of her own material and the data concerning spicular composition given by Hinde (1883), the present author placed this genus in the family Eusiphonellidae, and not in Discocoeliidae, which was suggested by Laubenfels (1955).

Eusiphonella bronni (Muenster, 1833)
(Pl XXXIX, Fig. 10)

1826—33. *Scyphia bronni* (Münster); G. A. Goldfuss, Pl. 33, Fig. 9.
1883. *Eusiphonella bronni* (Münster); J. G. Hinde, p. 178.
1913. *Eusiphonella bronni* Münster; J. Siemiradzki; p. 33, Pl. 8, Fig. 97.
1929. *Eusiphonella bronni* Münster; F. Oppliger; p. 4.
1938. *Eusiphonella bronni* var. *rauffi*; A. Širkova, p. 5.
1964. *Eusiphonella bronni* Münster; W. Wagner, p. 26, Pl. 5, Fig. 2.

Material. — One well-preserved specimen; skeleton calcitized, with traces of spicules.

Dimensions (in mm):

height	apical diameter	basal diameter
9.5	5.5	2

Descriptions. — *Eusiphonella* solitary, tubular in shape, with sharply truncated apex. Osculum terminal, 2 mm wide, more or less star-like in outline. Ostia obscured; postica ovate, set in vertical rows on paragaster surface. Cortical skeleton lacking; pseudocortex present. Parenchymal skeleton built of fine fibres about 0.07 mm thick, forming network with rhomboidal meshes.

Comparisons. — The specimen described here differs from that figured by Siemiradzki (1913, Pl. 8, Fig. 97) in smaller size and the lack of typical ostia. By "coarse pores" Siemiradzki (1913) presumably referred to the meshes of the network. The author's specimen differs from the English forms of Hinde (1883) in the lack of cortex.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów). Czechoslovakia: Upper Tithonian. England: Oxfordian. Southern Germany: upper part of the Upper Jurassic.

Family **Elasmostomatidae** Laubenfels, 1955

This family, as interpreted by Laubenfels (1955, p. E98), comprises foliate, fan-like or cup-like sponges with oscula situated on both sides, i.e.

such as *Elasmostoma* Fromentel, *Steinmanella* Welter, and *Diaplectia* Hinde known from the Jurassis and Cretaceous. According to Wagner (1964) this family is primarily characterized by skeleton consisting of triactines united with calcareous cement and it comprises such genera as *Eusiphonella, Corynella, Enaulofungia* and *Peronidella.* These genera were previously placed by Laubenfels (1955) in different families. The analysis of the author's collection has given further support to the point of view of Laubenfels (1955).

The original diagnosis of this family (Laubenfels, 1955) may be supplemented as follows: the genera comprised by this family are characterized by the lack of canal system in parenchymal network; the skeleton mostly consists of sagittal triactines, accompanied by diactines; it is uncertain whether tetractines are represented or not.

In Poland this family is represented by the genera *Elasmostoma* and *Diaplectia.*

Genus *Elasmostoma* Fromentel, 1860

Type species: *Elasmostoma acutimargo* (Roemer, 1839).

According to Zittel (1878), this genus comprises platy, funnel-like, cup-like thin-walled forms with osculum situated on upper side and without water canals. Subsequently Hinde (1893) noted that thick fibres of skeleton part are built of triactines, and thinner — of diactines.

Elasmostoma patelliformis sp.n.
(Pl. XXXVII, Fig. 8; Text-fig. 16)

Holotype: UŁ Sp VII/41; Pl. XXXVII, Fig. 8; Text-fig. 16.
Type horizon: Oxfordian.
Type locality: vicinities of Cracow (more exact location is not known).
Derivation of the name: from Lat. *patella* — cup.

Diagnosis. — *Elasmostoma* small, flat-concave, built of thick fibres. Canal system not developed; pseudocanals and pseudopores present; fibres built of sagittal triactines and diactines.

Material. — One complete well-preserved and two micritized specimens.

Dimensions (in mm):

	height	maximum width	thickness
holotype (UŁ Sp VII/41)	16	15	4

Description. — *Elasmostoma* growing in the vertical direction; fan-cup-like, with rounded margin. Hypophare short, conical, covered with cortex. Wall surface without cortex, pseudoporous. Ostia, postica, canals and paragaster not developed. Pseudopores and pseudocanals corresponding to the shape and size of the space between fibres.

Cortical skeleton independent, developed only around the hypophare, dense, built of randomly distributed triactines and diactines; triactines sagittal and T-shaped, with facial rays somewhat bent.

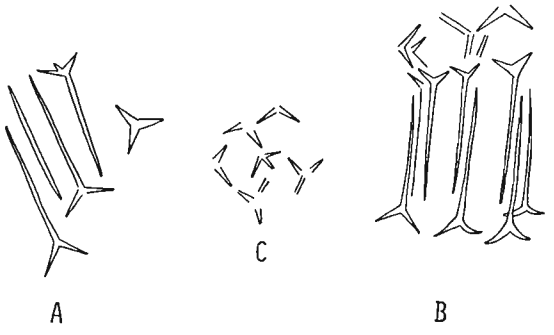


Fig. 16. *Elasmostoma patelliformis* sp.n. (holotype, UŁ Sp VII/41): *A* types of spicules in spicular composition; *B* arrangement of spicules in fibres (transversal section of fibres), *a* apical ray, *b* facial rays; *C* arrangement of facial rays seen in trangential section of fibres, *1* diactines, *2—3* sagittal triactines; ×165.

Parenchymal skeleton built of fibres nonuniform in length and thickness. In the lower part of the sponges the fibres are 0.13—0.3 mm thick, forming more regular network with smaller meshes; the fibres becoming longer and thicker on excurrent surface in the marginal zone; in the latter area the spaces between the fibres are variable in shape and size and the fibres are mostly built of fine sagittal triactines with apical rays 0.12 mm long and 0.008 mm thick. In comparison with cortical spicules the parenchymal spicules are larger and display paired facial rays 0.02 mm long, bent and set tangential to the surface of fibres. Facial rays from the surface of fibres form a network pattern with polygonal meshes.

Comparisons. — *Elasmostoma patelliformis* sp.n. differs from the remaining species of this genus in smaller size, more variable thickness of fibres and smaller differentiation in composition of triactines. English species yield both triactines and tetractines (Hinde, 1883), whereas *Elasmostoma patelliformis* sp.n. mostly yields poorly differentiated triactines and some accompanying diactines and no tetractines. This species closely resembles *Grantessa poculum* (Burton 1963, p. 324, Fig. 174) in composition of spicules and arrangement of spicules in fibres.

Occurrence. — Poland: Oxfordian (vicinities of Cracow).

Genus *Diaplectia* Hinde, 1883

Type species: *Diaplectia auricula* Hinde, 1883

The lack of differentiated water system and the spicular composition (see Hinde, 1883) make it possible to allocate this genus in the family Elasmostomatidae.

Diaplectia auricula Hinde, 1883
(Pl. XXXVII, Fig. 12)

1883. *Diaplectia auricula* Hinde; J. G. Hinde, p. 193, Pl. 36, Fig. 4.
1884. *Diaplectia auricula* Hinde; J. G. Hinde, p. 245, Pl. 19, Fig. 3.

Material. — Two micritized specimens difficult to free from the rock.

Description. — *Diaplectia* of the form of shallow cup. Wall surface even, margin rounded. Canal system not developed. Composition of skeleton difficult to reconstruction using the material available; it may be mentioned here that according to Siemiradzki (1913) only traictines are represented in the skeleton.

Occurrence. — Poland: Upper Oxfordian (Niwiska Dolne). England: Bathonian.

Family **Sestrostomellidae** Laubenfels, 1955, emend.

The diagnosis given by Laubenfels (1955) may be supplemented as follows: parenchymal fibres comprising triactines and tetractines of variable size and shape, as well as occasional diactines. Paragaster cavity present or lacking; in the latter case it is replaced by set of apochetes.

Genus *Sestrostomella* Zittel, 1878

Type species: *Sestrostomella robusta* Zittel, 1878.

According to Zittel (1878) this genus is represented by forms solitary or forming bushy clusters and known from the Triassic to Cretaceous.

Sestrostomella wartae sp.n.
(Pl. XXIX, Fig. 4; Pl. XXXIII, Fig. 2; Pl. XXXVII, Figs 4—5; Text-fig. 17)

Holotype: UŁ Sp VII/34; Pl. XXXVII, Fig. 4.
Type horizon: Upper Oxfordian, Idoceras planula Zone.
Type locality: Wydrzynów, Wieluń—Częstochowa part of the Polish Jura Chain.
Derivation of the name: from Warta river, close to which the type locality is situated.

Diagnosis. — *Sestrostomella* ovate, without paragaster cavity. Ostia differentiated. Postica forming concentrations in depression. Parenchymal network dense, built of irregularly anastomosing fibres. Cortex present.

Material. — Fourteen well-preserved specimens.

Dimensions (in mm):

	height	maximum thickness
egg-like specimens	10—14	6—9
semicircular specimens	7—8	7—9

Description. — *Sestrostomella* solitary, ovate, with even surface. Apical surface gently convex or with small depression. Postica surrounded by furrows form a concentration of 6—12 pores in the depression. Paragaster cavity lacking. Apochetes tubular, anastomosing, variable in length and 0.2—0.3 mm wide, running along the axial part. Prosochetes poorly distinct, sinuous. Ostia not differentiated.

Cortical skeleton irregularly wrinkled, variable in thickness, covering lower part and sometimes walls of the sponge. Sagittal tripods variable

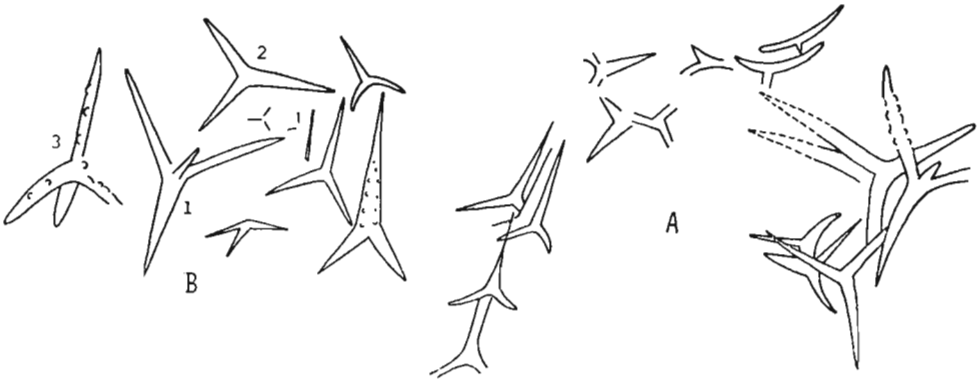


Fig. 17. *Sestrostomella wartae* sp.n. (UŁ Sp VII/16): *A* arrangement of spicules in parenchymal fibres; *B* types of spicules: *1* tetractines, *2* regular triactines, *3* sagittal tetractines, ×165.

in size; rays 0.07—0.5 mm long, oriented towards the interior of wall. The largest spicules, with facial rays 0.36 mm long, occurring on cortex surface.

Parenchymal skeleton danse, built of irregularly anastomosing fibres 0.06 mm thick and 0.1—0.3 mm long. In the fibres the regular and sagittal triactines predominate; rays of regular triactines are 0.09—0.12 mm long, and those of irregular triactines — 0.15—0.3 mm long and 0.015—0.03 mm thick. Tuning fork spicules are occasionally found. Ray surface knobbed; the knobs are of the pillar form and set along median part of the ray, which may be noted at the magnification × 500. Parenchymal spicules may be divided into three groups on the basis of differences in size: a) large spicules, the principal components of skeletal fibres; b) medium-size spicules occurring along the margins of fibres, and c) fine spicules distributed among the largest spicules randomly or in net-like manner. The fine diactines occur on external surface of fibres.

Variability. The 14 specimens of *S. wartae* display differences in size as well as in shape. The latter are related to the mode of attachment to the bottom. Individuals with fine short hypophare are egg- or pear-shaped, whereas those with wide attachment area are semicircular in shape and with somewhat concave apex.

Remarks. — The microstructure of parenchymal skeleton is imporfant for identification of families (see Ziegler & Rietschel, 1970). The species here proposed resembles *S. cartieri* Oppliger, differing in structure of water system, smaller dimensions of particular elements, and in stratigraphic position.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów).

Genus *Blastinia* Zittel, 1878, *emend.* Hinde, 1893

Type species: *Blastinia (Achilleum) costatum* Goldfuss, 1833.

Zittel's (1878) diagnosis, already emendated by Hinde (1893), may be supplemented as follows: sponges without distinct canals; paragaster lacking. Spicular composition complex: diactines predominant, accompanied by triactines and tetractines.

The genus *Blastinia* Zittel is known from the Middle und Upper Jurassic. It was allocated in the family Stellispongidae by Laubenfles (1955). However, it differs from typical Stellispongidae in skeleton built of tri- and tetractines besides diactines; and the structure of water system appears typical of the family Sestrostomellidae. The predominance of diactines in the skeleton makes it possible to assume that the two families are closely affined.

Blastinia bulbosa sp. n.

(Pl. XXXII, Fig. 3; Pl. XXXIII, Fig. 1; Pl. XXXVII, Figs 9—11; Text-figs 18—19)

Holotype: UŁ Sp VII/314; Pl. XXXVII, Fig. 9.
Type horizon: Upper Oxfordian.
Type locality: Wydrzynów, Wieluń—Częstochowa part of the Polish Jura Chain.
Derivation of the name: from the shape of apex.

Diagnosis. — *Blastinia* small, tubular or egg-like, forming clusters by apical budding. Diactines accompanied by less numerous tri- and tetractines. Water system not differentiated.

Material. — Five complete specimens with traces of budding and a single specimen consisting of two individuals.

Dimensions (in mm):

	height	maximum thickness	width apex	width hypophare
holotype	16.5	6	5.5	4

Description. — Small *Blastinia* forming clusters by apical or subapical budding. Individuals tubular or egg-shaped. Apical part rounded or spherical, separated by constriction from the rest of sponge, not covered with cortex and with short furrows arranged in star-like pattern. Lateral

Fig. 18. *Blastinia bulbosa* sp.n. (UŁ Sp VII/314—318): outlines of budding individuals, *a* trace of apex of parent form.

walls even, with smooth or finely wrinkled cortex. Osculum, paragaster and canals not differentiated. Internal cavedia locally fissure-like.

Cortical skeleton forming layer varying in thickness, about 0.14 mm thick, and built of equiradial tripods with rays 0.07—0.1 mm long and of sagittal triactines.

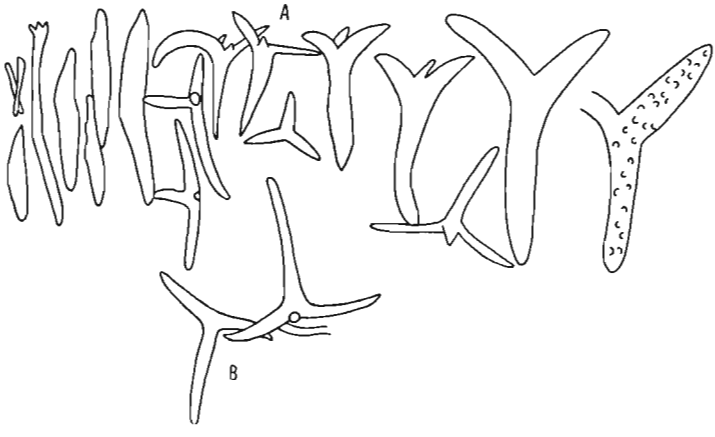


Fig. 19. *Blastinia bulbosa* sp.n. (UŁ Sp VII/34): *A* types of spicules from parenchymal skeleton, ×125; *B* original arrangement of two spicules.

Parenchymal skeleton net-like, dense, with regular meshes, built of short fibres 0.2 mm thick. Arcuate and irregularly bent diactines are numerous; they are accompanied by occasional T-shaped triactines with short apical ray and nonuniform in lenght, regular triactines variable in size, and somewhat more numerous smooth and knobbed tetractines.

Remarks. — All the mature representatives of *B. bulbosa* sp.n. bear scars after breaking off of the young individuals. The scars indicate that skeletons and water systems of mature and young individuals were in contact. The water system consists of fine canals narrower than meshes of skeletal network.

Comparisons. — Numerous diactines and tetractines set in fibres and triactines variable in size make it possible to assign these forms to the genus *Blastinia*. The specimens are similar to *B. insignis* Oppliger, diffe-

ring in length and depth of furrows, thickness of fibres and spicular composition. They differ from representatives of other species in apical budding which leads to origin of bushy froms.

Occurrence. — Poland: Upper Oxfordian (Bielawa, Wydrzynów).

Genus *Myrmecium* Goldfuss, 1833

Type species: *Myrmecium hemisphaericum* Goldfuss, 1833.

Spicular composition typical of this genus was hitherto unknown. Thin section analysis has shown that skeletons of Upper Oxfordian specimens from Poland primarily consist of regular smooth or knobby triactines; sagittal and T-shaped triactines, sagittal tetractines and diactines are subordinate. Spicule rays are sharp-ended.

The status of the genus *Myrmecium* is the subject of controversy. Wagner (1964) treated *Myrmecium* as synonym of *Eusiphonella* placed in the family Elasmostomatidae. According to Laubenfels (1955), *Myrmecidium* Vinassa de Regny (= *Myrmecium* Goldfuss) differs in structure from all the Calcispongea and it belongs to the suborder Uncertain. Zhuravleva (1962) treated *Myrmecium* Goldfuss, *Gymnomyrmecium* Pomel, *Myrmecidium* Vinassa de Regny as synonyms of *Epithales* Pomel known from the Oxfordian of Germany. Siemiradzki (1913), Zittel (1878), Hinde (1883, 1893), Oppliger (1929) and Širkova (1938) separated *Myrmecium* from *Eusiphonella* but they did not specify to which family it belongs. According to the latter authors, *Myrmecium* differs from *Eusiphonella* in lateral walls covered with cortex.

According to the present author, *Myrmecium* is an important genus without features typical of the family Elasmostomatidae, and it differs from *Corynella* and *Eusiphonella* in spicular composition, structures of parenchymal skeleton and pattern of water system. The composition of parenchymal skeleton appears typical of the family Sestrostomellidae.

Myrmecium is represented by 4 species in the Upper Oxfordian of Poland in comparison with 10 species known from the whole Mesozoic of Europe. It is known from the Cretaceous of Crimea (Schemjakin, 1962, 1965).

Myrmecium hemisphaericum Goldfuss, 1833

(Pl. XXXIV, Fig. 3; Pl. XXXVII, Figs 6—7; Pl. XXXVIII, Fig. 1; Text-fig. 20)

1897. *Myrmecium hemisphaericum* Goldfuss; O. Zeise, p. 322.
1929. *Myrmecium hemisphaericum* Goldfuss F. Oppliger, p. 5 (here synonymy).
1938. *Myrmecium hemisphaericum* var. *geminum*; A. Širkova p. 7.

Material. — Fourteen well-preserved specimens.

Dimensions (in mm):

height	width	
	lower part	upper part
6—13	1—6	4—9

Description. — *Myrmecium* small, hemispherical or conical. Apex rounded, porous, with cortex separated from walls by a margin. Lateral surface wrinkled. Osculum ovate or star-like, 1.75—2.3 mm wide, with traces of marginalia. Postica depressed, 0.35—0.85 mm wide, forming two rings around the osculum. Paragaster cavity deep, tubular, with uneven surface. Ostia not differentiated; canal system poorly distinct and difficult to delineate. Water caverns present.

Cortical skeleton layered. External layer developed only in the lowermost basal part, consisting of filiform diactines forming set of basalia.

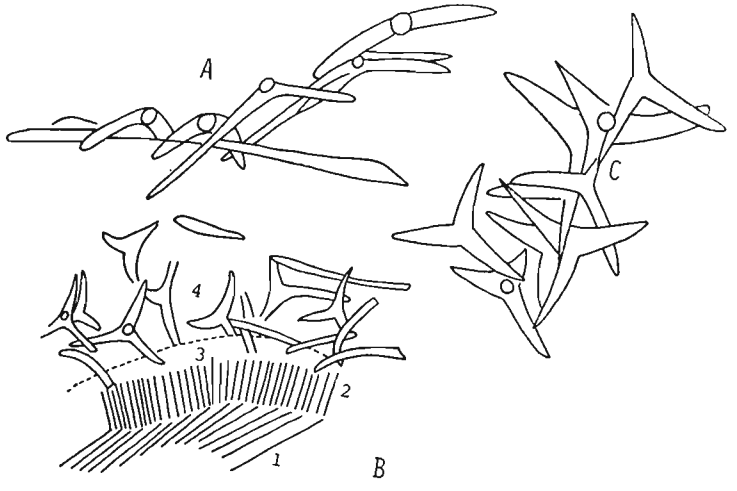


Fig. 20. *Myrmecium hemisphaericum* Goldfuss (UŁ Sp VII/17b): *A* arrangement of spicules in dependent cortex; *B* microstructure of basal part of cortical skeleton, *1* long filiform diactines displaying no junction with overlying skeletal layer, *2* short, vertical, densely-spaced diactines, *3* amorphous structureless layer, *4* outline of spicules occurring in dependent cortex of basal part; *C* arrangement of spicules in parenchymal fibres from lower part of the sponge, ×165.

The second layer, 0.07—0.09 mm thick, covering sponge base and lateral walls, consisting of free, short, densely-spaced vertical diactines. Third layer is represented by amorphous, completely calcitized zone; it is covered by diactines and triactines of parenchymal fibres. Upper part of sponge is covered by pseudocortex consisting of flattened fibres. Spicules forming the thorny sponge surface and accompanied by low tripodial spicules.

Parenchymal skeleton consisting of fibres 0.52 mm long and about 0.15—0.16 mm thick forming regular network with meshes 0.15 mm in

diameter. In the fibres triactines predominate; tetractines and diactines are subordinate.

Variability primarily expresed by differences in shape. The morphotypes recognized include: short-pillar, short-conical, tubular-conical and spherical. They differ in height, diameter of apex, and number of wrinkles on walls. Forms tubular-conical in shape display 10 wrinkles recording growth stages; juvenile forms are slender and conical in shape and display not numerous growth wrinkles.

Occurence. — Poland: Upper Oxfordian (Wydrzynów). Southern Germany: common in the Middle Malm. Czechoslovakia: Upper Tithonian. Switzerland: Upper Jurassic. France and the U.S.R.R. (Crimea): Cretaceous.

Myrmecium indutum (Quenstedt, 1859)
(Pl. XXXIV, Fig. 2; Pl. XXXVIII, Figs 7—8)

1859. *Spongites indutus* Quenstedt; F. A. Quenstedt, p. 698, Figs 21—22.
1913. *Myrmecium indutum* (Quenstedt); J. Siemiradzki, p. 34 (here synonymy).

Material. — Nineteen well-preserved specimens.
Dimensions (in mm):

height	width	
	apex	hypophare
7—14	4—7×9	0.5—3

Description. — *Myrmecium* moderate in size, conically narrowing towards the base. Hypophare short, rounded, with traces of rhizoids. Apex flat, cortex-less. Wall surface finely porous, wrinkled. Osculum about 0.2 mm wide, differently located in particular specimens. Paragaster tubular. Postica elongated, 2×1 mm in size, distributed over the surface of apex and paragaster cavity. Aporrhyses vertical, poorly distinct, surrounded by more loosely speced fibres. Ostia minute, 0.07 mm in widt, randomly distributed over the cortex.

Cortical skeleton wrinkled, 0.35 mm thick, covering the whole wall; it consists of large thorny triactines, smooth and turning-fork sagittal triactines and diactines. Facial rays of sagittal triactines 0.1 mm long; and apical ray — 0.15 mm long.

Parenchymal skeleton dense, net-like. Fibre short, fairly wide, 0.14 mm thick, built of numerous regular triactines, diactines, and densely spaced sagittal triactines. Triactines variable in size, showing some regularity in arrangement. Diactines occurring in peripheral parts of fibres and becoming more numerous in fibres situated closer to the surface of paragaster cavity. Regular triactines are the most common around network meshes and in central parts of fibres.

Variability. The specimens assigned to *M. indutum* represent different growth stages and differ from one another in height and number and width of wrinkles. The specific features displayed, by all of them include: conical shape, small size of hypophare, flat apex with postica ring, wrinkled surface of lateral walls, occurrence of paragaster, minute ostia marked on cortex, and complex spicular composition. The specimens with 2—3 wrinkles (not counting wrinkles from hypophare) represent early growth stages; specimens with 8 wrinkles or more and wider than the former represent ephebic stage.

Occurrence. — Poland: Oxfordian (Bałtów, Krzemionki, Wydrzynów). Germany: Upper Jurassic.

Myrmecium pyramidum sp. n.
(Pl. XXXVII, Figs 2—3; Text-fig. 21)

Holotype: UŁ Sp VII/272; Pl. XXXVII, Fig. 2.
Type horizon: Upper Oxfordian.
Type locality: Wydrzynów, Wieluń—Częstochowa part of the Polish Jura Chain.
Derivation of the name: from pyramidal shape.

Diagnosis. — *Myrmecium* with pyramidal shape, solitary or forming clusters. Paragaster cavity variable in depth. Aporrhyses narrower than network meshes. Postica irregularly distributed. Parenchymal fibres fine.

Material. — Six individuals forming cluster and four well-preserved complete individuals.

Dimensions (in mm):

height	apex diameter	hypophare diameter	number of wrinkles
8—12	6×7—9×11	1—1.5	3—11

Description. — *Myrmecium* with pyramidal shape, forming clusters. Apical surface flat to gently convex, ovate, not covered with cortical skeleton. Lateral walls regularly finely wrinkled. Osculum about 1.5 mm wide, star-like in outline, surrounded by furrows irregular in length and width. Postica numerous, ovate or star-like, narrower than network meshes, irregularly distributed over the apex. Ostia obscured. Paragaster variable in depth. Aporrhyses irregular, sinuous, resembling elongate cavities. Epirrhyses obscured or very short in the subsurface.

Cortical skeleton fine, nonuniform in thickness, 0.16 mm thick in places, wrinkled, covering the whole lateral surface; built primarily of regular triactines nonuniform in size, densely spaced and arranged in the alternating manner. The ray oblique oriented in the cortex is here assumed to be apical; this ray and diactines resulted in finely thorny appearance of sponge surface.

Parenchymal skeleton built of short fibres, 0.1 mm thick, randomly oriented and anastomosing into almost regular network. Spicules of dif-

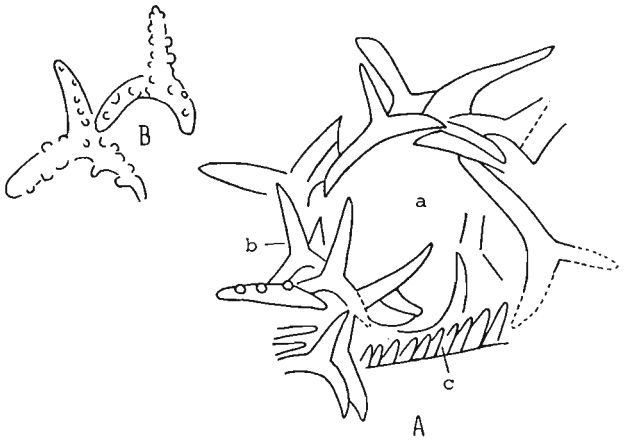


Fig. 21. *Myrmecium pyramidum* sp.n. (UŁ Sp VII/20b): *A* arrangement of spicules around meshes of parenchymal network; *B* parenchymal spicules with warty ornamentation, *a* meshes of the network, *b* triactines situated around mesh, *c* fragments of spicules in fibres, ×85.

ferent types and sizes are represented in the skeleton: numerous diactines 0.1—04 mm long, smooth and knobbed regular and sagittal triactines, and occasional regular tetractines. Larger triactines were found in fibres deeper in the wall. Regular triactines with sharp-pointed and knobbed rays quantitatively predominate in the skeleton; knobs on ray surface are sometimes set in rows. Spicules are densely spaced and closely adjoin one another in fibres.

Variability. Variability in development of individuals is reflected by the cluster available. One of the earliest stages represents a convexity covered with cortex and yielding fine cortical triactines and one pore 0.09 mm in diameter, which may represent praeosculum. The next stage is presumably represented by a tubercle with apex and without cortex, and with lateral walls covered with skeleton in common with parent individual. Skelatal fibres are almost uniform in width as in mature individuals. In the successive stage the sponges are similar in shape to mature individuals, differing in smaller size. Along with age, distinct wrinkles appear on wall, initially in small numbers; moreover, distinct osculum with even margin develops. Successive stages are characterized by the development of numerous wrinkles (7—13 in number) and short suboscular furrows, i.e. features typical of mature individuals.

Comparisons. — The new species resembles *M. hemisphaericum* in the arrangement of spicules in fibres. The former differs from all other species of this genus in density of network, dimensions of fibres and the mode of growth.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów).

Myrmecium cylindricum Siemiradzki, 1913
(Pl. XXX, Fig. 1; Pl. XXXIV, Fig. 1; Pl. XXXVIII, Figs 4—6)

1913. *Myrmecium cylindricum* Siemiradzki; J. Siemiradzki, p. 34. Pl. 8 Fig. 104 (here synonymy).

Material. — Forty-six complete specimens and several fragments. Dimensions (in mm):

height	thickness	number of wrinkles
9—18	3—7	4—15

Description. — *Myrmecium* irregularly cylindrical, forming small clusters of individuals overgrowing one another at the base. Apex ovate, flat to somewhat convex. Surface irregularly transversally wrinkled in the ring-like manner; wrinkles variable in height. The sponges grow in the vertical direction. Every wrinkle ends with sharp margin. Osculum circular, 1.9 mm wide, varying in localization. Postica about 0.52 mm wide. Paragaster deep, cylindrical and constricted. Excurrent spaces irregularly elongated, resembling canals. Epirrhyses not developed. Ostia 0.025 mm wide, almost unnoticeable on wall surface.

Cortical skeleton covering the whole sponge except for apex, transversally wrinkled on the walls, consisting of three thin layers 0.07 mm thick. It is crust-like and easily separable from the parenchymal skeleton in the basal part. The cortical skeleton consists of sagittal triactines with apical rays 0.28 mm long, and smaller equiradial triactines.

Parenchymal skeleton forming fine network consisting of short, variously anastomosing fibres. Spicular composition complex: regular triactines predominate; moreover, some diactines and tetractines are found. Spicules arranged in fibres are numerous, short-rayed and fairly thick — 0.016 mm thick. Smooth spicules predominate. Apical rays and diactines are set parallel to the orientation of fibres.

Variability primarily concerns the thickness/height ratio of specimens. The sponges vary in shape from slender and high to thick and equally high. Moreover, number of wrinkles appears to be variable.

Comparisons. — The specimens from the Upper Oxfordian of Działoszyn appear similar in morphology and structure to those described as *M. cylindricum* by Siemiradzki (1913) from Cracow area generally larger and displaying better preserved skeleton than the latter. The two ecological types, i.e. thick-cylindrical and thin-cylindrical, almost worm-like forms from Działoszyn presumably represent middle-terminal neanic stage. One of the author's specimens (UŁ Sp VII/234) is characterized by cortical skeleton with more strongly developed wrinkles which results in origin of structures resembling those known from sponges of the order Thalamida Laubenfels.

Occurrence. — Poland: Oxfordian (Minogi), Upper Oxfordian (Wydrzynów).

Genus *Holcospongia* Hinde, 1893

Type species: *Spongia floriceps* Phillips, 1829

The relationship between the genera *Holcospongia* and *Enaulofungia* Fromentel remains disputable. Several authors such as d'Orbigny (1849), Fromentel (1859), and in some time Hinde (1883), Oppliger (1892), Počta (1885), Welter (1911) and Zhuravleva (1956, 1962) place the species attributed by the others to *Holcospongia* in *Stelliospongia* d'Orbigny on the basis of external morphology and primarily the occurrence of furrows arranged in star-like fashion on the surface of spherical forms. The structure of skeletal network was only occasionally discussed. Zittel (1878) and Zhuravleva (1962) consider *Enaulofungia corallina* Fromentel as one of species of the genus *Stellispongia*. Steinmann (1882, p. 180) found the lack of tri- and tetractines and occurrence of simple or bent, blunt-ended spicules (presumably diactines and monactines) in the fibres of *Stellispongia*. According to Hinde (1883), specimens interpreted as *Enaulofungia* by Zittel (1878) have the structure obliterated and were misinterpreted. In his subsequent revision Hinde (1892) found that the Mesozoic specimen he placed in *Stellispongia* differs in structure of skeleton. Following the point of view of Steinmann (1882), Hinde placed the specimens bearing rhabdes in *Stellispongia* d'Orbigny, and the specimens displaying uniform external morphology and with fibres built of tri- and tetractines — in *Holcospongia*. The diagnosis of the latter genus given by Hinde (1893, p. 225) is as follows: "The skeleton fibres form an open tissue; they consist of fairly large axial three-and in some instances four-rayed spicules enclosed by marginal filiform spicules, probably three-rayed. The dermal layer consists of an agglomeration of three and perhaps of four-rayed spicules of various dimensions, which are closely felted together." The point of view of Hinde (op. cit.) was accepted by Siemiradzki (1913) and Oppliger (1929). There arises the question whether *Holcospongia* and *Enaulofungia* are synonyms or separate genera. According to Wagner (1964) the genus *Enaulofungia* does not have well-differentiated paragaster but rather flat osculum where outlets of vertical canals are situated. Wagner (1964) figured tripods arranged in fibres as spicules of *E. semicincta*. Moreover, he recognized the priority of the name *Enaulofungia* Fromentel and interpreted *Holcospongia* as its synonym.

The analysis of thin sections of the species from the Oxfordian of Poland has shown that *Enaulofungia* and *Holcospongia* represent two homomorphic genera differing in structure of skeleton.

Wagner (1964) assigned the genus *Enaulofungia* to the family Elas-

mostomatidae. This genus is characterized by skeleton consisting of uniform spicules thus the point of view of Wagner (1964) is accepted here. In turn, the genus *Holcospongia* is characterized by skeleton comprising several types of spicules and cannot be accomodated in the family Elasmostomatidae but rather in Sestrostomellidae.

The genus *Holcospongia* is represented in Poland by 7 species from the Middle Jurassic (described by Siemiradzki, 1913) and Upper Jurassic.

Holcospongia glomerata (Quenstedt, 1859)
(Pl. XXXV, Fig. 2; Pl. XXXVIII, Figs 13—14; Text-fig. 22)

1913. *Holcospongia* glomerata (Quenstedt); J. Siemiradzki, p. 35, Pl. 9, Fig. 92 (here synonymy)

Material. — Thirty-six specimens with well-preserved spicules.
Dimensions (in mm):

height	thickness	
	maximum	at the base
11—20	9—18	11

Description. — *Holcospongia* solitary, spherical to egg-shaped, more or less regular, usually with thick short base instead of hypophare. Forms with hypophare are characterized by convex apex. Osculum situated in depression and surrounded by radially arranged furrows. Postica up to 1.5 mm in width, concentrated on the bottom of the depression. Furrows variable in width, length and number; some of them reach lateral walls.

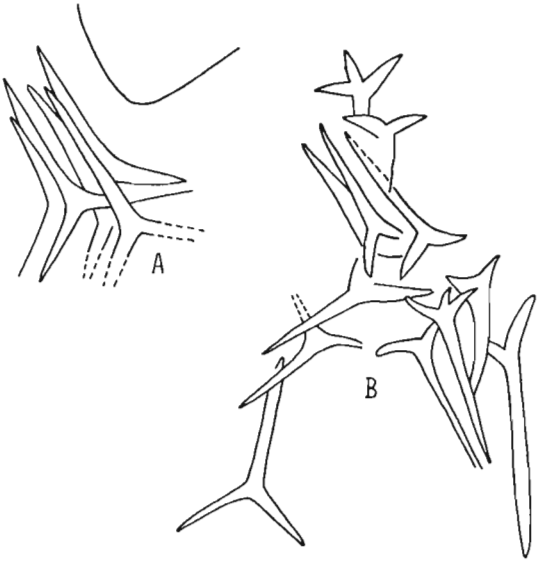


Fig. 22. *Holcospongia glomerata* (Quenstedt) (UŁ Sp VII/12a): *A* sagittal triactines, *B* arrangement of tetractines and triactines in fibres, ×165.

Paragaster cavity lacking. Aporrhyses radial centropetal, accompanied by elongated, sinuous excurrent cavities. Epirrhyses poorly distinct.

Cortical skeleton obscure in the forms studies. Basal parts of some forms display calcite layer without traces of spiculation.

Parenchymal skeleton comprising anastomosing fibres of nonuniform length, about 0.3 mm long and 0. 15—0.2 mm thick, radially arranged; the spicules comprise: sagittal triactines with apical ray 0.1—0.13 mm long and 0.02 mm thick and sharp-ended, and less numerous, regular and sagittal tetractines. The fibres are formed of numerous densely spaced spicules.

Variability. Twenty eight forms derived from the Middle Oxfordian of Bałtów display high variability in size and external morphology. The majority of specimens (26 out of 36) are penetrated throughout by a natural channel. The position of this channel in sponge body and development of its margins indicates that the sponges were not attached to the bottom but were rather overgrowing stems of marine plants. This tubular channel is nonuniform in diameter; similarly, outlets of that channels display uneven margins. Morphology of apex and skeletal structure are such as illustrated by Siemiradzki (1913).

Comparisons. — The specimens most closely resemble forms described by Zittel (1878) in structure of water system. According to Hinde (1893) apical rays are 0.46 mm long, filiform spicules are 0.005—0.01 mm thick. Fibres of Polish and English specimens appear to be the same.

Occurrence. — Poland: Callovian (Balin), Oxfordian (Bałtów, area of Przedbórz, Wrzosów), Kimmeridgian (Podgórze, Włodowice, Dobrogoszyce). Germany: Kimmeridgian. Switzerland: Upper Jurassic. England: Bathonian.

Holcospongia polita Hinde, 1893
(Pl. XXXVIII, Figs 9—10)

1913. *Holcospongia polita* Hinde; J. Siemiradzki, p. 35 (here synonymy).
1929. *Holcospongia polita* Hinde; F. Oppliger, p. 7, Pl. I, Fig. 4.

Material. — Five complete and 9 fragmentary specimens.

Dimensions (in mm):

height	maximum thickness
9—13	6—8

Description. — *Holcospongia* small, club-like to ovate, solitary or forming small clusters growing upwards. Apical plane convex, radially furrowed. Aporrhyses variable in number and size on the apex, varying from 0.15 to 0.35 mm in width. Forms about 0.3 mm wide situated at the center of concentration of aporrhyses. Paragaster lacking; canals following sinuous course. Ostia polygonal, distributed between tripod rays on the cortex.

Cortical skeleton irregularly wrinkled, fine, covering basal part. It consists of densely-spaced triactines, tripods and sagittal tetractines variable in size and with sagittal ray 0.25—0.3 mm long. Tetractines deeper seated, with rays set outwards (similarly as in the case of triactines).

Parenchymal skeleton built of fibres 0.06 mm thick and about 0.3 mm long. Network with smaller and larger canal meshes of the same width as apical furrows. Spicules smooth and ornamented with fine projections nonuniform in height. Triactines predominate among spicules. Apical rays of tetractines are 0.06—0.12 mm long, and the facial ones — 0.03 mm long, arcuate, and equiangularly set; moreover, some low T-shaped triactines, fine diactines and tripods are sometimes found. Spicules are densely spaced in fibres. Facial rays display various types of endings and intervene with one another.

Comparisons. — The specimens are most similar to those described by Hinde, differing in smaller size, thickness of fibres (fibres are 0.05—0.15 mm thick in the latter) and length of rays. Such differences were attributed by Burton (1963) to growth variability. According to Siemiradzki (1913), *H. polita* from the Middle Jurassic of Poland have fibres of the same thicknes as English specimens; the former have spicule rays 0.16—0.43 mm long which separates them from those from the Oxfordian of Działoszyn.

Occurrence. — Poland: Callovian (Balin, Pomorzany), Upper Oxfordian (Działoszyn and vicinities). Switzerland: Rauracian. England: Bathonian.

Holcospongia koltuni sp.n.

(Pl. XXIX, Fig. 5; Pl. XXXV, Fig. 5; Pl. XXXVIII, Fig. 11; Text-fig. 23)

Holotype: UŁ Sp VII/297; Pl. XXXVIII, Fig. 11.
Type horizon: Upper Oxfordian, Idoceras planula Zone.
Type locality: Wydrzynów, Wieluń—Częstochowa part of the Polish Jura Chain.
Derivation of the name: in honour of Dr. W. M. Koltun, student of living sponges.

Diagnosis. — *Holcospongia* single, semicircular, with growth in transverse direction. Canal system developed. Paragaster cavity narrow, variable in depth. Parenchymal network fine, yielding mostly triactines with straight rays.

Material. — Six well-preserved specimens.

Dimensions (in mm):

height	thickness	
	apical part	basal part
6.5—9	6—9	2.5—11

Description. — *Holcospongia* single, semicircular, with growth in transverse direction. Apex slightly concave; basal part varying in development depending on the mode of attachment. Lateral walls smooth. Osculum 0.2—2.1 mm wide, surrounded by more or less fine, nonuniformly long

furrows in some specimens. Paragaster cavity narrow, tubular, slightly wider than aporrhyses. Ostia differentiated, uniformly distributed throughout the surface, narrower than postica and skeletal network meshes. Epirrhyses fine; aporrhyses tubular, radially approaching towards apex.

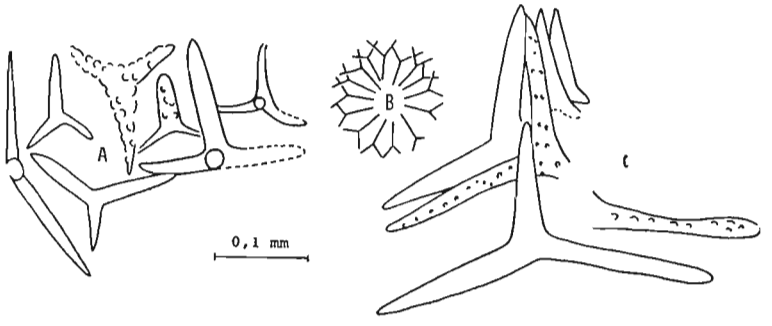


Fig. 23. *Holcospongia koltuni* sp.n. (UŁ Sp VII/13A): *A* spicules occurring in principal skeleton; *B* scheme of arrangement of spicules around ostium in cortex (UŁ Sp VII/300); *C* arrangement of triactines in fibres.

Cortical skeleton covering only the bassal part; represented by a layer variable in thickness and built of spicules with sagittal ray 0.07 mm long. In proximal part the skeleton is wrinkled. Around ostia apical rays are oriented inwards into the pores.

Parenchymal skeleton net-like. Fibres randomly oriented, 0.3—0.35 mm long, 0.07—0.1 mm wide, and displaying traces of sagittal triactines with rays 0.05—0.085 mm long, regular triactines with rays 0.18 mm long, and occasional tetractines. Surface of triactines smooth to knobbed.

Variability. Specimens assigned to *H. koltuni* sp.n. display variability in the mode of attachment and in development and number of furrows. Moreover, basal part may be flat shield-like or somewhat conical.

Comparisons. — The specimens resemble *Stellispongia depressa* Počta from the Upper Cretaceous of Czechoslovakia in shape, differing in spicular composition, smaller size, furrows confined to the apex, and in stratigraphic position. They differ from *H. glomerata* and *H. polita* in the presence of paragaster cavity, ostia well-differentiated on the pseudocortex, and by predominance of triactines with straight and not arcuate rays.

Occurence. — Poland: Upper Oxfordian (Wydrzynów).

Holcospongia pyrula sp.n.
(Pl. XXXV, Fig. 3; Pl. XXXVIII, Fig. 12; Text-fig. 24)

Holotype: UŁ Sp. VII/307; Pl. XXXVIII, Fig. 12.
Type horizon: Upper Oxfordian, Idoceras planula Zone.
Type locality: Wydrzynów, Wieluń—Częstochowa part of the Polish Jura Chain.
Derivation of the name: *Lat. pyrum* — pear, from the shape of sponge.

Diagnosis. — *Holcospongia* pear-shaped, with smooth surface covered with cortex. Paragaster cavity lacking. Skeleton built of loosely anastomosing fibres. Spicular composition complex.

Material. — Six well-preserved specimens.

Dimensions (in mm):

	height	maximum thickness	pedicle length	pedicle thickness
holotype UŁ Sp VII/307	20	14×15	5	4
paratype UŁ Sp VII/308	13	9	4	6

Description. — *Holcospongia* pear-shaped, single, with short hypophare. External surface smooth; paragaster cavity lacking. Irregular cavities and sinuous canals with outlets situated in the apex plane. Postica ovate, 0.25 mm wide distributed throughout the cortex. Ostia hardly visible, becoming more numerous in the lower part, between spicula rays.

Cortical skeleton forming a layer variable in thickness, about 1 mm thick and becoming thicker at the base; built of tetractines.

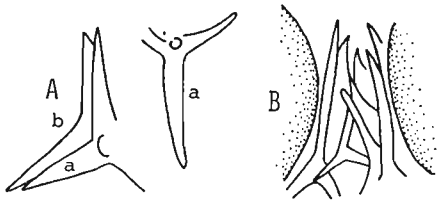


Fig. 24. *Holcospongia pyrula* sp.n. (UŁ Sp VII/67): *A* spicules: *a* tetractines, *b* triactines; *B* arrangement of spicules in fibres from basal part of the sponge.

Parenchymal skeleton moderately dense, net-like, formed of meandering fibres 0.1 mm thick on the average and about 0.2 mm long. Spicules numerous, varying in size; sagittal tetractines predominate; moreover, regular triactines and diactines were found. Spicule rays smooth, with sharp-pointed ends. Basal and upper parts of the sponge somewhat differing in structure of skeleton. Apical rays are longer (about 0.18 mm long) and spicules seem to be more regular, equiradial in the former part.

Comparisons. — *Holcospongia pyrula* sp.n. are most similar to *H. contorta* Hinde, differing in larger size of particular elements, the lack of furrows in apical part, and in the presence of large triactines. The latter is also highly similar to *H. glomerata* (Quenstedt) in shape, differing in cortex covering the whole surface, smaller length of fibres and more loose parenchymal network, as well as in quantitative predominance of tetractines on triactines. *Holcospongia pyrula* sp.n. differs from *H. koltuni* sp.n. in shorter fibres (0.2 and 0.3—0.35 mm, respectively).

Occurrence. — Poland: Upper Oxfordian (Wydrzynów).

Holcospongia sp.
(Pl. XXXV, Fig. 4; Text-fig. 25)

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

	height	width	
		apex	hypophare
specimen UŁ Sp VII/27	22	16	4

Description. — Sponge of the form of reversed cone. Apex flat, with concentration of postica in the center. Wall surface smooth. Ostia poorly visible, 0.25—0.35 mm wide under the cortex. Osculum and paragaster cavity not developed. A set of elongated excurrent cavities, marking excurrent zone stretching from the base to apex, continues along axis of the sponge. Aporrhyses variable in development, arcuate and almost parallel to the apex in the upper part, becoming less distinct in the lower part. Epirrhyses undiscernible.

Cortical skeleton covering the whole sponge. The traces of spicules make it possible to assume that the skeleton consisted of fine sagittal tri- and tetractines forming a single layer.

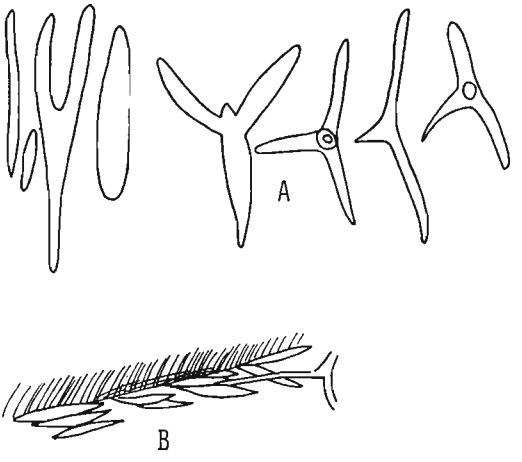


Fig. 25. *Holcospongia* sp., Callovian, Balin (UŁ Sp VII/58): *A* differentiation of spicules in subapical part of the sponge, *B* small diactines from the surface of fibres; ×85.

Parenchymal skeleton built of short fibres about 0.25 mm thick, arcuately spreading from axial part of the sponge. Network uniformly dense, with meshes 0.7—0.9 mm wide. Fibres consisting of numerous diactines, tri- and irregular tetractines with straight or bent rays. Spicules, with the exception of diactines, arranged in net-like pattern in fibres. Sagittal spicules with apical ray 0.2 mm long in subapical part. Distal ends of rays nonuniform, not very sharp, sometimes bifurcating. Regular triactines

with surface densely covered with knobs are concentrated around network meshes. Triactines are the principal component of parenchymal skeleton.

Comparisons. — The specimen is most similar to *H. pyrula* sp.n. The former differs from all the species of the genus *Holcospongia* in structure of water system and occurrence of numerous diactines.

Occurrence. — Poland: Callovian (Balin).

Family **Discocoeliidae** Laubenfels, 1955

Laubenfels (1955) allocated in this family the genera *Peronidella* Zittel, *Discocoelia* Fromentel and *Eusiphonella* Zittel considering the bushy shape with osculum on or in the proximity of apex of branches as the features typical of these pharetronids. Previously, Hinde (1893, p. 218) in revision of his earlier monograph (Hinde, 1883) interpreted the species of *Discocoelia* as some *Eusiphonella*. Similarly, the remaining species of *Discocoelia* were treated by Oppliger as *Corynella champlitensis* (Oppliger 1929, o. 17). Subsequently Wagner (1964) assigned the genus *Eusiphonella* to the family Elasmostomatidae, whereas the present author allocated this genus in the family Lelapiidae. In result of such treatment the family Discocoeliidae Laubenfels become monotypic, comprising only the genus *Peronidella* Zittel. Moreover, genus *Lymnorella* is here allocated with certain reservation.

Genus *Peronidella* (= *Peronella*), Zittel, 1878

Type species: *Spongites pistilliformis* Lamouroux, 1821.

The genus *Peronidella* is primarily characterized by the lack of pores and canals differentiated in parenchymal network at the presence of paragaster. The analysis of Polish material makes it possible to state that the spicular composition is complex; here are represented tri-, tetractines and filiform diactines varying in size and shape. Some previous researchers (Zittel 1878; Hinde 1883; Siemiradzki 1913; and Oppliger 1929)

elements	*Peronidella*	*Corynella*
ostia	not differentiated in pseudocortex and cortex	differentiated
water canals	not differentiated in skeleton	differentiated
paragaster cavity	tubular	tubular
spicular composition	complex; tri-, tetractines and diactines; not united with calcareous cement	uniform; triactines predominate; diactines subordinate; not united with calcareous cement

assumed that the genera *Peronidella* and *Corynella* are closely related differing only in development of water system. However, this assumption seems invalid (see Table p. 266).

Laubenfels (1955) assigned the genus *Peronidella* to the family Discocoeliidae; in turn, Wagner (1964) assigned the two above genera to the family Elasmostomatidae, stating that they have parenchymal spicules with coatings of calcareous cement. The differences tabulated above indicate that the two genera cannot be assigned to the same family.

The species: *Peronidella pistilliformis, P. cylindrica* and *P. waltoni* are characterized by the widest geographic distribution. The genus *Peronidella* underwent a rapid evolution and showed a high differentiation in the Jurassic and Cretaceous. In Poland, so far, 9 its species are known.

Peronidella pistilliformis pistilliformis (Lamouroux, 1821)
(Pl. XXXVII, Fig. 1; Text-fig. 26)

1821. *Spongites pistilliformis* Lamouroux; J. Lamouroux, p. 88, Pl. 184, Fig. 6.
1913. *Peronidella pistilliformis* (Lamouroux); J. Siemiradzki, p. 29, Pl. 8, Fig. 109 (nom Fig. 101) (here synonymy).

Material. — Eight complete well-preserved specimens with basal part broken-off.

Dimensions (in mm):

height		thickness	
total	apical part	apical part	hypophare
10—11	3—4.5	4.5—7	2—5

Description. — *Peronidella* small, conical, with apex capitately widened. Lower part becoming gradually narrower towards the base. Apex flattened. External surface smooth, sometimes with transversal constrictions. Osculum circular, 1—2.5 mm wide, situated in the center of

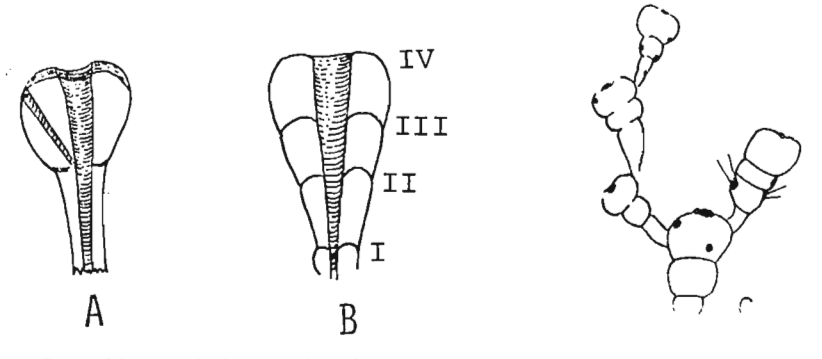


Fig. 26. *Peronidella pistilliformis pistilliformis* (Lamouroux) (UŁ Sp VII/22, 116): *A* longitudinal section through bud and canal, ×2; *B* longitudinal section showing location of apex during the ontogeny; *C* reconstruction of cluster.

apex and surrounded by calcitized ridge 0.35 mm and presumably built of marginalia. Paragaster narrow, tubular, extending up to the base. Ostia obscured, always smaller than network meshes.

Cortical skeleton preserved around the base and close to the place of budding, formed of fine layer of densely spaced sagittal triactines; apical ray of the triactines set oblique outwards.

Parenchymal skeleton net-like, formed of short fibres 0.07—0.3 mm thick; fibres parallel to the apex surface in upper part of sponge. Spicular composition complex; tetractines predominate; moreover, regular and irregular triactines are found.

Comparisons. — The Polish forms resemble those from England in dimensions and composition of skeleton. Shape and preservation of the specimens studied indicate that they were forming bushy clusters and had cortex and water systems united. This is also the case of English forms.

Occurrence. — Poland: Callovian (Balin, Pomorzany, Wodna), Upper Oxfordian (Wydrzynów). France: Middle Jurassic. South England: Callovian.

Peronidella pistilliformis preocelata subsp. n.

(Pl. XXXI, Fig. 2; Pl. XL, Figs 10—12; Text-fig. 27)

Holotype: UŁ Sp VII/119; Pl. XL, Fig. 10.

Type horizon: Upper Oxfordian.

Type locality: Wydrzynów near Działoszyn, Wieluń—Częstochowa part of the Polish Jura Chain.

Derivation of the name: from the similarity to Cretaceous species, *Peronidella ocelata* Hinde.

Diagnosis. — *Peronidella* club-like, small, with flat apex. Parenchymal fibres tubular, thick. Network regular.

Material. — Eight specimens.

Dimensions (in mm):

height	width	
	apex	hypophare
7—18	3—6	1.2—2

Description. — Sponges small, club-like, becoming gently narrower towards the base. External morphology as that in nominate subspecies. Osculum 1.4 mm wide, located in small apical depression. Paragaster moderately deep, 0.5 mm wide at the bottom. Postica from paragaster surface 0.15 mm wide.

Cortical skeleton consisting of two layers, independent and pseudocortex formed of flattened fibres 0.75 mm wide. Independent skeleton preserved in places; it forms a cover about 0.15 mm thick and built of tripods with rays 0.07—0.1 mm long and of sagittal triactines.

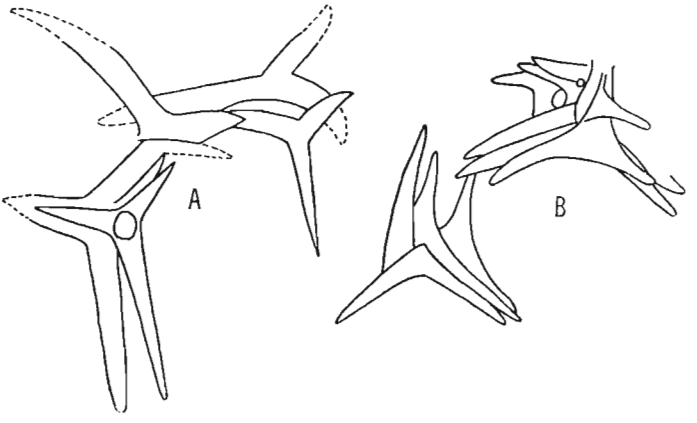


Fig. 27. *Peronidella pistilliformis preocelata* subsp.n. (UŁ Sp VII/46): *A* arrangement of sagittal tetractines in fibres, ×165; *B* outline of spicules occurring in dependent cortex close to apex, ×85.

Parenchymal skeleton regular, built of fibres 0.35 mm thick. The fibres appear tubular and built of numerous densely-spaced spicules in transversal section. Closer to the surface the fibres consist of regular triactines; deeper part of the fibres consist of tetractines and (?) sagittal triactines. Apical ray of tetractines 0.14 mm long; facial rays 0.06 mm long.

Comparisons. — The specimens resemble *P. pistilliformis pistilliformis* (Lamouroux) and *P. ocelata* Hinde in general shape and structure of skeleton. They differ from the nominate subspecies in somewhat thicker fibres and flat apex. In turn, they differ from *P. ocelata* Hinde in more dense network and markedly thicker fibres (fibres 0.14 mm thick in the latter).

Occurrence. — Poland: Upper Oxfordian (Wydrzynów).

Peronidella cylindrica (Goldfuss, 1826)
(Pl. XL, Fig. 14)

1913. *Peronidella cylindrica* (Goldfuss); J. Siemiradzki, p. 31, Pl. 8, Fig. 99 (here synonymy).
1929. *Peronidella cylindrica* (Goldfuss); F. Oppliger, p. 14.

Material. — Nine specimens.

Dimensions (in mm):

height	thickness: wall	thickness: apex	hypophare base	osculum diameter
33—53	4—5	10—12	10	2.5—4

Description. — *Peronidella* massive, with thick, short hypophare. Apex variously rounded, separated from walls by a sharp margin. Osculum circular, terminal on the apex. Paragaster cavity tubular, deep; surface of

the cavity with elliptical postica of various sizes; the postica are arranged in regular ring-like rows close to the apex. Canals poorly developed, observable only close to the surface.

Cortical skeleton preserved only in some places, wrinkled on the hypophare, about 0.115 mm thick, primarily built of tetractines and tripods. Triactines with rays 0.11—0.35 mm long and 0.035 mm thick and irregularly set. Diactines 0.25—0.35 mm long found in meshes of the network; presumably they resulted in finely thorny appearance of sponge surface. Ostia hardly visible between rays.

Parenchymal skeleton was previously described by Hinde (1893, p. 167) and Siemiradzki (1913, p. 31). Network dense; fibres about 0.25 mm thick, comprising equiradial triactines and sagittal tetractines nonuniform in size and with rays 0.3—0.7 mm long. Spicule surface finely knobbed. Almost all facial rays arranged in the same plane. Diactines occasional.

Comparisons. — Arrangement of spicules in fibres similar to that described by Zittel (1878) and Oppliger (1929, p. 14). The specimens studied most closely resemble *P. cylindrica* from Upper Jurassic of Switzerland, and differ from those from the Upper Oxfordian of Ojców (Siemiradzki, 1913, p. 31) in smaller dimensions and thinner fibres (0.25 mm thick, respectively).

Occurrence. — Poland: Upper Oxfordian (Krzemionki, Paczółtowice, Ojców, Wydrzynów, Niwiska Dolne). England: Upper Jurassic. Western Germany: Upper Jurassic. Switzerland: Upper Jurassic.

Peronidella metabronni Sollas, 1883

(Pl. XL, Fig. 15; Text-fig. 28)

1883. *Peronidella metabronni* Sollas; Sollas, p. 548, Pl. 21, Figs 26—27.
1893. *Peronidella metabronni* Sollas; J. G. Hinde, p. 215, Pl. 14, Fig. 4.
1913. *Peronidella metabronni* Sollas; J. Siemiradzki, p. 30, Pl. 3, Fig. 111.

Material. — Three specimens.

Dimensions (in mm):

height	thickness		osculum diameter
	maximum	wall close to apex	
13—18	5—8	1—2	3

Remarks. — The morphology of the author's specimens does not differ from that described by Hinde (1893) and Siemiradzki (1913). The Polish specimens differ from English ones in fibres thinner (about 0.09 mm and 0.1—0.17 mm thick, respectively) and of variable length. According to the present author the fibres are built of regular and sagittal tetractines, and tuning fork and regular triactines with rays 0.12 mm long; rays are usually sharp-pointed and finely, variably knobby. Siemiradzki (1913, p. 3)

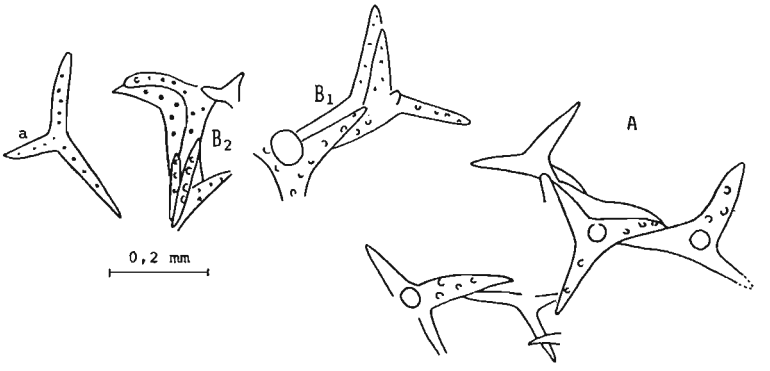


Fig. 28. *Peronidella metabronni* Sollas (UŁ Sp VII/35): *A* arrangement of warty tetractines and triactines; note variability in shape and size of spicules; *B* and B_1 — mode of junction of spicules; *C* spicule with short apical ray (*a*).

mentioned large fragments of rays found in thin sections and indicating the presence of large spicules. The author's specimens display dense cortex formed of sagittal triactines and tetractines and with rays oriented inwards. The specimens of Siemiradzki (1913) were characterized by the occurrence of pseudocortex and the lack of independent cortex.

Occurrence. — Poland: Callovian (Balin), Upper Oxfordian (Wydrzynów). England: Bathonian, Parkinsonia Zone.

Peronidella profurcata sp. n.
(Pl. XL, Figs 8—9)

Holotype: UŁ Sp VII/159; Pl. XL, Fig. 8.
Type horizon: Upper Oxfordian, Idoceras planula Zone.
Type locality: Wydrzynów, Wieluń—Cracow part of the Polish Jura Chain.
Derivation of the name: from the similarity to the species *Peronidella furcata* Goldfuss, from the Upper Cretaceous.

Diagnosis. — *Peronidella* small, cylindrical, occurring single or in bushy clusters. Regular triactines predominating in the fibres. Independent cortex and pseudocortex with regular meshes present.

Material. — Four complete and nine fragmentary specimens.

Dimensions (in mm):

height	diameter apex	of basal part
11—12	4	4—4.5

Description. — *Peronidella* small, cylindrical. Apex flat with slightly rounded margins. Walls 2 mm thick. Osculum 1—1.5 mm wide, surrounded by moderately high ridge built of calcitized perioscular marginalia.

External surface regularly porous. Pseudocortical meshes arranged in moderately long, oblique rows.

Cortical skeleton forming thin layer 0.2—0.3 mm thick; built of triactines. Moreover, modified spicules with relicts of fourth ray were found.

Parenchymal skeleton built of fibres 0.17 mm thick. Spicular composition different in particular parts of sponge. Sagittal tetractines with moderately long apical ray occur in basal part. The tetractines are accompanied by sagittal triactines with apical ray 0.16—0.2 mm long and by regular triactines. Small and large regular triactines predominate in the fibres from the mid-height upwards. Larger triactines with rays 0.125 mm long and 0.04 mm thick are surrounded by smaller ones with rays 0.06 mm long.

Comparisons. — The specimens most closely resemble *P. furcata* Goldfuss from the Upper Cretaceous, differing in smaller size. They differ from other species in more regular pseudocortical network and in shape of its meshes, as well as in width of fibres.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów).

Peronidella proramosa sp. n.

(Pl. XXIX, Fig. 3; Pl. XXXVII, Fig. 2; Pl. XL, Figs 5—7; Text-fig. 29)

Holotype: UŁ Sp VII/131; Pl. XL, Fig. 7.

Type horizon: Upper Oxfordian, Idoceras planula Zone.

Type locality: Wydrzynów, Wieluń—Częstochowa part of the Polish Jura Chain.

Derivation of the name: from the similarity to the species *Peronidella ramosa* Hinde from the Upper Cretaceous.

Diagnosis. — *Peronidella* cylindrical with constricted walls, occurring single or in clusters. Perenchymal network formed of fine fibres with meshes variable in size.

Material. — Fifteen specimens.

Dimensions (in mm):

height	thickness		number of
	maximum	minimum	constrictions
6—23	1—5	1.5—3	1—6

Description. — *Peronidella* cylindrical with irregular transverse constrictions. Osculum nonuniform in width, 0.875—2.1 mm wide, surrounded by perioscular spicules. Paragaster cavity simple or constricted. Postica occurring in small paragaster depressions.

Cortical skeleton layered, 0.14—0.5 mm thick, confined to the lower part of sponge; it consists of small tripodial triactines and sagittal tetractines. Pseudocortex from upper part of sponge displays fibres 0.35 mm wide. Fibres built of tetractines with apical rays 0.21 mm long. Weathered fibres display apparent monactine structure.

Parenchymal skeleton represented by regular network of fibres 0.14—0.2 mm thick and with meshes 0.21—0.35 mm in diameter. Fibres formed of sagittal tetractines with apical rays 0.15 mm long and facial rays 0.01—0.07 mm long; spicules varying in thickness. The tetractines are

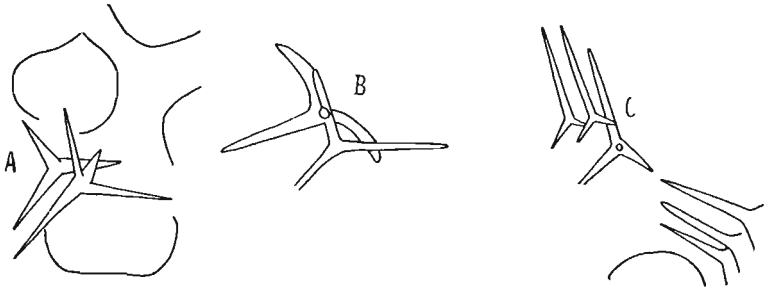


Fig. 29. *Peronidella proramosa* sp.n. (UŁ Sp VII/26): *A* triactines and regular tetractines in fibres; *B* triactines and tetractines in fibres close to the outer surface; *C* sagittal tetractines, ×85.

accompanied by regular tetractines finer than the sagittal ones, and by innumerous diactines.

Variability. The specimens show variability in growth. The youngest of them display two constrictions and smooth surface. Along with age the number of constrictions increases up to 7 in the mature stage. The constrictions are variable in width.

Comparisons. — The Polish specimens resemble bushy English forms of the species *P. ramosa* (Hinde, 1893) from the Cretaceous, differing in finer general shape and the presence of constrictions, as well as in skeleton comprising both small triactines and larger tetractines (according to Hinde, 1893, English forms display only triactines). The above differences as well as different stratigraphic position make it possible to allocate the Polish forms in a separate new species.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów).

Peronidella tenuis mira subsp. n.
(Pl. XXXVI, Fig. 4; Pl. XL, Fig. 3; Text-fig. 30)

Holotype: UŁ Sp VII/110; Pl. XL, Fig. 3.
Type horizon: Upper Oxfordian.
Type locality: Wydrzynów near Działoszyn, Wieluń—Częstochowa part of the Polish Jura Chain.
Derivation of the name: *Lat. mirus* — strange.

Diagnosis. — *Peronidella* forming clusters laterally developing. Single individuals small, short, ovate in outline, with flat apex. Osculum wide. Network with polygonal meshes.

Material. — Cluster consisting of 5 well-preserved specimens and one destroyed.

Dimensions (in mm):

	height		width of individual	
	cluster	individual	apex	lower part
Specimen UŁ Sp VII/170	11—12	4—6	3—4	2—3

Description. — *Peronidella* forming short-brached bushy clusters. Individuals small, short, regular in shape, overgrowing with one another in the lower parts. Apex flattened with rounded margins. External surface smooth. Osculum cirular, 0.1—0.35 mm wide, surrounded by perioscular spicules. Paragaster uniform in width. Canals obscured. Incurrent cavities notable just beneath the surface.

Cortical skeleton thickest in the lower part, built of densely spaced finely-knobbed triactines and smooth sagittal tetractines. Apical rays oriented inwards.

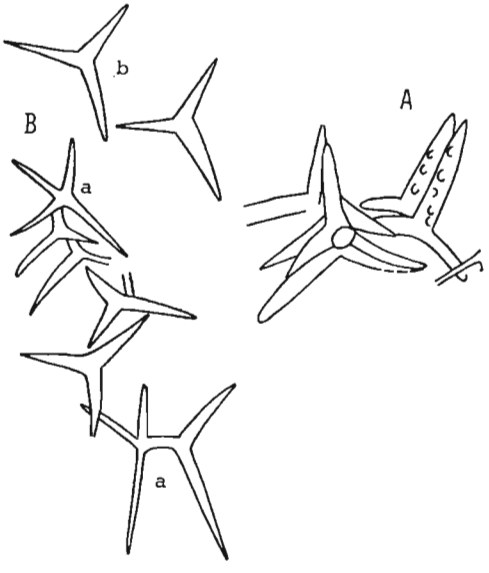


Fig. 30. *Peronidella tenuis mira* subsp.n. (UŁ Sp VII/24b): *A* arrangement of spicules in cortex, ×165; *B* original arrangement of triactines (*b*) and tetractines (*a*) in fibres, ×85.

Parenchymal skeleton forming dense regular network with polygonal meshes 0.1—0.15 mm wide. Skeleton built of sagittal tetractines and regular triactines of similar size. Rays sharp-pointed, long. Regular triactines predominate; T-shaped and tuning fork are occasionally found.

Comparisons. — The specimens are similar to *P. tenuis* Hinde, differing in smaller dimensions and more regular shape of individuals, wider osculum, and flat apex. They differ from *P. ramosa* in ovate shape of individu-

als forming clusters, their smaller size, and in irregular, broadly branching shape of the cluster.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów). England: Bajocian.

Peronidella floriceps (Etallon, 1861)
(Pl. XXXI, Fig. 1; Pl. XXXVII, Fig. 3; Pl. XL, Figs 13, 16)

1861. *Paraeudea floriceps* Etallon; A. Etallon, p. 419, Pl. 58—26.
1929. *Peronidella floriceps* (Etallon); F. Oppliger, p. 12, Pl. 2, Fig. 2b.

Material. — One complete and 7 fragmentary specimens.

Dimensions (in mm):

height	thickness		osculum
	maximum	apex	diameter
13—45	9—17	8—11	4—6

Description. — *Peronidella* massive, thick-walled, with even or transversally folded surface. Apex conically convex. Osculum with narrow margins set upwards. Paragaster deep, tubular, with transversally furrowed surface. Canals and ostia obscured. Postica fissure-like distributed on paragaster surface.

Cortical skeleton preserved on smaller specimens, formed of spicules variable in size and with bent rays.

Parenchymal skeleton net-like, dense, built of fine, non-oriented fibres 0.08—0.15 mm thick. Spicules variable in size: smaller and larger tetractines and diactines; large sagittal tetractines with sharp-pointed rays predominate; regular, sometimes slightly knobbed triactines are innumerous. Diactines small, fairly numerous, speced between tetractines.

Remarks. — The Polish specimen is similar in morphology with those described by Oppliger (1929).

Occurrence. — Poland: Upper Oxfordian (Wydrzynów). Switzerland: Rauracian.

? *Peronidella* sp.
(Pl. XXIX, Fig. 1; Pl. XL, Fig. 4)

Material. — One specimen 25 mm high and 6—7 mm thick.

Description. — *Peronidella* cylindrical. External morphology such as in other representatives of this genus. Osculum and paragaster lacking. Elongated cavedia resembling canals observable under surface close to the apex. Ostia not differentiated in pseudocortex.

Cortical skeleton was presumably covering the whole sponge. It is built of spicules variable in size, irregularly spaced. Large sagittal tetractines overlying fine triactines and tetractines and numerous diactines.

Parenchymal skeleton formed of fibres 0.12—0.21 mm thick and united into a loose network. Surface of fibres revealing traces of numerous densely spaced small tetractines and triactines.

Remarks. — The lack of differentiated canals and ostia, as well as the spicular composition indicate affinity with *Peronidella*. However, the lack of paragaster, and osculum and the spicules densely spaced in fibres differ this form from all the species of *Peronidella*.

Occurrence. — Poland: Callovian (Balin).

Genus *Lymnorella* (= *Lymnorea*) Lamouroux, 1821

Type species: *Lymnorea* (= *Lymnorella*) *mamillaris* Lamouroux, 1821

Lamouroux placed this genus in the family Stellispongiidae, which is difficult to accept. Stelliispongidae comprises genera with parenchymal skeleton built exclusively of diactines whereas skeleton of *Lymnorella* is built of both tetractines and diactines. This troublesome genus is placed in the family Discocoeliidae Laubenfels with reservation because of the lack of triactines in the parenchymal skeleton. The analysis of structure of skeleton has shown that the arrangement of sagittal spicules in fibres resembles that of *Vosmaeropsis sasaki* Hozawa (see Burton, p. 356).

The genus *Lymnorella* is known from the Middle and Upper Jurassic of Europe (Poland, England, southern Germany) and from the Triassic of western England. Up to now, 9 species were described. In Poland, it is represented by 5 species (one of which is new): *L. mamilosa, L. inclusa* and *L. pygmea* described from the Middle Oxfordian by Siemiradzki (1913), and *L. globonica* sp. n. from the Upper Oxfordian, described below.

Lymnorella ramosa Hinde, 1893

(Pl. XXX, Fig. 2; Pl. XXXIII, Fig. 3; Pl. XXXIX, Figs 13—14; Text-fig. 31)

1893. *Lymnorella ramosa* Hinde; J. G. Hinde, p. 238, Pl. 38, Fig. 6.

Dimensions (in mm):

height	thickness
9—22	3—8

Material. — Six well-preserved specimens.

Description. — *Lymnorella* single or branching, straight or bent. Apex rounded, without cortex. External surface smooth, with traces of fine wrinkles. Osculum and paragaster cavity lacking. Canal system difficult to distinguish; some sinuous canals about 0.15 mm wide and without any preferred orientation may be noted. Ostia fine, 0.06 mm wide. Postica loosely-spaced, forming irregular concentrations around a single pore larger than others on the apex.

Cortical skeleton confined to lateral walls, 0.04 mm thick, built of small equiradial and sagittal triactines with apical rays 0.3 mm long, and filiform diactines 0.15 mm long. Spicular rays oriented to the interior of sponge. Numerous diactines set vertical between triactines; they were responsible for the thorny appearance of sponge surface.

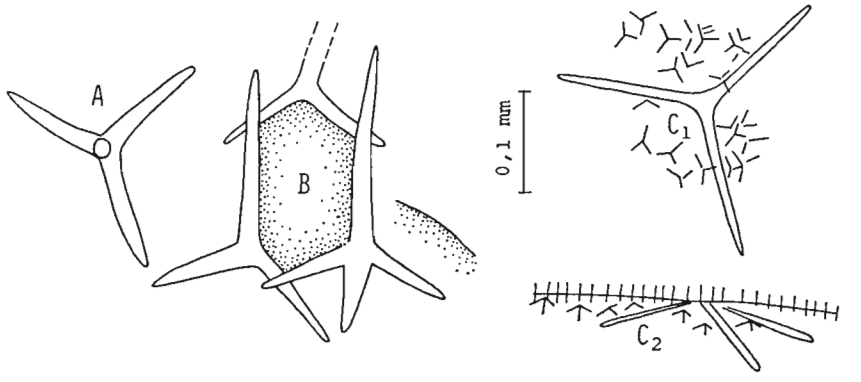


Fig. 31. *Lymnorella ramosa* Hinde: *A* tetractine; *B* arrangement of tetractines around mesh of network, longitudinal section through fibres (UŁ Sp VII/2a); C_1 arrangement of spicules in cortex (UŁ Sp VII/335); C_2 reconstruction of arrangement of these spicules, vertical section.

Parenchymal skeleton net-like, with meshes almost uniform in size; fibres 0,3 mm long and 0.06 mm thick, consisting of large and small sharp-rayed tetractines. Large tetractines with apical ray 0.3—0.6 mm long and 0.1 mm thick. Surface of spicules smooth or knobbed. Central part of fibre occupied by a ray of large spicule, and periphery — by smaller spicules. Diactines occasional.

Remarks. — The specimens differ from English cluster-forming forms in smaller dimensions, thinner fibres (0.1—0.15 mm thick in the latter case) and occurrence of sagittal tetractines. However, it should be admitted that Hinde (1893) did found such tetractines because of recrystallization of the skeleton but he inferred their occurrence. Tetractines of such type are present in *L. globoconica* sp. n.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów). England: Bathonian.

Lymnorella aff. *inclusa* (Hinde, 1883)

(Pl. XXXIX, Figs 18—19)

Material. — Four well-preserved and 2 calcified specimens.

Dimensions (in mm):

height	maximum thickness
13—18	11×14—16×18

Description. — *Lymnorella* spherical to semispherical, with lower part varying in development. Apex rounded, even or with depressions, covered with thin cortex. Osculum and paragaster cavity not developed. Postica ovate, innumerous, 0.1—0.45 mm wide, irregularly distributed. Ostia numerous, about 0.07 mm wide, densely spaced throughout the cortex.

Cortical skeleton fine, layered, covering the whole sponge, consisting of fine triactines. Parenchymal skeleton network calcified, seems to be dense, with fine meshes.

Remarks. — The specimens resemble forms described by Hinde (1893) and Siemiradzki (1913) in morphology, differing in somewhat younger age, smaller dimensions, and supposedly denser parenchymal skeleton network.

Occurrence. — Poland: Callovian (Balin), Upper Oxfordian (Niwiska Dolne, Wrzosowa, Piechcin).

Lymnorella globoconica sp. n.
(Pl. XXXIX, Figs 15—16; Text-fig. 32)

Holotype: UŁ Sp VII/343; Pl. XXXIX, Fig. 16.
Type horizon: Upper Oxfordian, Idoceras planula Zone.
Type locality: Wydrzynów, Wieluń—Częstochowa part of the Polish Jura Chain.
Derivation of the name: From the shape of sponge.

Diagnosis. — *Lymnorella* small, conical with spherical apical part. Water system developed. Paragaster cavity deep. Fibres consisting of sagittal triactines.

Material. — Five complete, well-preserved specimens.

Dimensions (in mm):

height			thickness	
total	apex	base	maximum	base
8	3	5	8	3

Description. — *Lymnorella* single, conical, with spherical, convex apex. External surface smooth, with wrinkled cortex in the lower part of sponge, the upper, spherical part is covered by net-like pseudocortex. Ostia very fine, spaced between spicules, appear to be ovate at the magnification × 100. Postica large, 0.35 mm wide, loosely distributed in funnel-like depressions on apex surface. Osculum irregularly star-like, varying in location in funnel-like depression on the apex; osculum surrounded by postica. Paragaster cavity conical, deep, with irregular surface; wide elongated subcortical cavities present. Epirrhyses varying in arrangement, almost parallel to one another in upper part of the sponge, oriented upwards. Aporrhyses wider, more sinuous, forming sets oriented downwards.

Cortical skeleton layered, 0.2 mm thick, covering lateral surfaces and paragaster. External, finely thorny part represents independent cortex;

and the internal one — pseudocortex. Pseudocortex with fibres 0.35 mm thick and more dense than in parenchymal network. Paragastral cortex with rays projected in the form of prickles; other, modified rays occur-

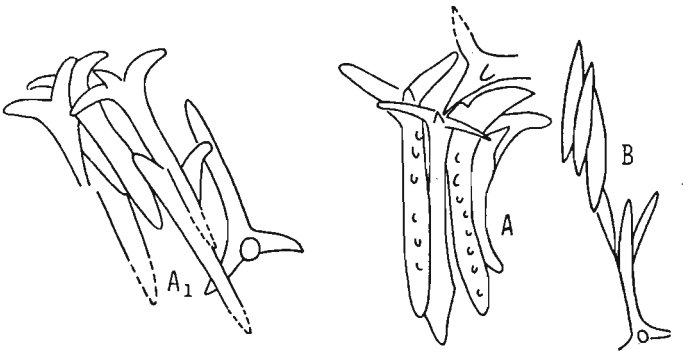


Fig. 32. *Lymnorella globoconica* sp.n. (UŁ Sp VII/14): *A*—*A*$_1$ smooth and ornamentated sagittal tetractines from fibres close to apex, *B* arrangement of diactines; ×85.

ring between the former lays on the surface. Spicules are crowded in the cortex, forming a continuous mass. Apex of the holotype displays traces of loosely spaced tetractines, indicating the existence of dermalia.

Parenchymal skeleton net-like, composed of fibres 0.14—0.175 mm wide and 0.6—0.8 mm long. The fibres comprise thorny and smooth sagittal tetractines with rays 0.32 mm and less numerous diactines. Apical rays of spicules occurring in fibres are facing one another, and facial rays are situated at the joints of the fibres. Thin transversal fibres occurring in subcortical cavities display apparent diactine structure, whereas they actually represent apical rays of tetractines transversally penetrating the cavities.

Comparisons. — The specimens most closely resemble *L. michelini* (d'Orbigny) differing from it and the type species in markedly smaller size, shape, mode of growth, and wider parenchymal fibres.

Occurrence. — Poland: Upper Oxfordian (Wydrzynów).

Order **Thalamida** Laubenfels, 1955 (= **Sphinctozoa** Steinmann, 1882)

The systematic subdivision of this group is based on development of chambers, their arrangement, microstructure of walls, the presence or lack of central tube, and on development of elements infilling the chambers.

Laubenfels (1955) rejected the name Sphinctozoa, originally introduced by Steinmann (1882) for this order, and proposed a new one, Thalamida. In his subdivision of this order in families Laubenfels (1955) partly

followed Steinmann (1882) and Girty (1908). In turn, Seilacher (1961) re-established the name Sphinctozoa.

Representatives of this order are known to occur from the Carboniferous to Cretaceous, being particularly numerous in the Permian and Triassic of the southern Europe and in the Triassic of North America. The sponges are also occasionally found in the Jurassic and Cretaceous. Up to now they were not known from Poland.

Superfamily **Porata** Seilacher, 1961
Family **Cryptocoellidae** Steinmann, 1882
Genus *Sphinctonella* gen. n.

Type species: *Sphinctonella trestiani* sp. n.

Diagnosis. — Thalamida nodular, sometimes encrusting, with fine spongy-vesicular structure, asiphonate. Central tube lacking. Infilling tissue of the tubular type.

This is a monotypic genus, found in Upper Oxfordian limestones at Piechcin near Inowrocław.

Remarks. — The features such as irregular shape of chambers, occurrence of large, irregular, egg-shaped chambers and some smaller ones surrounding the latter, finely-vesicular skeleton separating the chamber, porosity of walls and the lack of central tube are typical of the family Cryptocoeliidae. *Sphinctonella* gen. n. somewhat resembles the genus *Cryptocoelia* Steinmann differing in tubular and not trabecular skeleton infilling chambers. The tubular tissue resembles that of the genus *Polytholosis* Rauff, 1938, of the family Polytholosiidae Seilacher, 1932; the *Sphinctonella* gen. n. differs from the latter genus in the lack of central tube.

Sphinctonella trestiani sp. n.
(Pl. XLI, Fig. 1a—d)

Holotype: UŁ Sp V/2; Pl. XLI, Fig. 1a—d.
Type horizon: Upper Oxfordian.
Type locality: Piechcin near Inowrocław, Kujawy.
Derivation of the name: in honour of Dr. Grigorij Trestian of the Pedagogical Institute at Tiraspol, Moldavian S.S.R.

Diagnosis. — Sponge tuber-like, with fine spongy- vesicular structure, asiphonate, finely porous.

Material. — One complete and 9 fragmentary specimens.

Description. — Sponge irregular in shape, generally block-or plate-like. External surface uneven, with numerous openings. Growth mostly to the sides. Skeletal tissue represented by thin, translucent, mineralized chamber walls, with poorly visible microstructure. In places they bear

traces of small, densely spaced numerous monactines and some triactines. Chambers vesicular, nonuniform in size, sometimes flattened, asiphonate; they may be divided according to size into: a) small, less than 1 mm in diameter, b) medium, 1—3 mm in diameter, and c) large, about 5 mm in diameter. The large chambers represent the principal structural-morphological element and are surrounded by medium-size vesicules. Chambers are polygonal or ovate in cross-section and their arrangement is variable. They are limited by vesicular skeleton, more or less solid and built of fine vesicles. Chambers contact with one another through large openings in their walls or through tubular constriction occasionally found. Osculum and central tube passing through the whole assemblage of chambers are lacking. Walls of chambers are porous, non-layered, 1.5—2 mm thick. Their external surface is smooth and the internal one — uneven. There are two types of pores in the wall: fine, numerous, densely spaced pores leading to vesicular space, and large, markedly less numerous (one or a few), irregularly spaced, variable in size and outline, which link large chambers. The former may be interpreted as incurrent pores (ostia) and the latter — as excurrent pores (postica). The chambers are usually empty, and only a few of them contain fine spherical or tubular elements closely infilling them. The contact of the spherical elements with walls of chambers remains obscure but it appears that these elements were connected with very thin short canals.

Occurrence. — Poland: Upper Oxfordian (Piechcin).

Genus *Cryptocoeliopsis* Wilckens, 1937

Type species: *Cryptocoeliopsis gracilis* Wilckens, 1937.

Diagnosis. — After Seilacher (1961, p. 751).

Cryptocoeliopis tmeticus sp.n.

(Pl. XLI, Fig. 2a—b)

Holotype: UŁ Sp V/11; Pl. XLI, Fig. 2a—b.
Type horizon: Upper Callovian.
Type locality: Ćmielów, eastern margin of the Holy Cross Mts.
Derivation of the name: Gr. *tmetikos* — cutable.

Diagnosis. — Cryptocoeliopsis asiphonate, with chamber arranged one above another. Walls finely porous. Skeleton of chambers reticulate.

Material. — One specimen.

Dimensions (in mm): lenght — 35 mm, width at the apex — 5.5 mm, width at the base — 11.0 mm.

Description. — Sponge conical, irregular, built of low, shield-like elements with smooth surface. Walls fine, nonuniform in thickness, finely po-

rous, with net-like microstructure. Walls are about 0.25 mm thick in external part of element, and 0.04—0.08 mm in the internal part. Pores ovate, hardly visible, 0.032 mm in diameter. Osculum and central cavity (= tube) lacking. Chamber hemispherical shield-like, low, arranged in chains (the catenulate type), wider than high. Canal system obscured. Reticular and locally spherical structures may be noted in the micrite which is infilling at present the chambers. The structures yield randomly crowded skeletal elements which resemble spicules of the monactine and triactine types. Fine pores arranged in rings may be noted in depressions in lateral walls of chambers. They presumably represent incurrent pores. In turn, pores smaller than the former, occurring in the top part of internal surface of chambers, may represent excurrent pores.

Growth of individual. The specimen studied consists of 14 shield-like chambers becomin progressively narrower towards the top. The basal chamber differs from the remaining ones in arrangement of inter-chamber skeleton. The skeletal tissue is folded and sometimes almost horizontal oriented. About 6 growth zones were found. The successive chambers are characterized by uniform internal structure, height and shape.

Comparisons. — The external morphology and reticular structure of skeleton infilling the chambers make it possible to assign this specimen to the genus *Cryptocoeliopsis* Wilckens, 1937. Dimensions and arrangement of chambers differ it from the only species of this genus, *C. gracilis* Wilckens known from the Upper Triassic.

Occurrence. — Poland: Upper Callovian (Przepaść near Ćmielów).

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HELENA HURCEWICZ

JURAJSKIE CALCISPONGEA Z POLSKI

Streszczenie

Praca niniejsza dotyczy morfologii zewnętrznej mikrostruktury szkieletu, rozwoju i zmienności 37 gatunków z rzędu Pharetronida oraz 2 gatunków z rzędu Thalamida. Opisane gąbki pochodzą przede wszystkim z jury Krakowsko-Wieluńskiej i Kujaw. Zostały one zebrane przez autorkę i uzupełnione materiałami otrzymanymi z Muzeum Zakładu Nauk Geologicznych P.A.N. w Krakowie, od prof. W. Kracha. W większości okazy pochodzą z wapieni oksfordu górnego (Tabela I). Cały zbadany zespół Calcispongea swym składem rodzajowym i gatunkowym zbliżony jest do rauracki ego zespołu Szwajcarii i Anglii południowo wschodniej. Wspólne gatunki z rauraku Szwajcarii to: *Corynella quenstedti, C. stellifera, Peronidella cylindrica, P. floriceps, Eudea perforta, Holcospongia glomerata* i *H. polita*. Niektóre rodzaje i gatunki znane są także na terenie ZSRR: (Krym), Czechosłowacji, RFN i Anglii.

Zasięg stratygraficzny niektórych gatunków jest ograniczony wyłącznie do oksfordu górnego, np. *Corynella quenstedti, Eudea perforata* i *Peronidella cylindrica*. Szerszy pionowy zasięg miały *P. pistilliformis, H. polita,* znane z keloweju i starszego oksfordu Polski i innych obszarów. Najszerszy zasięg stratygraficzny wykazują *Holcospongia glomerata* i *Lymnorella inclusa,* znane zarówno z keloweju jak i oksfordu i kimerydu. Najliczniej w Polsce reprezentowana jest rodzina Lelapiidae, rozwinięta w g. oksfordzie (12 gatunków). Szczególną uwagę zwraca dość duże zróżnicowanie gatunkowe rodzajów *Corynella* (5 gatunków), *Peronidella* (9 gatunków), *Holcospongia* (5 gatunków) oraz *Myrmecium* (4 gatunki).

Dużą zmienność zauważono wśród *Corynella quenstedti*, którego osobniki różnią się między sobą uformowaniem ścianek. U *Eudea perforata* i *Myrmecium* Goldfuss z g. oksfordu obserwuje się duże zróżnicowanie kształtu od postaci krępych przez wysmukłe do cylindrycznogałązkowych. U *M. hemisphaericum* występuje pogrubianie się ścianek pomiędzy przewężeniami. W kolonijnym skupieniu osobników tego gatunku przeważają fazy dojrzałe ale młodociane i starcze są również obecne.

Osobne zagadnienie w ramach wstępnych badań gąbek wapiennych stanowi analiza zespołu cech pozwalających na wyróżnienie gatunków i rodzajów.

Cechy rodzajowe są następujące: sposób wykształcenia systemu wodnego, charakter sieci głównej szkieletu, jej gęstość i kierunek układu pasm. Cechy gatunkowe są następujące: kształt i wymiary osobnika, kształt apeksu, obecność swoistego korteksu, szkieletu dermalnego, ułożenie i wymiary porów i bruzdek.

Badania cienkich szlifów, zwłaszcza podłużnego przekroju, ujawniły, że końce promieni spikul przeważnie są ostro zakończone i wyraźnie widoczne w szlifach. Świadczy to, że u tych gąbek za życia pasma szkieletowe były utworzone ze spikul wzajemnie nakładających się promieniami lub sklejonych mezogleą a nie cementem wapiennym. Zwrócono uwagę na obecność spikul ornamentowych obok gładkich (Tekst-fig. 4—5).

Szczegółowe badania mikrostruktury w dobrze zachowanych okazach stały się podstawą przeklasyfikowania niektórych rodzajów. Rodzaj *Corynella*, ze względu na skład i rozmieszczenie spikul, podobne do rodzaju *Lelapia*, został zaliczony zgodnie z Laubenfelsem do Lelapiidae. Autor sądzi, że *Enaulofungia* i *Holcospongia* są to dwa odrębne rodzaje prawie homomorficznej postaci różniące się składem spikulacji i budową szkieletu.

ХЕЛЕНА ХУРЦЕВИЧ

ЮРСКИЕ CALCISPONGEA ИЗ ПОЛЬШИ

Резюме

Настоящая работа посвящена морфологии внешней микроструктуры скелета и эволюции 37 видов отряда Pharetronida и 2 видов отряда Thalamida. Описаные губки были собраны автором главным образом на площади Краковско-Велюнь-

ской Юры и в Куявии и дополнены материалами, полученными от проф. В. Краха из Музея Института Геологических Наук П.А.Н. в Кракове. Подавляющее число экземпляров добыто из известняков верхнего оксфорда (табл. 1) Весь изученный комплекс Calcispongea по своему родовому и видовому составу сходен с ронакским сообществом Швейцарии и Юго-Восточной Англии. К общим видам с ронаком Швейцарии относятся: *Corynella quenstedti*, *C. stellifera*, *Peronidella cylindrica*, *P. floriceps*, *Eudea perforata*, *Holcospongia glomerata*, *H. polita*. Некоторые роды и виды встречаются в Крыму (СССР), Чехословакии, Германии и Англии.

Стратиграфическое распространение некоторых видов четко ограничено верхним оксфордом. К таким видам относятся, например, *Corynella quenstedti*, *Eudea perforata* и *Peronidella cylindrica*. Более широким интервалом вертикального распространения характеризуются *P. pistilliformis* и *H. polita*, встречающиеся в келловее с нижнем оксфорде Польши и других стран. Самым широким интервалом стратиграфического распространения обладают *Holcospongia glomerata* и *Lymnorella inclusa*, наблюдающиеся в келловее, оксфорде и кимеридже. Наиболее разнообразным составом на территории Польши отличается семейство Lelapiidae, представленное в верхнем оксфорде (12 видов). Следует отметить довольно разнообразный видовой состав родов *Corynella* (5 видов), *Peronidella* (9 видов), *Holcospongia* (5 видов) и *Myrmecium* (4 вида).

Большие различия наблюдались среди *Corynella quenstedti* особи которых отличаются друг от друга строением стенок. *Eudea perforata* и *Myrmecium* Goldfuss из верхнего оксфорда характеризуются весьма разнообразными формами — утолщенными, вытянутыми, ветвисто-цилиндрическими и др. У *M. hemisphaericum* наблюдается утолщение стенок между пережимами. В колониальном скоплении особей этого вида преобладают зрелые фазы, однако присутствуют также юные и старческие стадии.

Отдельный вопрос в предварительном изучении известковых губок преставлял анализ комплекса характерных признаков, позволявших определять виды и роды.

К родовым признакам относятся следующие: вид строения ирригационной системы, характер главной системы скелета, густота системы, ориентировка полос. Видовые признаки следуюище: форма и величина особи, форма апекса, наличие своеобразного кортекса, дермального скелета, расположение и размеры пор и бороздок.

В прозрачных шлифах, особенно продольного сечения, наблюдалось, что лучи спикул обладают четко выраженными заостренными концами. Отсюда следует, что при жизни этих губок скелетные полосы состояли из спикул, перекрывающих друг друга лучами, или склеенных мезоглеей, но не известковым цементом. Наряду с гладкими спикулами наблюдались орнаментные спикулы (фиг. 4—5).

Детальное изучение микроструктуры особей с хорошей сохранностью дало основу для изменения классификации некоторых родов. Род *Corynella* на основании состава и расположения спикул, сходных с родом *Lelapia*, был зачислен

к Lelapiidae, согласно взгляду Лаубенфельса. Автор предполагает, что *Enaulofungia* и *Holcospongia* представляют два разных рода почти гомоморфного вида. отличающиеся составом спикул и строением скелета.

EXPLANATION OF PLATES

Plate XXIX

Fig. 1. *?Peronidella* sp., specimen UŁ Sp VII/176: long-rayed ornamented triactines of cortex, ×45.
Fig. 2. *Corynella quenstedti polonica* subsp. n, specimen UŁ Sp VII/45: short-rayed ornamented triactions of cortex, ×45.
Fig. 3. *Peronidella proramosa* sp.n., specimen UŁ Sp VII/136: smooth triactines of cortex, ×45.
Fig. 4. *Sestrostomella wartae* sp.n., specimen UŁ Sp VII/16/33: thin section of fragment of parenchymal skeleton; note endings and ornamentation of rays and close spacing of spicules; ×375.
Fig. 5. *Holcospongia koltuni* sp.n., specimen UŁ Sp VII/300: thin section of fragment of parenchymal skeleton; note endings of spicules and their ornamentation; the endings closely adjoining but not overgrowing with one another; ×190.

Plate XXX

Fig. 1. *Myrmecium cylindricum* Siemiradzki, specimen UŁ Sp VII/56: *a*—*b* thin sections of parenchymal skeleton, outlines of ornamented sagittal spicules visible (*a*); *a* ×95, *b* ×190.
Fig. 2. *Lymnorella ramosa* Hinde, specimen UŁ Sp VII/334: thin section through fragment of parenchymal skeleton; note large triactines with sharp-pointed rays and ornamented surface and diactines; ×95.

Plate XXXI

Fig. 1. *Peronidella floriceps* (Etallon), specimen UŁ Sp VII/179: thin section through fragment of: *a* cortex, *b* parenchymal skeleton with distinct outline of spicules; ×95.
Fig. 2. *Peronidella pistilliformis preocelata* subsp.n., specimen UŁ Sp VII/46/122: thin section through fragment of parenchymal skeleton; note arrangement of sagittal spicules; ×95.

Plate XXXII

Fig. 1. *Corynella quenstedti polonica* subsp.n., specimen UŁ Sp VII/606: thin section through fragment of parenchymal skeleton; note arrangement of triactines; ×95.

Fig. 2. *Corynella nodosa* Oppliger, specimen UŁ Sp VII/74: thin section through fragment of parenchymal skeleton; ×190.
Fig. 3. *Blastinia bulbosa* sp.n., specimen UŁ Sp VII/320: thin section through fragment of parenchymal skeleton; note ornamentation of spicules; ×95.

Plate XXXIII

Fig. 1. *Blastinia bulbosa* sp.n, specimen UŁ Sp VII/319: longitudinal section displaying pattern of canals of water system; ×8.
Fig. 2. *Sestrostomella wartae* sp.n., specimen UŁ Sp VII/16/33: longitudinal section showing course of apochetes; ×8.
Fig. 3. *Lymnorella ramosa* Hinde, specimen UŁ Sp VII/334: longitudinal section; note the lack of distinct water canals in water system; ×8.

Plate XXXIV

Fig. 1. *Myrmecium cylindricum* Siemiradzki, specimen UŁ Sp VII/56: longitudinal section showing vertical course of apochetes; ×8.
Fig. 2. *Myrmecium indutum* (Quenstedt), specimen UŁ Sp. VII/55: longitudinal section showing pattern of canals of water system; ×8.
Fig. 3. *Myrmecium hemisphaericum* Goldfuss, specimen UŁ Sp VII/190: longitudinal section showing pattern of canals of water system; ×8.
Fig. 4. *Oculospongia protubulifera* sp.n., specimen UŁ Sp VII/186: thin section showing ornamentation of surface of triactines; ×375.
Fig. 5. *Oculospongia kielanae* sp.n., specimen UŁ Sp VII/183: longitudinal section showing pattern of canals of water system; ×8.

Plate XXXV

Fig. 1. *Corynella clava* Oppliger, specimen UŁ Sp VII/61: longitudinal section showing Leucon-type water system and passing by paragaster; ×8.
Fig. 2. *Holcospongia glomerata* (Quenstedt), specimen UŁ Sp VII/322: longitudinal section showing radial pattern of skeleton fibres and canals; ×8.
Fig. 3. *Holcospongia pyrula* sp.n., specimen UŁ Sp VII/67: longitudinal section showing excurrent cavities, curved excurrent canals and the lack of paragaster; ×8.
Fig. 4. *Holcospongia* sp., specimen UŁ Sp VII/227; longitudinal section; ×2.
Fig. 5. *Holcospongia koltuni* sp.n., specimen UŁ Sp VII/300: longitudinal section showing pattern of canals of water system; ×8.

Plate XXXVI

Fig. 1. *Corynella quenstedti polonica* subsp.n., specimen UŁ VII/606: axial section of the sponge; note irregular course of excurrent canals; ×8.
Fig. 2. *Corynella nodosa* Oppliger, specimen UŁ Sp VII/74: longitudinal section passing by paragaster; note growth zones; ×8.
Fig. 3. *Corynella cribrata* Hinde, specimen UŁ Sp VII/49*a*: fragment of axial section of the sponge; ×8.

Fig. 4. *Peronidella tenuis mira* subsp.n., specimen UŁ Sp VII/170/1: longitudinal section passing by paragaster; ×8.

Plate XXXVII

Fig. 1. *Peronidella pistilliformis* (Lamouroux), specimen UŁ Sp. VII/116: vertical section along sponge axis; note growth zones; ×8.

Fig. 2. *Peronidella proramosa* sp. n., specimen UŁ Sp VII/142: longitudinal section through paragaster; ×8.

Fig. 3. *Peronidella floriceps* (Etallon), specimen UŁ Sp VII/179; longitudinal section showing wide paragaster; ×8.

Figs 4, 5. *Sestrostomella wartae* sp.n., holotype, UŁ Sp VII/34, and specimen UŁ Sp VII/37: various morphotypes; ×4 and ×5, respectively.

Figs 6, 7. *Myrmecium hemisphaericum* Goldfuss, specimens UŁ Sp VII/196, 199: *6* slender form, *7* conical from; ×2.

Fig. 8. *Elasmostoma patelliformis* sp.n., specimen UŁ Sp VII/41 — holotype: *a* excurrent side, *b* incurrent side; ×2.

Figs 9—11. *Blastinia bulbosa* sp.n., holotype, UŁ Sp VII/314 and specimens UŁ Sp VII/316, 317; Fig. *11* shows broken surface of the specimen; ×2.

Fig. 12. *Diaplectia auricula* Hinde, specimen UŁ Sp VII/348; ×2.

Plate XXXVIII

Fig. 1. *Myrmecium hemisphaericum* Goldfuss, specimen UŁ Sp VII/192: stout form, *a* view from above, *b* side view; ×2. Other morphotypes are shown in Pl. XXXVII, Figs 6—7.

Figs 2, 3. *Myrmecium pyramidum* sp.n., holotype UŁ Sp VII/272 and specimen UŁ Sp VII/274: *2a-b* side view, *2c* apex with osculum and postica, *3* single specimen: ×2.

Figs 4—6. *Myrmecium cylindricum* Siemiradzki, specimens UŁ Sp VII/229, 227, 239; ×2.

Figs 7, 8. *Myrmecium indutum* (Quenstedt), specimens UŁ Sp VII/214, 222; *7* note wide postica; ×2.

Figs 9, 10. *Holcospongia polita* Hinde, specimens UŁ Sp VII/283; ×2.

Fig. 11. *Holcospongia koltuni* sp. n., specimen UŁ Sp VII/297 — holotype: *a-b*, view from above and side view, respectively; ×2.

Fig. 12. *Holcospongia pyrula* sp.n., specimen UŁ Sp VII/307 — holotype: note cortex in basal part; ×2.

Figs 13, 14. *Holcospongia glomerata* (Quenstedt), specimens UŁ Sp VII/322,: *13* — note radial furrows, on the right — opening at the place where the sponge overgrows an object; ×2.

Fig. 15. *Corynella langtonensis* Hinde, specimen UŁ Sp VII/350; colonial cluster of individuals; note oscula and excurrent furrows; ×2.

Plate XXXIX

Figs 1, 8, 9. *Corynella clava* Opplinger, specimens UŁ Sp VII/106, 103, 102: morphotypes; ×2.

Figs 2—4, 7. *Corynella cribrata* Hinde, specimens UŁ Sp VII/82, 88, 78, 86; cortex from basal part of sponge is shown in Figs 2—3; Fig. 7 shows a broken specimen with visible paragaster; ×2.

Figs 5, 6, 17. *Corynella quenstedti polonica* subsp.n., specimens UŁ Sp VII/44, 45 — holotype, and 48; *6a-b*, view from above and side view; ×2.

Fig. 10. *Eusiphonella bronni* Muenster, specimen UŁ Sp VII/278: *a* and *b* — view from above and side view; ×2.

Figs 11, 12, 20. *Corynella nodosa* Opplinger, specimens UŁ Sp VII/77b, 68, 70; ×2.

Figs 13, 14. *Lymnorella ramosa* Hinde, specimens UŁ Sp VII/330, 333: note the range of differences in size; ×2.

Figs 15, 16. *Lymnorella globoconica* sp.n., specimens UŁ Sp VII/342 and 343 — holotype; *15a-b* view from above and view; *16* side view on the holotype; ×2.

Figs 18, 19. *Lymnorella* aff. *inclusa* Hinde, specimens UŁ Sp VII/337, 339; ×2.

Fig. 21. *Corynella stellifera* Fromentel, specimen UŁ Sp VII/107; ×2.

Plate XL

Fig. 1. *Oculospongia kielanae* sp.n., specimen UŁ Sp VII/180 — holotype: *a* view from osculum side, *b* view from attachment side; ×2.

Fig. 2. *Oculospongia protubulifera* sp.n., specimen UŁ Sp VII/184 — holotype: *a-b* view from above and side view: ×2.

Fig. 3. *Peronidella tenuis mira* subsp.n., specimen UŁ Sp VII/170 — holotype: *a-b* view from above and side view; ×2.

Fig. 4. *?Peronidella* sp., specimen UŁ Sp VII/179; ×2.

Figs 5—7. *Peronidella proramosa* sp.n., specimens UŁ Sp VII/133, 139, and 131 — holotype; ×2.

Figs 8, 9. *Peronidella profurcata* sp.n., specimens UŁ Sp VII/150 — holotype and 162; ×2.

Figs 10—12. *Peronidella pistilliformis preocelata* subsp.n., specimens UŁ Sp VII/119 — holotype, 125: *11a-b* view from osculum side and side view; ×2.

Figs 13, 16. *Peronidella floriceps* (Etallon), specimens UŁ Sp VII/178, 173; *13a* damaged specimen seen from above, *13b* postica from paragaster walls, *16* the largest specimen from the collection; ×2.

Fig. 14. *Peronidella cylindrica* (Goldfuss), specimen UŁ Sp VII/150; specimen with damaged obliterated surface, *a* transversal section, *b* side view; ×2.

Fig. 15. *Peronidella metabronni* Sollas, specimen UŁ Sp VII/153; ×2.

Plate XLI

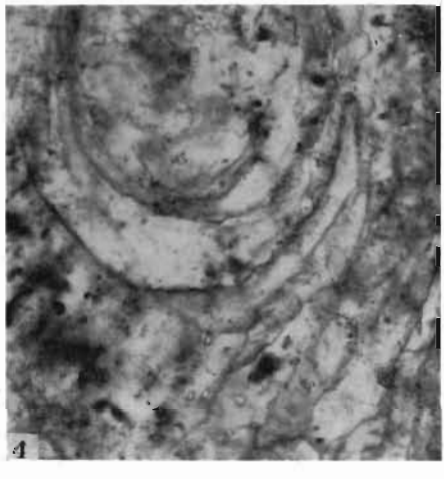
Fig. 1. *Sphinctonella trestiani* gen. et sp.n., specimen UŁ Sp VII/2 — holotype; *a* broken surface showing chambers, ×2; *b* the same view, ×8; *c* chamber with elements infilling it, ×20; *d* thin section showing chambers, ×12.

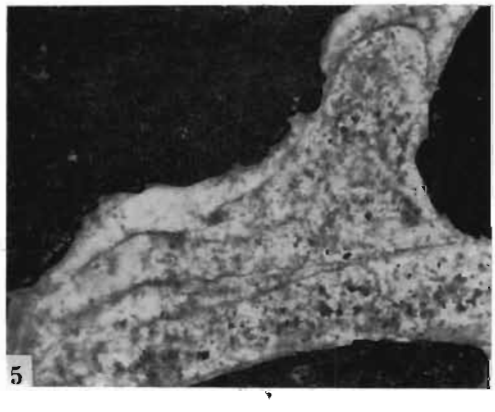
Fig. 2. *Cryptocoeliopsis tmeticus* sp. n., specimen UŁ Sp VII/11: *a* eight chambers arranged one above another, ×3, *b* longitudinal section through axial part of the sponge, ×3.6.


1


2


3


4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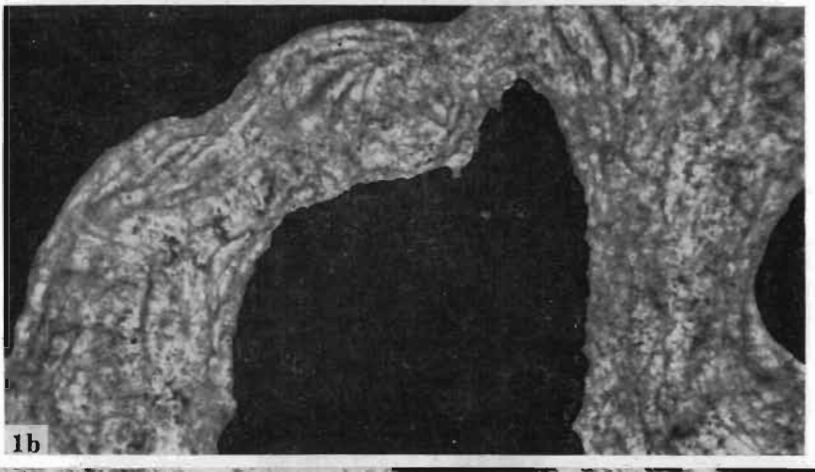
1a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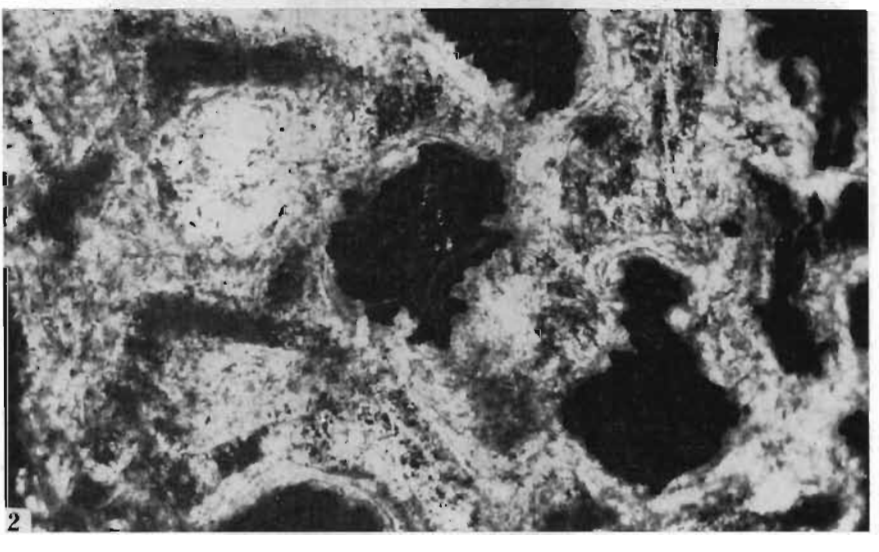
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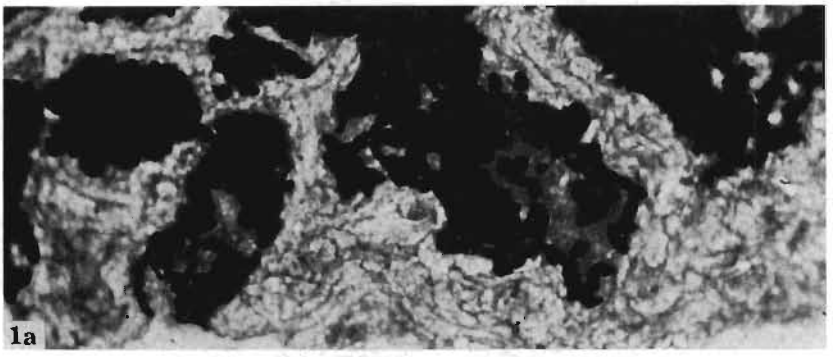
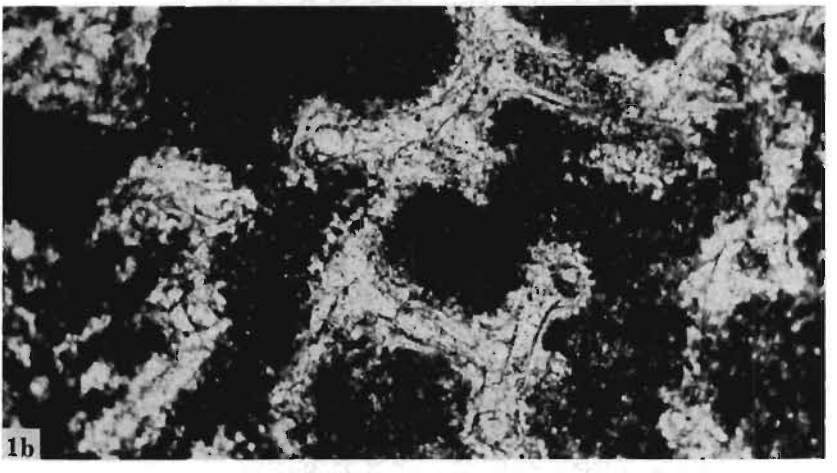
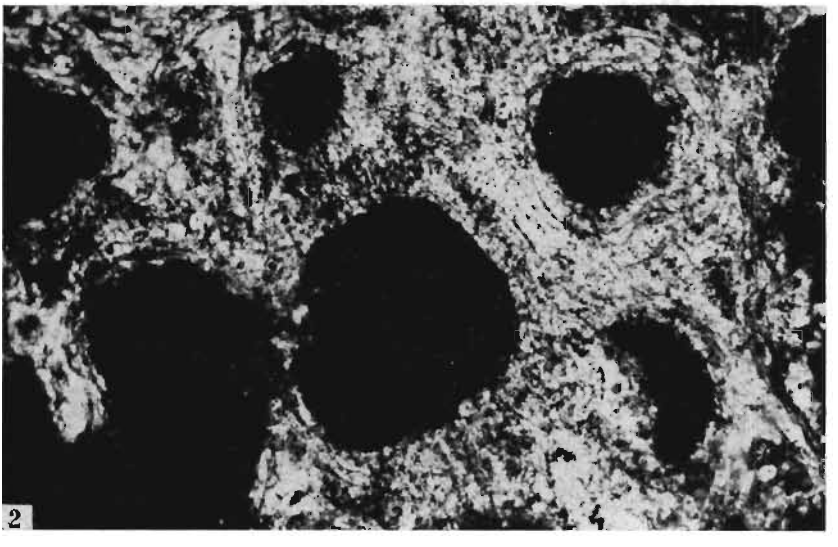
Phot. *L. Łuszczewska*







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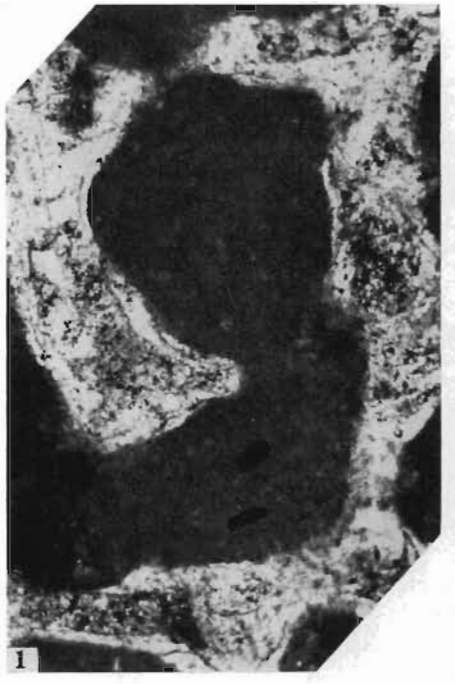
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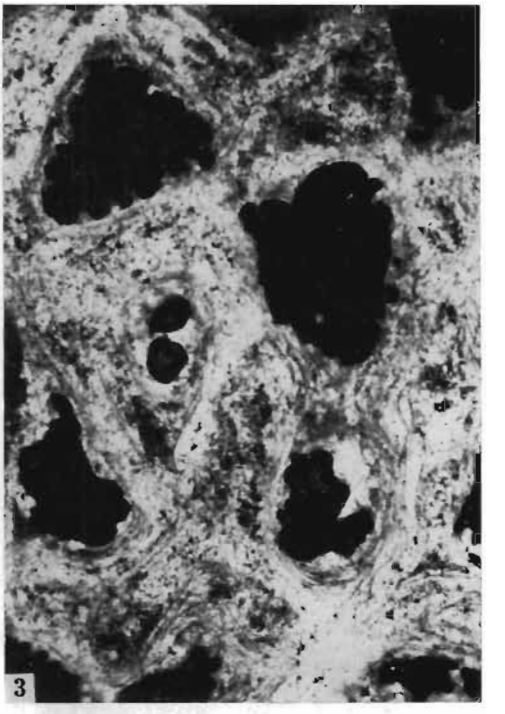
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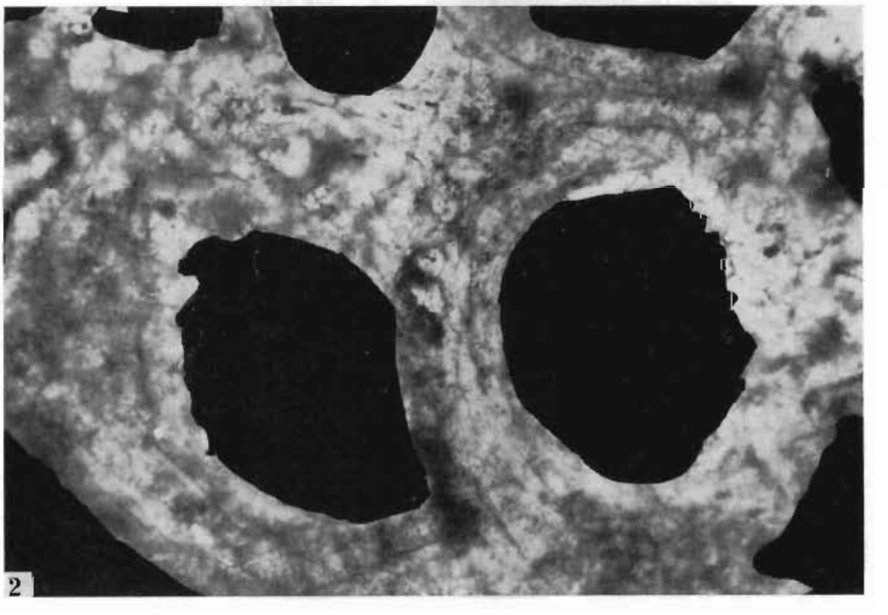
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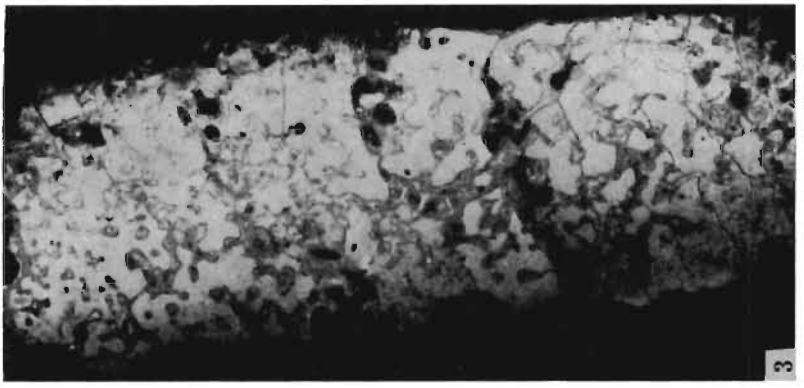

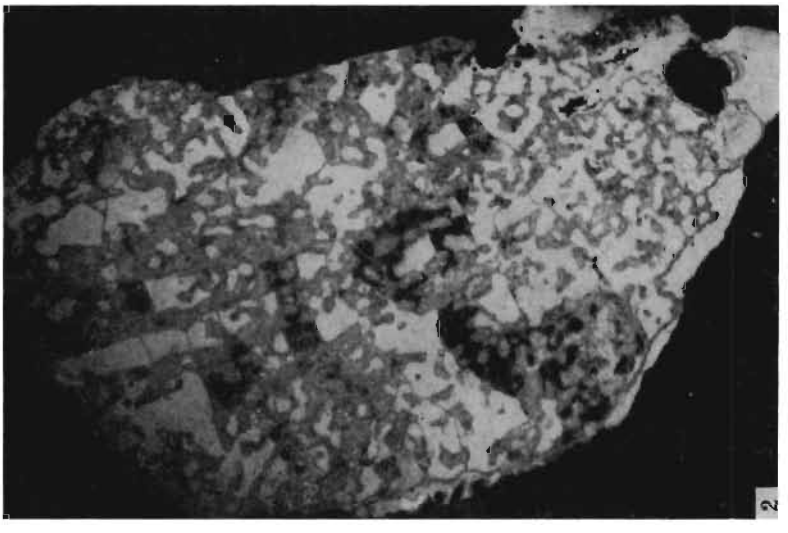

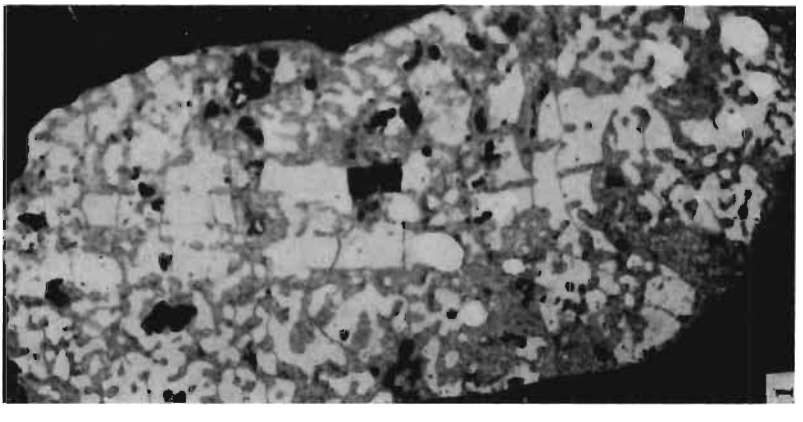

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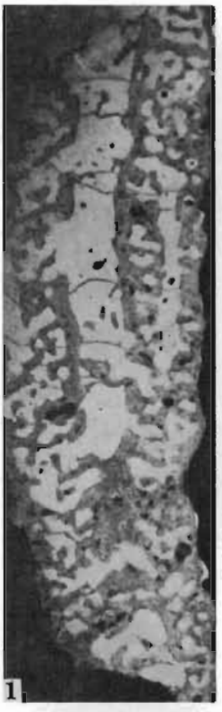
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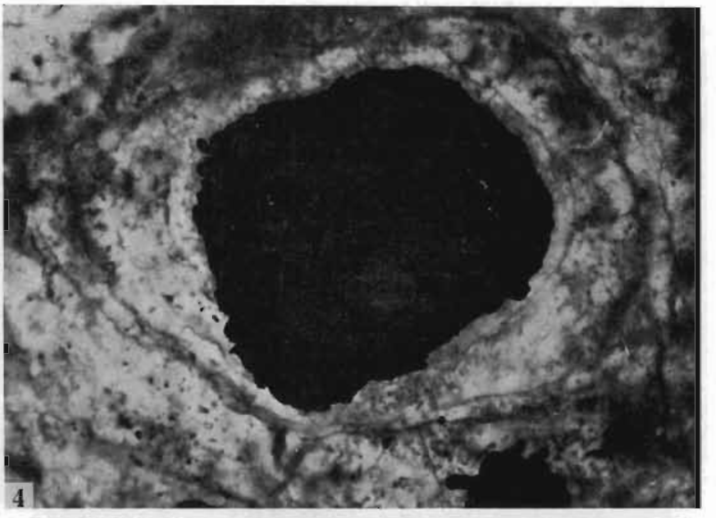
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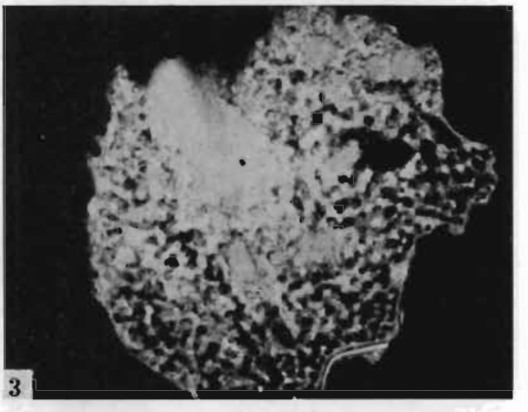
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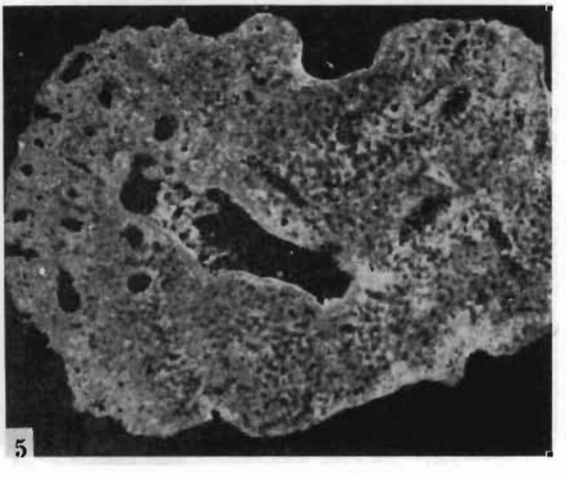
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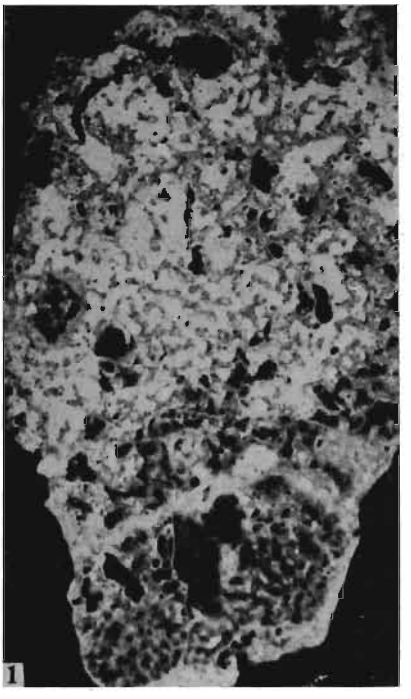
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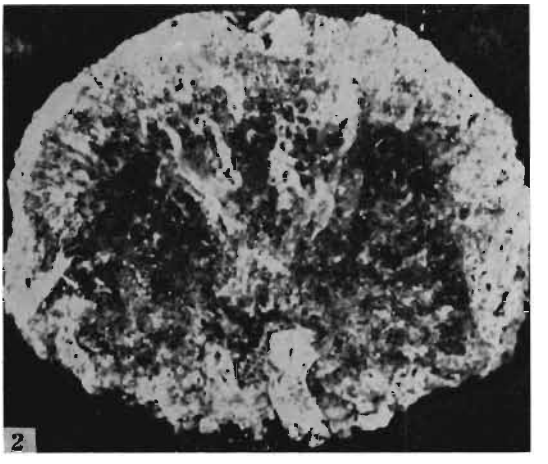
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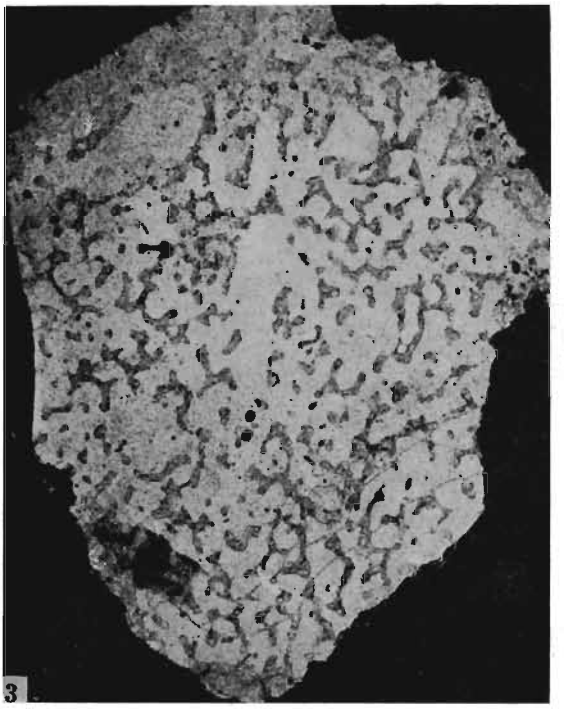
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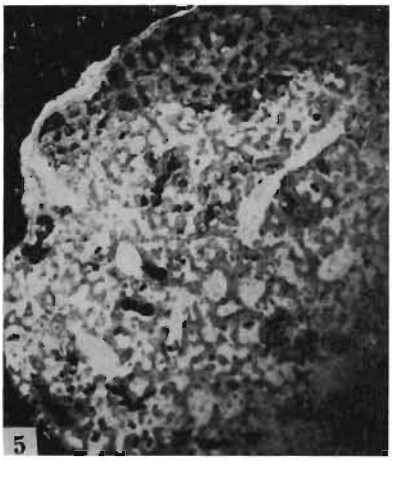
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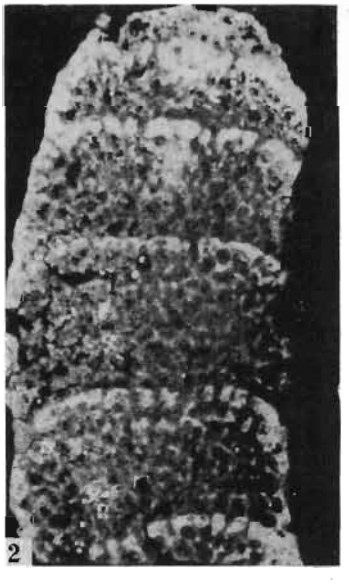
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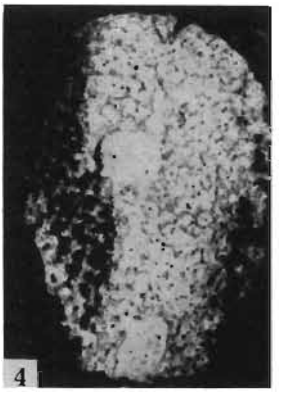
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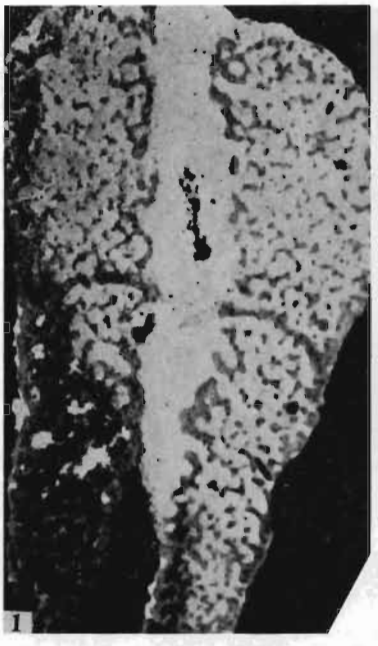
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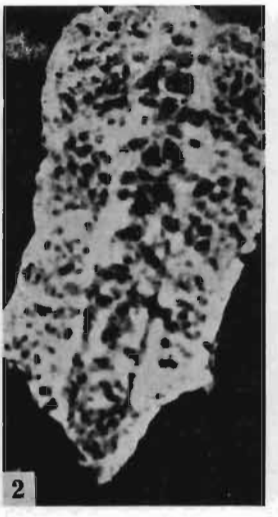
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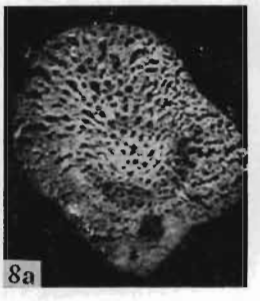
4


5


6


3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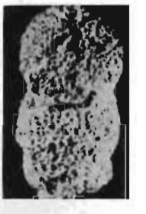
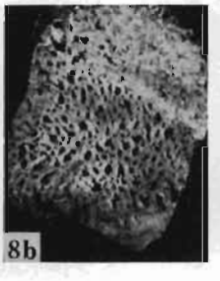
7

10

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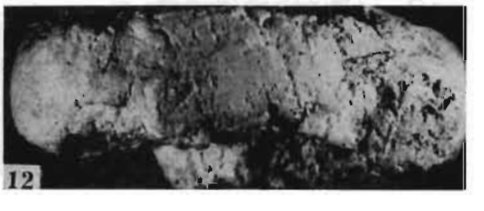
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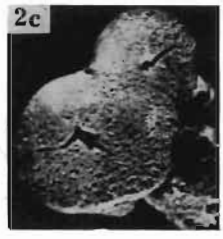
Phot. *L. Jędrasik*


1a


2a


2b


2c


1b


4


5


6

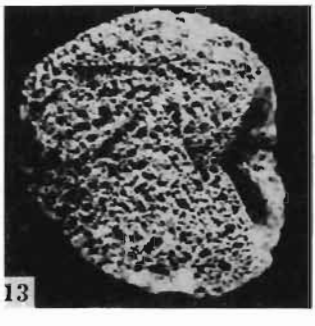

7


8


3


11a


9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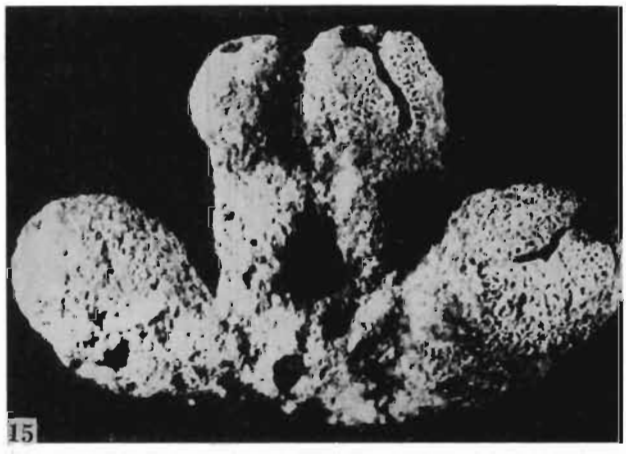
12


11b


10


14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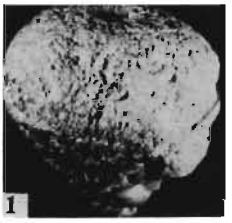
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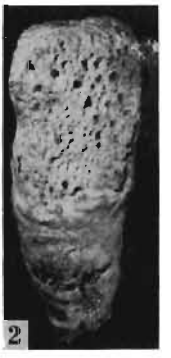
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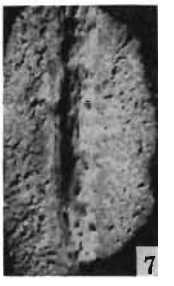
3


4


5


6a


6b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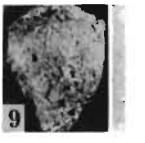
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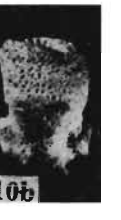
14


13


12


11


10a


10b


15a


15b

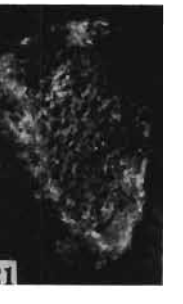

17


16


18


19


20


21

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1a


1b


2a


2b


14a


3a


3b


13a


13b

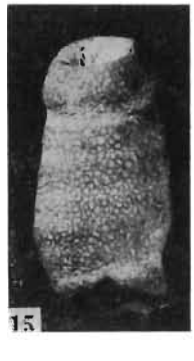

14b


4


10


11a


11b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8


9


6

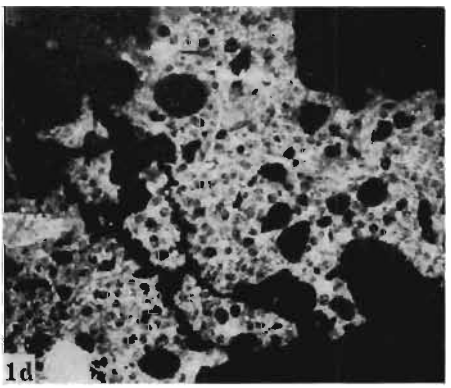

7


12


16

Phot. *L. Jędrasik*


1a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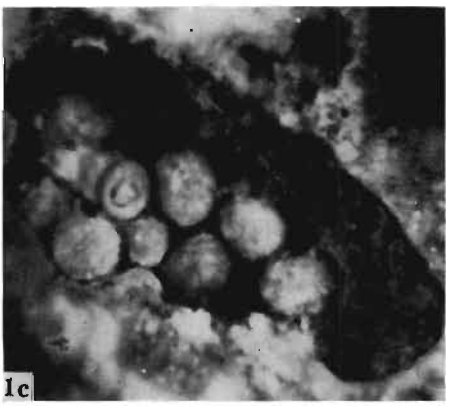
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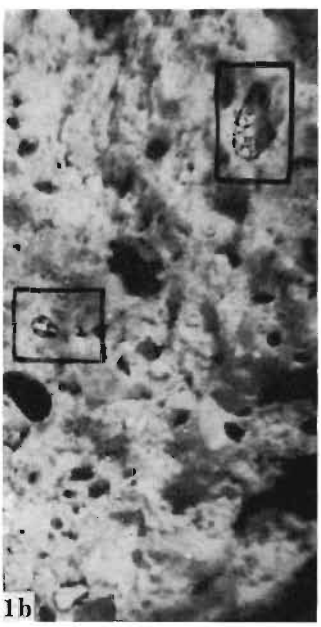
1b


2a


2b

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