ACTA PALAEONTOLOGICA POLONICA
Vol. XV 1970 No. 4

ANNA STASIŃSKA

SOME UPPER SILURIAN TABULATA FROM ŁĘŻYCE-BEŁCZ SECTION (HOLY CROSS MTS.)

Abstract. — Four species of the Tabulata, belonging to four genera, have been described and the development of a colony in the *Syringopora* traced. The assemblage under study confirms Upper Silurian age of lower Rzepin Beds in Łężyce-Bełcz section. Faunal and facial characteristics of the profile have been presented.

INTRODUCTION

The Upper Silesian deposits have first been found in Łężyce-Bełcz section by Samsonowicz (1934), who, on the basis of brachiopods occurring in this section determined the age of these beds as the Upper Ludlovian. In the area of the Holy Cross Mts., the Ludlovian deposits are represented (Czarnocki. 1919, 1936, 1957), in the lower part, by argillaceous lithofacies with graptolites and, in the upper part, by greywacke-clayey deposits. Czarnocki (1936, 1957) separated the siltstone greywacke deposits as Wydryszów Beds and the overlaying silty clayey deposits with intercalations of greywackes, limestones and sandstones — as Rzepin Beds.

The deposits of the Rzepin Beds outcrop in Łężyce-Bełcz section, situated about 7 km north-west of Opatów. In 1956–1957, a very rich fauna was collected by Dr. E. Tomczykowa (Geological Institute, Warszawa), who described it in her papers published 1960, 1961 and 1962. On the basis of brachiopods and trilobites she assigned the series of the deposits mentioned above to lower Rzepin Beds, corresponding to the Upper Silurian (H. Tomczyk, 1970).

The Rugosa from Łężyce-Bełcz section have been described by Różkowska (1962) who found in these beds the Upper Silurian species, mostly the representatives of the *Pilophyllum keyserlingi* Wedekind zone which was distinguished in 1927 by Wedekind for a species occurring in the Silurian of the Island of Gotland. Różkowska found that the species of Rugosa,

occurring in Łężyce-Bełcz section were similar to those from the Island of Gotland as well as, to a certain extent, to the species from the Skala stage in Podolia (U. S. R. R.).

The Tabulata, described in the present paper, and a single representative of the Stromatoporoidea — *Stromatopora cortesi* Nicholson, known from the Ludlovian of Estonia and the Island of Gotland, determined by J. Kaźmierczak (Palaeozoological Institute, Polish Academy of Sciences, Warszawa) from Łężyce-Bełcz section, also indicate the Upper Silurian age.

The collection of corals from Łężyce-Bełcz section has been turned over to the present writer for elaboration by Dr. E. Tomczykowa for which the writer's heartfelt thanks are extended to her.

The writer also feels indebted to Miss M. Czarnocka and Mrs M. Nowińska (both from the Palaeozoological Institute, Warszawa), who took photographs and prepared thin sections.

The work has been prepared at the Palaeozoological Institute, Polish Academy of Sciences in Warszawa (abbr. Z. Pal.) where the collection described is housed.

Faunal and facial characteristics of Łężyce-Bełcz section

In the area of the Holy Cross Mts. the marine basin receded north after the period of the synorogenic movements of the Cracovian phase. This was accompanied by the formation of near-shore deposits, which now outcrop in Łężyce-Bełcz section. A series of these deposits, overlaying Wydryszów Beds (developed in the form of greywackes) displays a considerable lithological differentiation and contains a rich fauna, composed mostly of such benthonic organisms as, brachiopods, trilobites, ostracods, corals, stromatopores, bryozoans and crinoids, as well as calcareous algae.

The oldest deposits, assigned to Rzepin Beds, make up a clayey series with few pelecypods and brachiopods. This series is overlaid by deposits with sandy and mudstone-calcareous intercalations and a rather poor fauna of brachiopods.

Detritic, marly limestones, pink and brown in colour, here and there oölitic, make up a younger series of deposits. An abundant fauna of these beds contains brachiopods, trilobites, pelecypods, corals, bryozoans, ostracods, crinoids and very numerous calcareous algae.

Marly claystones with an analogous fauna appear above detritic limestones. In overlaying beds, fauna becomes poorer and poorer, while the amount of detritus increases.

In the next outcrop, situated further north, there occur claystones with sandy-marly intercalations containing pelecypods and brachiopods and, higher up, detritic-marly limestones with many corals, bryozoans and calcareous algae.

Boreholes, situated to the north in the extension of the outcrop referred to above, pierce marly-sandy deposits of the same age or somewhat younger which contain a poor fauna of brachiopods, pelecypods and corals.

A rich fauna or detritic limestones consists, in Łężyce-Bełcz section, of benthonic organisms such as, corals, bryozoans and crinoids, brachiopods, pelecypods and trilobites.

The fauna of corals, occurring in this locality arrived probably from the north and developed only in the Ludlovian when conditions were formed favourable to its development and which resulted from the shallow-water zone connected with the coastal line and hard ground. This accumulation of fauna is an evidence for the proximity of a zone of the waves activity and, therefore, a considerable role is played in limestone by the detritic material formed by crushing colonial organisms and accompanying biocoenosis. It seems that the detritus was formed of dead skeletons and shells which occupied a gradually shallowing zone. On the other hand, the proper biocoenosis consists of delicate skeletons of corals and bryozoans which are undoubtedly preserved in situ (no traces of transportation and damage). This fauna settled on the shallow-water slope, in the vicinity of the zone of waving, which is indicated by the presence of oölites. A shallow-water environment is also indicated by a great abundance of various calcareous algae, occurring in the form of sphaerical accumulations and sometimes, surrounding coral skeletons (Pl. II, Fig. 2*a*, *b*). This zone was undoubtedly a gradually raising area, which is testified to by great quantities of detritus surpassing the amount of living organisms as is the case in Recent reefs, distributed in the areas of elevations (e.g., reefs of the Island of Hainan). In the lowering areas, reefs contain considerably more living organisms than detritus.

Despite of its considerable accumulation, the fauna from Łężyce-Bełcz section, does not form a reef but only its incipient stage. A further development of reef-forming organisms was probably interrupted in connection with a gradual shallowing of the marine basin, for in overlaying deposits, fauna is most frequently preserved in the form of detritus.

DESCRIPTIONS

Order **Favositida** Sokolov, 1962
Suborder **Favositina** Sokolov, 1950
Family **Favositidae** Dana, 1846
Subfamily **Favositinae** Sokolov, 1950
Genus *Mesofavosites* Sokolov, 1951
Mesofavosites imbellis Klaamann, 1961
(Pl. I, Fig. 1 *a*, *b*)

1961. *Mesofavosites imbellis* Klaamann; E. R. Klaamann, Tabuljaty..., pp. 80–81, Pl. 7, Figs. 4–5.

1964. *Mesofavosites imbellis* Klaamann; E. R. Klaamann, Pozdneordovikskie..., p. 58, Pl. 15, Figs. 7–8.

1964. *Mesofavosites imbellis* Klaamann; A. Stasińska, Tabulata..., pp. 76–77, Pl. 20, Figs. 5, 8.

Material. — Twenty-four fragmentary colonies, ten thin sections.

Description. — Colonies hemispherical, the largest of them 13 cm wide and 7 cm high. Corallites polygonal in transverse section. 1.0–1.3, rarely 1.4 mm in diameter. Walls 0.1–0.15 mm thick, here and there slightly undulating. Mural and, rarely occurring, angular pores 0.15, sometimes 0.2 mm in diameter. Tabulae horizontal, not uniform, spaced at 0.3–0.5 and 0.6–1.0 mm. Septal spines numerous, strongly developed, directed slightly upwards.

Occurrence. — Poland: Holy Cross Mts., Łężyce-Bełcz, Upper Silurian; erratic boulders. Norway; Limåstangen, Ringerike, Llandoverian, series 7. U. S. S. R.: Estonia, Wenlockian, upper part of Jaani stage.

Genus *Favosites* Lamarck, 1816

Favosites pseudoforbesi pseudoforbesi, Sokolov, 1952

(Pl. I, Fig. 2*a*, *b*)

1952. *Favosites pseudoforbesi* Sokolov; B. S. Sokolov, Tabuljaty..., pp. 50–51, Pl. 19, Figs. 1–4.

1962. *Favosites pseudoforbesi pseudoforbesi* Sokolov; E. R. Klaamann, Tabuljaty..., pp. 38–40, Pl. 7, Figs. 1–3; Text-figs. 7, 3*a*—*b*.

1967. *Favosites pseudoforbesi pseudoforbesi* Sokolov; A. Stasińska, Tabulata..., pp. 83–84, Pl. 24, Fig. 4*a*—*b*.

Material. — Five fragmentary colonies and four thin sections.

Description. — Colonies hemispherical, to 9 cm wide and 8 cm high. Corallites polygonal, 1.6–2.2 mm and rarely more in diameter. Wall thickness varying between 0.1 and 0.2 mm. Tabulae horizontal, not uniform, spaced at 0.4–0.6 and 0.7–1.0 mm. Pores very numerous, 0.2 mm in diameter, arranged in 1–3 rows. Septal spines thick, strongly developed, very numerous.

Occurrence. — Poland: Holy Cross Mts., Łężyce-Bełcz, Upper Silurian; erratic boulders. Sweden: Island of Gotland, Silurian. U. S. S. R.: Estonia, Ludlovian, Paadla stage.

Order **Syringoporida** Sokolov, 1962

Family **Syringoporidae** Nicholson, 1879

Genus *Syringopora* Goldfuss, 1826

Syringopora schmidti Tchernychev, 1937

(Pl. II, Fig. 1*a*, *b*)

1937. *Syringopora schmidti* Tchernychev; B. B. Tchernychev, Verchnesylurijskie..., pp. 93–94, Pl. 9, Figs. 2*a*, 2*b*.

1938. *Syringopora schmidti* Tchernychev; B. B. Tchernychev, O nekotorych..., p. 123, Pl. 6, Figs. 4*a*, 4*b*.
1962. *Syringopora schmidti* Tchernychev; E. R. Klaamann, Tabuljaty..., pp. 52–53; Text-fig. 16.
1967. *Syringopora schmidti* Tchernyschev; A. Stasińska, Tabulata..., p. 98, Pl. 31, Figs. 3*a*—*b*.
1967. *Syringopora schmidtiformis* Stasińska; A. Stasińska, Tabulata..., pp. 98–99, Pl. 32, Figs. 2*a*—*b*.

Material. — Fifteen fragmentary colonies, six thin sections.

Description. — Colonies bushlike, small, to 4.2 cm wide and 3.5 cm high. Corallites cylindrical, 1.3–1.5 mm in diameter, spaced at intervals of 0–1 mm, sometimes to 1.5 mm. Wall thickness varying between 0.15 and 0.30 mm. Walls covered with a fairly thick epitheca. Connecting tubules, 0.2–0.6 mm in diameter, spaced at intervals of 1.5–2.5 mm. Funnel-like tabulae having axial tubules. Spaces between tabulae, measured at the wall, amount to 0.2–0.3 mm. Septal spines short, arranged in vertical rows.

Development of a colony. — A colony originates with a protocorallite shaped like a coral of the genus *Aulopora*. Protocorallite is attached to the surface of a strange body. The first bud is formed at the terminal end of protocorallite in the form of a small convexity of the wall (Fig. 1*a*). This convexity becomes gradually rounder and rounder in transverse section and develops a body cavity. Then, a contraction appears between the parent and offspring individual (Fig. 1*b*, *c*). This contraction extends more and more (Fig. 1*d*—*f*) and transforms into a canal connecting both individuals (Fig. 1*g*). The young corallite raises and withdraws more and more from its parent individual. Further buddings take place in the same manner. Sometimes, convexities are formed on the wall of corallite and extend gradually until they contact neighbouring corallites and form a connecting canal (Fig. 2*a*—*c*).

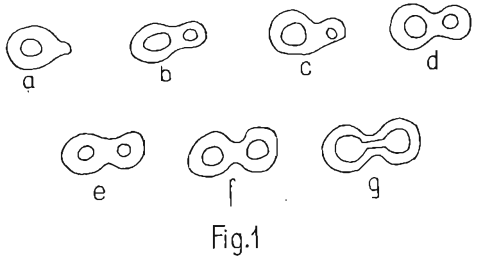


Fig.1

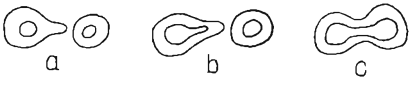


Fig.2

Fig. 1. *Syringopora schmidti* Tchernychev (Z. Pal. T/33): formation of young corallites, ×10.
Fig. 2. *Syringopora schmidti* Tchernychev: (Z. Pal. T/33): formation of a connecting tubule ×10.

Remarks. — *Syringopora schmidti* Tchernychev from Łężyce-Bełcz is marked by characters transitional between *S. schmidti* Tchernychev and *S. schmidtiformis* Stasińska, 1967 from erratic boulders of Poland (Table 1).

It has been shown by observations, made during the studies on the development of a colony, that spaces between corallites depend on a place through which a transverse section is made. Young corallites are arranged at short intervals (Pl. II, Fig. 1*a*) and it is only with their further growth that they withdraw from each other to a distance peculiar of a given species (Pl. II, Fig. 1*b*). In view of a poor state of preservation of the colony, it is difficult to measure the length of spines.

Since the differences in dimensions of particular elements of the colonies of *S. schmidti* and *S. schmidtiformis* turned out to be small, the writer is inclined to include the species *S. schmidtiformis* Stasińska, 1967 in the synonymy of *S. schmidti* Tchernychev.

Occurrence. — Poland: Holy Cross Mts., Łężyce-Bełcz, Upper Silurian; erratic boulders. U. S. S. R.: Estonia, Ludlovian, Paadla stage; Novaya Zemlya, Island of Dolgoy, Bolshezemelskaya Tundra, Silurian.

Order **Auloporida**

Family **Auloporidae** Milne-Edwards & Haime, 1850

Genus *Aulopora* Goldfuss, 1829

Aulopora enodis Klaamann, 1966

(Pl. III, Fig. 3)

1966. *Aulopora enodis* Klaamann; E. Klaamann, Inkomunikatnyje tabuljaty..., pp. 67–68, Pl. 19, Figs. 8, 9; Pl. 21, Fig. 1.

Material. — A fragmentary colony.

Description. — An incrusting colony, mostly dichotomously branched. Corallites slightly extending towards aperture. Calices, round in transverse section, with contracted apertures and 0.5–1.0 mm in diameter.

Corallites 3–4 mm long and 0.5–1.0 mm wide.

Septal spines small.

Remarks. — The specimen under study does not display differences as compared with a colony of the same species from Estonia.

Occurrence. — Poland: Holy Cross Mts., Łężyce-Bełcz, Upper Silurian. U. S. S. R.: Estonia, Wenlockian.

Palaeozoological Institute
of the Polish Academy of Sciences
Warszawa, Al. Żwirki i Wigury 93
May, 1970

REFERENCES

CZARNOCKI, J. 1919. Stratygrafia i tektonika Gór Świętokrzyskich. — *Prace Tow. Nauk. Warsz.*, **28**, 1–107, Warszawa.

— 1936. Przegląd stratygrafii i paleogeografii dewonu dolnego Gór Świętokrzyskich. — *Spraw. P. Inst. Geol.*, **8**, 4, 129–162, Warszawa.

— 1957. Geologia regionu łysogórskiego. — *Prace P. Inst. Geol.*, **18**, 1–97, Warszawa.

KLAAMANN, E. R. 1961. Tabuljaty i geliolitidy venloka Estonii. — *Trudy Inst. Geol. AN Est. SSR*, **6**, 69–110, Tallin.

— 1962. Tabuljaty verchnego silura Estonii. — *Ibidem*, **9**, 25–74.

— 1964. Pozdneordovikskie i rannesilurijskie Favositida Estonii. — *Inst. Geol. AN Est. SSR*, 1–118, Tallin.

— 1966. Inkomunikatnye tabuljaty Estonii. — *Ibidem*, 1–96.

SOKOLOV, B. S. 1952. Tabuljaty paleozoja evropejskoj časti SSSR. IV: Devon Russkoj platformy i zapadnogo Urala. — *Trudy VNIGRI, N. S.*, **62**, 1–208, Leningrad—Moskva.

STASIŃSKA, A. 1967. Tabulata from Norway, Sweden and from the erratic boulders of Poland (Tabulata z Norwegii, Szwecji i z głazów narzutowych Polski). — *Palaeont. Pol.*, **18**, 1–112, Warszawa.

TCHERNYCHEV, B. B. 1937. Verchnesilurijskie i devonskie Tabulata Novoj Zemli, Severnoj Zemli, Tajmyra. — *Trudy Arkt. Inst.*, **91**, 95–100, Leningrad—Moskva.

— 1938. O nekotorych verchnesilurijskich Tabulata s r. Letnej. — *Ibidem*, **101**, 147–153.

TOMCZYK, H. 1970. The Silurian. *In*: Geology of Poland. I: Stratigraphy. Part 1: The Precambrian and Palaeozoic. 237–314, Warszawa.

TOMCZYKOWA, E. 1960. Vorläufiger Entwurf der Stratigraphie des oberen und mittleren Ludlows in den Świętokrzyskie Góry. Prager Arbeitstagung über die Stratigraphie des Silurs und des Devons. 343–356, Praha.

— 1962*a*. O rodzaju Scotiella Delo z warstw rzepińskich Gór Świętokrzyskich. Księga Pamiątkowa ku czci prof. J. Samsonowicza. 187–199, Warszawa.

— 1962*b*. O trylobicie Acastella prima n. sp. — *Kwart. Geol.*, **6**, 2, 260–265, Warszawa.

RÓŻKOWSKA, M. 1962. Górnosylurskie Tetracoralla z warstw rzepińskich w profilu Łężyce-Bełcz (Góry Świętokrzyskie). — *Ibidem*, **174**, 5, 115–159.

— 1962*c*. Zespoły fauny w sylurze Polski. — *Biul. Inst. Geol.*, **174**, 5, 93–106, Warszawa.

ANNA STASIŃSKA

GÓRNOSYLURSKIE TABULATA Z DOLNYCH WARSTW RZEPIŃSKICH W PROFILU ŁĘŻYCE-BEŁCZ (GÓRY ŚWIĘTOKRZYSKIE)

Streszczenie

W niniejszej pracy podane są wyniki opracowania tabulatów z dolnych warstw rzepińskich (górny sylur), zaliczonych do rodzajów: *Mesofavosites* Sokolov, 1951, *Favosites* Lamarck, 1816, *Syringopora* Goldfuss, 1826 i *Aulopora* Goldfuss, 1829. Opisany materiał pochodzi z profilu Łężyce-Bełcz, położonego około 7 km na pn-zach. od Opatowa (Góry Świętokrzyskie) i został zebrany w latach 1956–1957 przez E. Tomczykową (Instytut Geologiczny, Warszawa). Zawiera on następujące formy: *Mesofa-*

vosites imbellis Klaamann, 1961, *Favosites pseudoforbesi pseudoforbesi* Sokolov, 1952, *Syringopora schmidti* Tchernychev, 1937 i *Aulopora enodis* Klaamann, 1966.

Opracowanie to potwierdziło wnioski stratygraficzne Tomczykowej (1960, 1961, 1962) i Różkowskiej (1962) co do górnosylurskiego wieku osadów.

Przedyskutowano również stosunki faunistyczno-facjalne na podstawie bogatej fauny, składającej się z organizmów bentonicznych. Fauna ta rozwinęła się najprawdopodobniej na płytkowodnym skłonie w bliskości strefy aktywnej działalności fal. Rozwój jej został przerwany zapewne dalszym spłyceniem się zbiornika morskiego.

Poza tym prześledzono u rodzaju *Syringopora* rozwój kolonii, sposób pączkowania i powstawanie kanałów łączących korality.

АННА СТАСИНЬСКА

ВЕРХНЕСИЛУРИЙСКИЕ TABULATA ИЗ НИЖНИХ ЖЕПИНЬСКИХ СЛОЕВ РАЗРЕЗА ЛЭНЖИЦЕ-БЭЛЧ (СВЕНТОКШИСКИЕ ГОРЫ)

Резюме

В статье представлены результаты изучения табулят из нижних жепиньских слоев (верхний силур), принадлежащих к родам: *Mesofavosites* Sokolov, 1951, *Favosites* Lamarck, 1816, *Syringopora* Goldfuss, 1826 и *Aulopora* Goldfuss, 1829. Описанный материал был собран из разреза Лэнжице-Бэлч, находящегося около 7 км на северо-запад от г. Опатова (Свентокшиские Горы), в годах 1956—1957 Э. Томчиковой (Геологический Институт, Варшава). В обработанной коллекции имеются следующие виды: *Mesofavosites imbellis* Klaamann, 1961, *Favosites pseudoforbesi pseudoforbesi* Sokolov, 1952, *Syringopora schmidti* Tchernychev, 1937 и *Aulopora enodis* Klaamann, 1966. Присутствие этих видов подтверждает верхнесилурийский возраст нижних жепиньских слоев, предложенный Томчиковой (Tomczykowa, 1960, 1961, 1962) и Ружковской (Różkowska, 1962).

Рассмотрены условия обитания и распределения донных организмов. Местом обитания этих организмов была вероятно зона мелководных склонов вблизи активной деятельности волн. Развитие бентоса прекратилось вследствие дальнейшего обмеления морского бассейна.

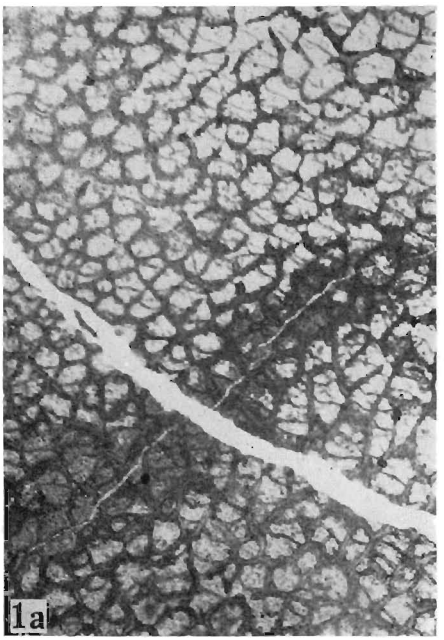
Кроме того, для рода *Syringopora* изучено развитие колонии, тип почкования и возникновение соединительных трубок.

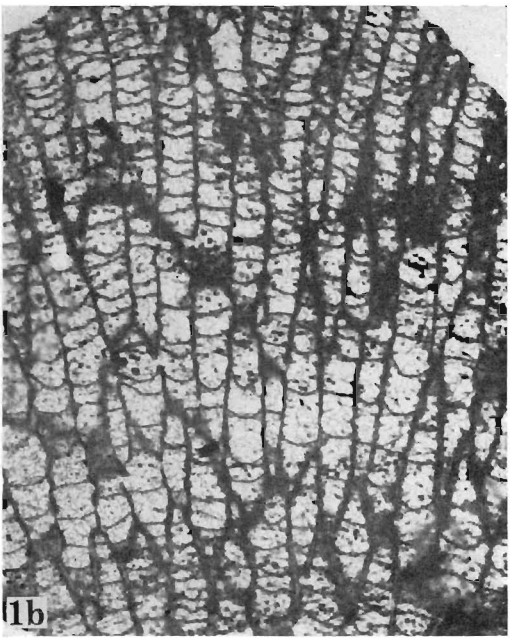
PLATES

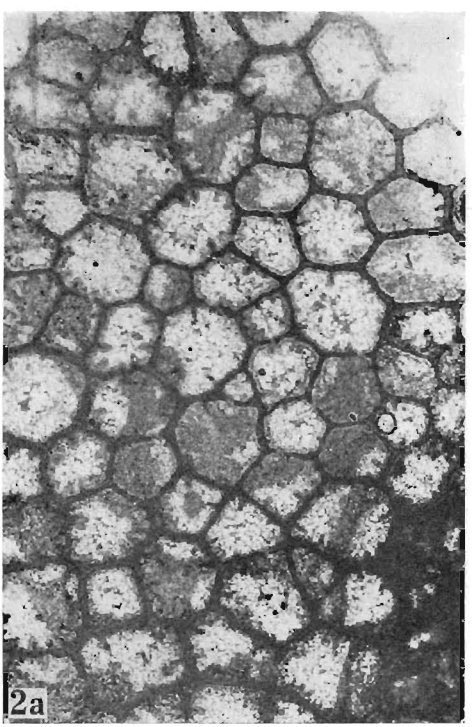
Plate I

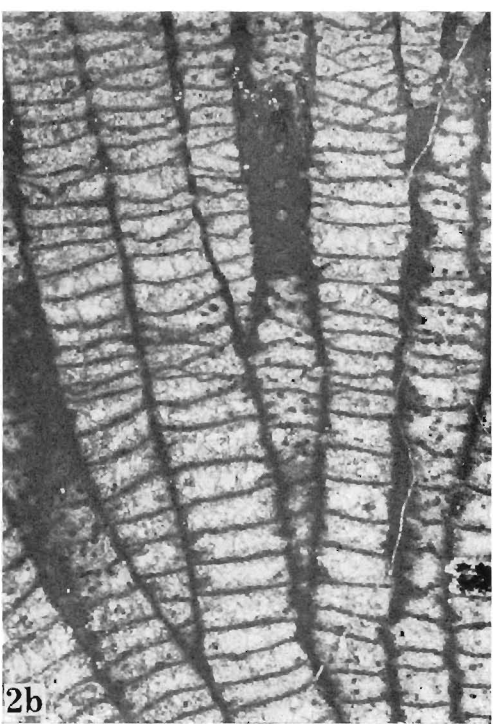
Fig. 1. *Mesofavosites imbellis* Klaamann (Z. Pal. T./VI/1): *a* cross-section, ×6; *b*, longitudinal section, ×6.

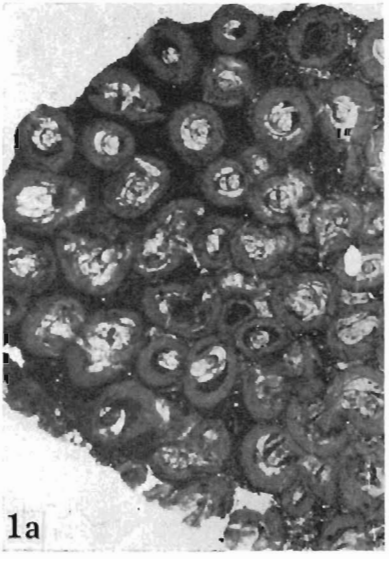
Fig. 2. *Favosites pseudoforbesi pseudoforbesi* Sokolov (Z. Pal. T. VI/25) *a* cross-section, ×6; *b* longitudinal section, ×6.

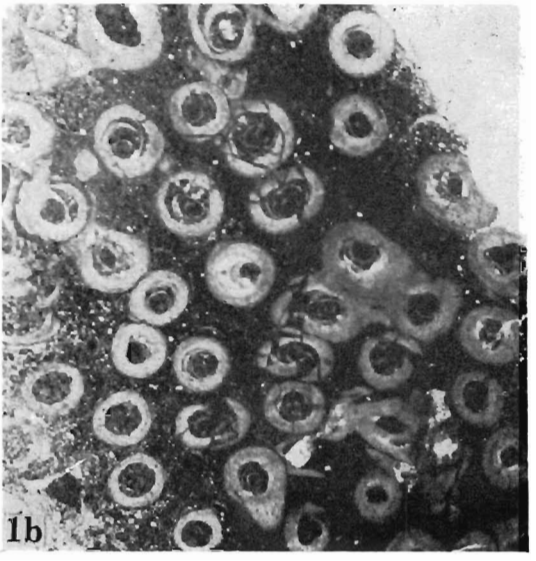

1a


1b


2a


2b


1a


1b

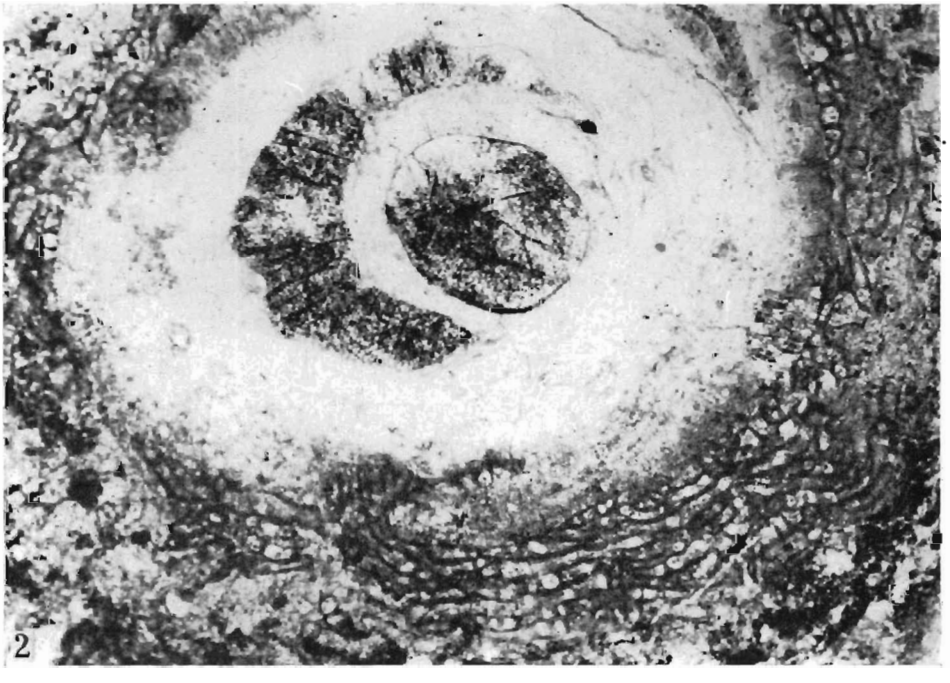

2

Plate II

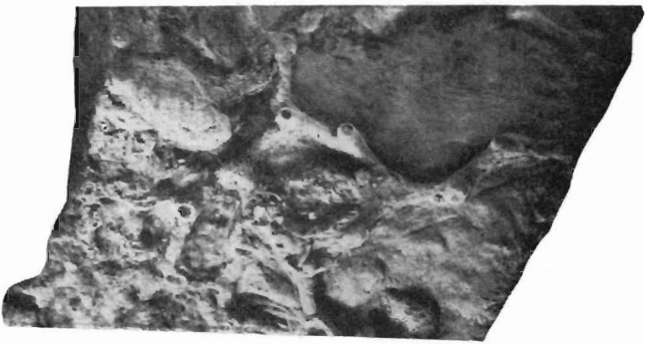
Fig. 1. *Syringopora schmidti* Tchernychev (Z. Pal. T./31): cross-section, $a \times 6$, $b \times 6$.
Fig. 2. Corallite of *Syringopora schmidti* (Z. Pal. T./32) surrounded with algae: $a \times 45$, $b \times 110$.

Plate III

Fig. 1. *Favosites pseudoforbesi pseudoforbesi* Sokolov (Z. Pal. T/VI/2): longitudinal section, ×1, 4.

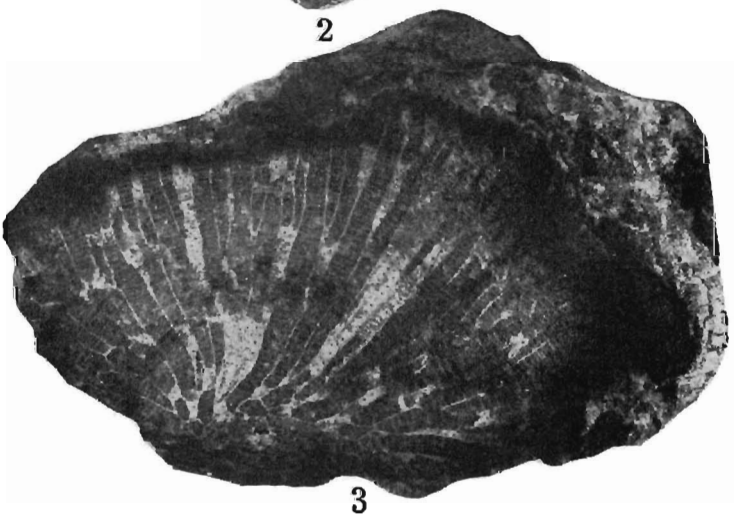
Fig. 2. *Syringopora schmidti Tchernychev* (Z. Pal. T./VI/32): side-view of a colony, ×1, 4.

Fig. 3. *Aulopora enodis Klaamann* (Z. Pal. T/VI/46): top view of a colony, ×3.



1

2



3