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ON SOME DEVONIAN AULOPORIDA (TABULATA) FROM POLAND

Abstract.—Description of 8 species (including 3 new, *Aulopora lataeformis* sp.n., *Grabaulites jurkowicensis* sp.n., *G. skalensis* sp. n.) belonging to 3 genera found in Devonian of Poland are given. Budding is investigated.

INTRODUCTION

The paper presents the results of a detailed morphological investigation of *Aulopora* Goldfuss, *Mastopora* Sokolov and *Grabaulites* Sokolov from the Devonian of Poland.

The material was collected by the present author during 1953-1955 in the Middle and Upper Devonian of the Holy Cross Mountains (Góry Świętokrzyskie).

The work was completed in the Palaeozoological Institute of the Polish Academy of Sciences in Warsaw, in 1973. The accompanying drawings were done by Mrs. K. Budzyńska and Mrs. D. Sławik, while the photographs were prepared by Fiss M. Czarnocka and Miss E. Mulawa; the thin sections were made by Mrs. M. Nowińska, to whom the author express her thanks.

The material described herein is housed in the Palaeozoological Institute of the Polish Academy of Sciences in Warsaw (abbr. Z PAL).

CORALLUM GROWTH

Probably all representatives of the Tabulata show similar initial development of the colony. Its growth begins with the auloporoid stage, as confirmed by several writers. Lindström (1865) give the example of the development of colonies in *Favosipora clausa* ("*Favosites clausus*") and *Heliolites porosus* (1899). Beecher (1893), Girty (1895) and Vojnovsky-Krieger (1928) displayed the auloporoid shape of protocorallites in genera

Pleurodictyum, *Favosites* and *Michelinia*. Similar observations of development of a colony were done by Sokolov (1955) on the representatives of *Favosites*, *Michelinia*, *Syringopora* and *Fletcheria* and by Stasińska (1967) on the representatives of Halysitida and *Favosites* and *Favosipora clausa* (Lindström).

Similar development of colony occurs in representatives of Auloporida, namely in the genera *Aulopora* Goldfuss, *Mastopora* Sokolov and *Grabaulites* Sokolov. Initial stage begins with protocorallite which consists of a bubble-shaped, calcareous cover for the settled larva. Protocorallite is attached to the substratum, and there arise one or two offsets. Corallites multiplying by marginal budding on the walls (Pl. XXII, Figs 1, 2b-c; Text-figs 1, 2). In *Aulopora serpens*, *A. liniformis*, *A. lata* and *A. lataeformis* sp.n. the appearance of a young individual was on the walls below the calices (Text-fig. 1). In *Grabaulites jurkovicensis* sp.n. (Text-fig. 2) the young individuals occur on the walls of calyces.

In the first group of species, at the moment of appearance of a young individual the parent corallite became oval in transverse section (Text-fig. 1 a-c). Initial stage is characterised by the formation of the bud developed on the walls (Text-fig. 1 d-f). In the initial phases, when the buds were small, they did not exert any influence on the internal morphology of the parent corallite. Parent corallite slightly rised in place in which the young corallites detach from it (Text-fig. 1 g-i). After some time, the young corallites separate from parent individual and grow at an angle in opposite directions. Calices of a parent individual, raised over substratum, were round in cross-section. Development of one bud was the same as that of two buds (Pl. VI, Fig. 4; Text-fig. 1).

A similar type of budding occurs in the genus *Mastopora* (Pl. XXII, Fig. 1; Text-fig. 3 a-e). In places of dense concentration the young coral-

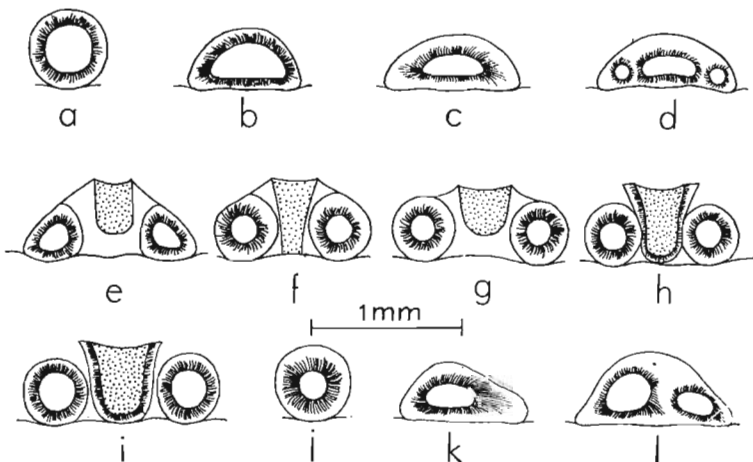


Fig. 1. *Aulopora serpens minor*: formation of young corallites on the wall (Z. PAL. T. VIII-1); $\times 40$.

lites achieve polygonal shapes (Text-fig. 1f) and frequently are directed at different angles.

In *Grabaulites jurkowicensis* sp.n. and *G. skalensis* sp.n. colonies multiply by marginal budding on walls of calyces (Text-fig. 2).

A similar type of budding is known in *Aplophyllia sexradiata* (Roniewicz, 1966; Hexacorallia, family Stylinidae d'Orbigny) under the name of extratentacular marginal.

A slightly different budding occurs in *Kozlowskiocystia polonica* (Stasińska, 1969), as its colonies multiply by budding on the dissepimentarium. This type of budding is known as „Pocket budding” in the suborder *Amphiastreaida* Alloiteau, 1952 (Ogilvie, 1897; Alloiteau, 1957; Roniewicz, 1966).

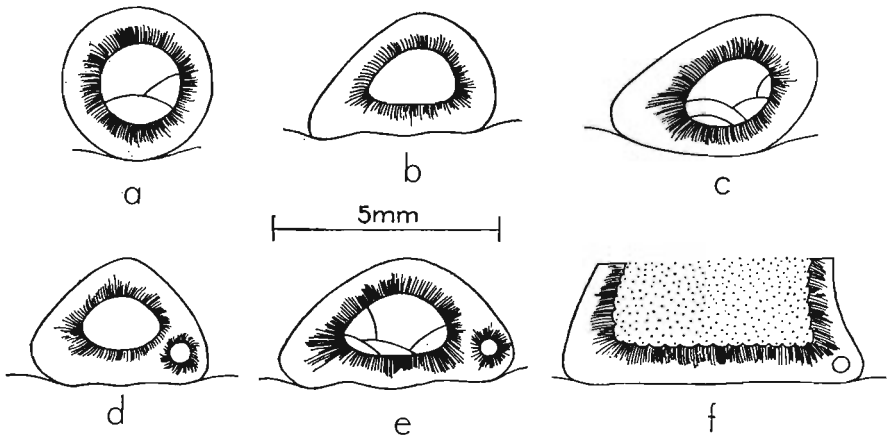


Fig. 2. *Grabaulites jurkowicensis* sp. n.: formation of young corallites on the wall of calyces (Z. PAI. T. VIII-46); $\times 12$.

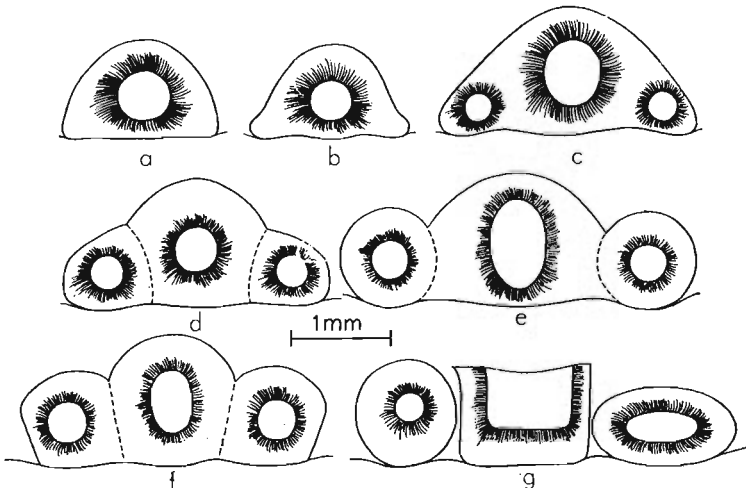


Fig. 3. *Mastopora spicata*: formation of young corallites on the wall (Z. PAI. T. VIII-49); $\times 40$.

In the *Aulopora* studied in these paper 2 types of structure of corallites may be distinguished:

I. Tubular corallites with radial fine structure of walls (Text-fig. 4).

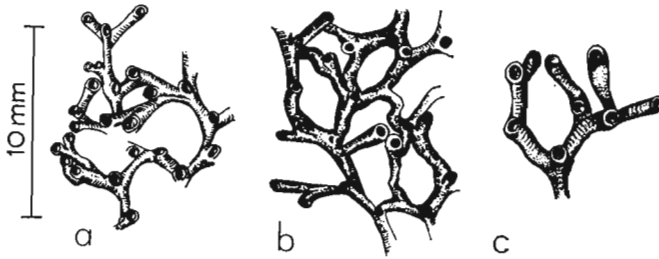


Fig. 4. Tubular corallites in: a *Aulopora serpens minor* Goldfuss (Z. PAL. T. VIII-1), $\times 5$; b *Aulopora serpens minor* Goldfuss (Z. PAL. T. VIII-3), $\times 5$; c *Aulopora serpens maior* Goldfuss (Z. PAL. T. VIII-26), $\times 5$.

Tabulae few or absent. Septal spines lacking. Marginal budding on walls of corallites (Pl. XXII, Fig. 2; Text-fig. 1). To that group should be assigned: *Aulopora serpens minor* and *A. serpens maior*.

II. Conical corallites with radial fine structure of walls (Text-fig. 5). Tabulae rare. Septal spines short, rare or numerous, they are only the extensions of walls. Marginal budding on the walls of corallites. Here belong: *A. liniformis*, *A. lata* and *A. lataeformis* sp.n.

In the *Grabaulites* studied in this paper one type of corallites structure may be distinguished: conical corallites, short and large (Text-fig. 6). Wall structure concentric (Pl. XXII, Fig. 1). Tabulae vesicle-shaped. Septa with a trabecular structure like in *Syringopora*, composed of very thin fibres. Marginal budding on walls of calyces (Text-fig. 2). Here are assigned: *G. jurkowicensis* sp.n. and *G. skalensis* sp.n.

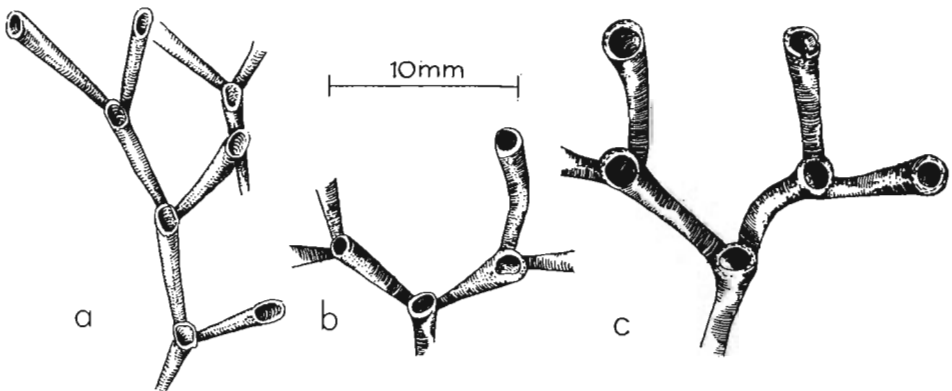


Fig. 5. Conical corallites in: a *Aulopora liniformis* Lecompte (Z. PAL. T. VIII-35), $\times 5$; b *Aulopora lataeformis* sp.n. (Z. PAL. T. VIII-42), $\times 5$; c *Aulopora lata* Lecompte (Z. PAL. T. VIII-53), $\times 5$.

In all species of the genera *Aulopora*, *Mastopora* and *Grabaulites* studied in this paper the corallite wall is composed of two layers: epitheca and wall. The epitheca is thin and covers the wall of corallite with a uniform layer, it consists of radially arranged fibres. They are thicker than

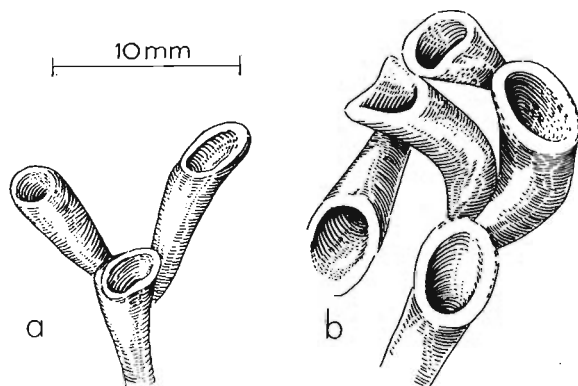


Fig. 6. Conical corallites in: a *Grabaulites skalensis* sp.n. (Z. PAL. T. VIII-48), $\times 5$; b *Grabaulites jurkowicensis* sp.n. (Z. Pal. T. VIII-46), $\times 5$.

fibres forming the wall. The exterior is marked by horizontal growth lines which are thin and closely spaced. Wall is composed of radially arranged fibres (Pl. XXII, Figs 1, 2). This is a radial type of structure. Only the walls of *Grabaulites jurkowicensis* sp.n. and *G. skalensis* sp.n. show a concentric type of fine structure, like *Syringopora* (Pl. XXII, Fig. 3).

The structure of the colony and the mode of budding in the representatives of *Aulopora* and *Mastopora*, as well as in genera *Favosipora* and *Palaeofavosites*, indicate their close mutual relationships. The representatives of *Aulopora* and *Mastopora* have some characters in common. The corallites in places of dense concentration achieve polygonal shapes but not communicate, however, by means of pores. The calices rise higher than in those portions of the colony, where they are loosely arranged. The wall microstructure is radial. The mode of budding is marginal, extratentacular and buds form on walls of the corallites. The genera *Favosipora* and *Palaeofavosites* have the radial wall microstructure, the angular pores and their mode of budding is the same as in the before mentioned genera.

Judging from the above introduced data and taking into account that the genus *Mastopora*, so far known from the Devonian, and the genus *Favosipora*, from the Wenlockian (Island of Gotland), is highly probable that they originated from the representatives of the genus *Aulopora* with the type of structure as the present in *A. serpens* Goldfuss. However, the genus *Palaeofavosites*, which appeared in the Middle Ordovician originates probably from the forms close to the genus *Favosipora*.

SYSTEMATIC PART

Order **Auloporida** Sokolov, 1950

The Auloporida have a very wide geographical and stratigraphical distribution (Upper Cambrian to Lower Permian). The following 7 families belong here: Auloporidae Milne-Edwards & Haime, 1851, Moniloporidae Grabau, 1899, Auloheliidae Sokolov, 1950, Aulocystidae Sokolov, 1950, Kozłowskiocystidae (Stasińska, 1969), Romingeriidae Sokolov, 1950. Two families: Auloporidae and Aulocystidae are here described.

Family **Auloporidae** Milne-Edwards & Haime, 1851

The 7 genera are recognized having a wide stratigraphical distribution (Upper Cambrian to Lower Permian): *Protoaulopora* Sokolov, 1950, *Aulopora* Goldfuss, 1829, *Mastopora* Sokolov, 1952, *Auloporella* Grubbs, 1939, *Aulocaulis* Fenton & Fenton, 1937, *Plexituba* Steinbroock, 1946, *Oncopora* Počta, 1902.

Two genera *Aulopora* and *Mastopora* from the Holy Cross Mountains are described in this paper.

Genus *Aulopora* Goldfuss, 1826

Some ten species recognized have a wide geographical (Europa, Asia, North America) and stratigraphical (Ordovician-Permian) distribution. The *Aulopora* of Poland, described in the present paper comes from Couvinian and Givetian of the Holy Cross Mountains. Colonies repent and incrusting coralla of tabulates, tetracorals, bryozoans and brachiopod shells. Corallites cylindrical or tabular, forming branches by budding 2 corallites or rarely 1, which anastomose or do not anastomose. Sometimes group in agglomeration. Calyces slightly raised over substratum. Fine structure of wall radial or concentric. Tabulae horizontal, uneven, vesicle-shaped, rare or absent. Septa represented by spinules or with a trabecular structure. Gemmation marginal on the walls.

Aulopora serpens minor Goldfuss, 1826

(Pl. XIX, Fig. 1; Pl. XXII, Fig. 2; Text-figs 1, 4a, b, 7)

1826. *Aulopora serpens* var. *minor* Goldfuss; A. Goldfuss, p. 82, Pl. 29, Fig. 1b.

Revised diagnosis. — Colony incrusting skeletons of foreign organisms. Corallites cylindrical or tabular. The length of corallites amounts to 1.5-3 mm and 0.5-0.6 mm in diameter. Corallites circular in cross-section,

0.8 mm in diameter. Walls 0.1 mm thick. Fine structure of walls radial, epitheca thin. Tabulae few or absent. Septal spines lacking.

Material. — Fragments of 25 colonies.

Description. — Corallum incrusting tetracorals, tabulates and bryozoans. Colony forming branches by budding two corallites or rarely one which anastomose or do not anastomose with each other, here and there

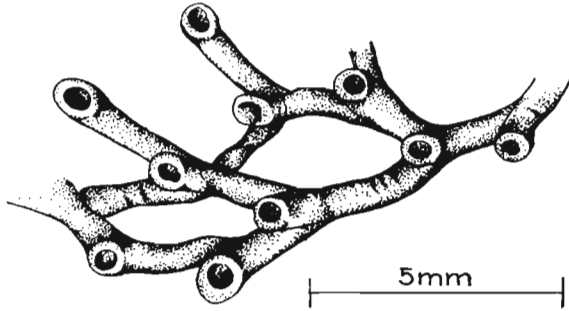


Fig. 7. *Aulopora serpens minor* Goldfuss (Z. PAL. T. VIII-28), $\times 10$.

grouped in agglomeration, of laterally contiguous corallites. They are cylindrical or tubular and adhere to the substratum over entire length as far as the point of formation a new corallites in the place where the young corallites detach from the parent individual. Corallites usually reach 1.5-2 mm in diameter. In transverse section the corallites are round at first and then gradually become oval. Calyces round or a little narrow in cross-section, slightly raised over the substratum. Walls 0.1 mm thick, with fine radial structure, rarely preserved. Epitheca very thin, built of thin, radially arranged fibres, rarely preserved. Tabulae thin, rare, or absent. Septal spines lacking. Corallites multiplying by marginal budding on the walls. When two buds are formed, they appear simultaneously. New corallites grew at 90° angle in opposite directions.

Remarks. — The colonies here described are very similar to *Aulopora serpens* var. *minor* described by Goldfuss in 1826, Pl. 29, Fig. 1b. It is to some extent similar to *A. parva* Lecompte, but differs from the latter in having larger corallite and lacking septal spines.

Distribution. — Poland: Couvinan (Grzegorzowice), Givetian (Skały, Pokrzywianka). GFR: Middle Devonian.

Aulopora serpens maior Goldfuss, 1826

(Pl. XIX, Fig. 2; Text-figs 4, 7, 8)

1826. *Aulopora serpens* var. *maior* Goldfuss; A. Goldfuss, p. 82, Pl. 29, Fig. 1a.

Material. — Fragment of a colony.

Description. — Corallum incrusting tetracoral specimen. Colony forming branches by budding two or one corallites which are branched or

form a loose network. Corallites reach 3.5-5 mm in length. Their diameter reach 0.5-0.7 mm. Calyces reach 1-1.2 mm in cross-section. Walls 0.2-0.3 mm thick with radial structure, rarely preserved. Epitheca thin, build of thin, radially arranged fibres, rarely preserved. Tabulae rare. Septal spines lacking. Corallites multiplying by marginal budding on the walls.

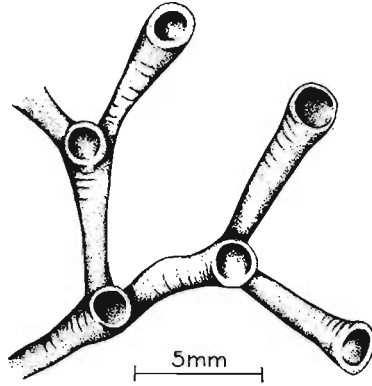


Fig. 8. *Aulopora serpens maior* Goldfuss (Z. PAL. T. VIII-26); $\times 10$.

Remarks. — The investigated colony is close to that of the *A. serpens* var. *maior* by Goldfuss in 1826, Pl. 29, Fig. 1a.

Distribution. — Poland Couvinian (Wydryszów). GFR: Middle Devonian.

Aulopora liniformis Lecompte, 1939
(Pl. XIX, Fig. 3; Text-figs 5a, 9)

1939. *Aulopora liniformis* Lecompte; M. Lecompte, p. 180, Pl. 15, Fig. 5.

Material. — Fragments of 15 colonies.

Description. — Corallum incrusting tetracorals and tabulates. Corallites conical, thin, reach 4-5 mm in length. Their larger diameter reach

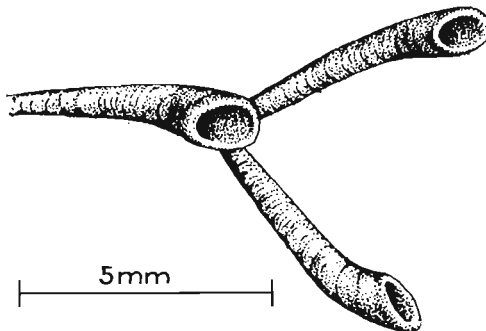


Fig. 9. *Aulopora liniformis* Lecompte (Z. PAL. T. VIII-35); $\times 10$.

0.4-0.7 mm. Calyces slightly raised over substratum 0.7 mm upwards, round, 0.6-0.9 mm in cross-section. Walls 0.1 mm thick. Epitheca thin. Tabulae rare. Septal spines short, numerous. Repent subhexagonal network, measuring 1.3×1 mm, 1.4×1.4 mm. Marginal budding on the walls.

Remarks. — Our specimens are nearly identical to *Aulopora liniformis* from Belgium.

Distribution. — Poland: Couvinian, (Grzegorzowice). Belgium: Givetian.

Aulopora lataeformis sp.n.

(Pl. XX, Fig. 1; Text-figs 5b, 10)

Type specimen: Z. PAL. T. VIII-42; Pl. XX, Fig. 1; Text-figs 5b, 10.

Type horizon: Givetian.

Type locality: Poland, Holy Cross Mts., Skaly.

Derivation of the name: similar to *A. lata* Lecompte, 1939.

Diagnosis. — Colony incrusting. Corallites reach 4-5 mm in length, larger diameter reaches 0.7-1 mm. Calyces round, 2.5-2.7 mm in diameter. Walls 0.2-0.6 mm thick. Tabulae rare. Septal spines short, rare.

Material. — Fragments of 10 colonies.

Description. — Colony incrusting tetracorals, tabulates and/or Bryozoa. Shape of colony ranging from subhexagonal network, measuring 6×9 mm, to biserial rows. Corallites reach 4-5 mm in length. Their larger diameter reach 0.7-0.8 mm, near calyces 1 mm. Calyces round in cross-section, 1.5-1.6 mm in diameter. Walls 0.2-0.6 mm thick. Epitheca

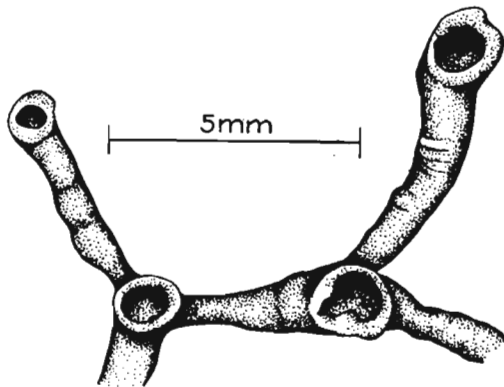


Fig. 10. *Aulopora lataeformis* sp.n. (Z. PAL. T. VIII-42); $\times 10$.

wrinkled. Tabulae rare. Septal spines short, rare. Corallites multiplying by marginal budding on the walls. New corallites grew about 90° angle in opposite directions.

Remarks. — *Aulopora lataeformis* sp.n. is similar to *A. lata* Lecompte, but differs in having much smaller dimensions of corallites.

Distribution. — Poland: Couvinian (Grzegorzowice), Givetian (Skały).

Aulopora lata Lecompte, 1939

(Pl. XX, Fig. 3; Text-figs 5c, 11)

1939. *Aulopora lata* Lecompte; M. Lecompte, p. 181, Pl. 15, Fig. 4.

Material. — Fragment of a colony.

Description. — Colony incrusting *Alveolites* sp., very badly preserved. Corallites thin, reach 5-7 mm in length. Their larger diameter reach 0.7-1 mm, near calyces 1.5-2 mm. Calyces round in cross-section, 2.5-2.7 mm in diameter. Walls thin, 0.1-0.2 mm thick. Epitheca thin, transversely wrinkled. Tabulae rare. Septal spines numerous, sometimes ar-

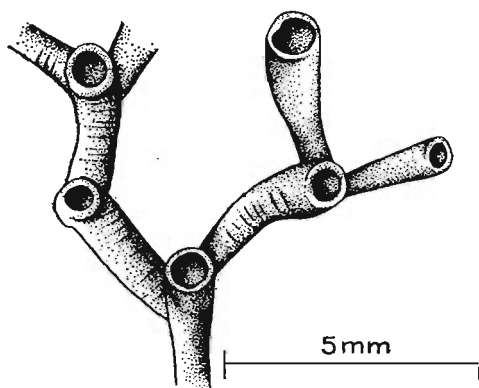


Fig. 11. *Aulopora lata* Lecompte (Z. PAL. T. VIII-45); $\times 10$.

ranged in vertical rows. Shape of colony ranging from a loose, subhexagonal network, measuring 9×14 mm, to biserial rows.

Remarks. — *Aulopora lata* from Poland is most similar to *A. lata* from Belgium. It differs from those of Belgium in having septal spines.

Distribution. — Poland: Givetian (Skały). Belgium: Frasnian.

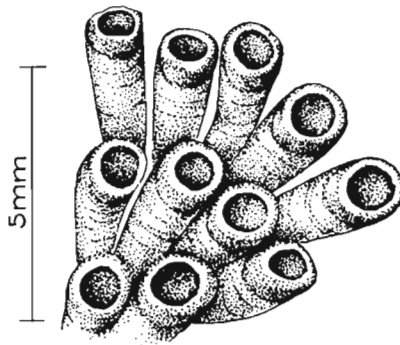
Genus *Mastopora* Sokolov, 1952

Coralla incrusting skeletons of foreign organisms. Colony composed of laterally contiguous corallites, grouped in accumulation. Calyces round in cross-section, slightly raised over substratum, a little narrow.

Genus *Mastopora* occurs in Silurian-Upper Devonian of the USSR and Middle-Upper Devonian of North America.

Mastopora spicata (Goldfuss, 1826)

(Pl. XX, Fig. 2; Pl. XXII, Fig. 1; Text-figs 3, 12)

1826. *Aulopora spicata* Goldfuss; G. Goldfuss, p. 79, Pl. 29, Fig. 3a-b.1936. "*Aulopora spicata*" Goldfuss; M. Lecompte, pp. 86-90, Pl. 13, Fig. 3 (previous synonymy).**Material.** — Fragments of 5 colonies.**Description.** — Colony incrusting tetracorals and stromatoporoids. Corallites grouped in agglomeration, reach 3.5-4 mm in length. Their larger diameter reaches 0.7-1.2 mm. Calyces oval in cross-section, 1-1.2 mm,Fig. 12. *Mastopora spicata* (Goldfuss, 1826) (Z. PAL. T. VIII-49); $\times 10$.

rarely 1.5 mm in diameter. Walls 0.2 mm thick. Tabulae horizontal, uneven, vesiculous. Septal spines lacking. Corallites multiplying by marginal budding on the walls.

Remarks. — Colony here described does not exhibit any differences from *M. spicata* of Germany (Bensberg).**Distribution.** — Poland: Givetian (Zbrza). GFR: Emsian.Family **Aulocystidae** Sokolov, 1950

Colony small. Corallites tabular or conical. Calyces funnel-like. Walls consist of concentric fibres, with layered structure. Epitheca thick. Septal spines arranged in vertical rows. Tabulae funnel-like, uneven or vesiculous.

The 6 genera recognized having a wide stratigraphical distribution (Ludlow — Upper Carboniferous of Eurasia, Devonian-Carboniferous of N. America, Middle Devonian of Australia) are: *Aulocystis* Schlüter, 1885, *Grabaulites* Sokolov, 1962, *Remešia* Kettner, 1934, *Trypanopora* Sokolov & Obut, 1955, *Aulocystella* Kuzina in Sokolov, 1955, *Adetopora* Sokolov, 1955.

Genus *Grabaulites* Sokolov, 1962

Five species are recognized from Ludlow-Middle Devonian of Urals, Middle Devonian of Siberia; Ludlow-Middle Devonian of N. America, Middle Devonian of Poland.

Grabaulites jurkowicensis sp.n.

(Pl. XXI, Fig. 1; Pl. XXII, Fig 3; Text-figs 2, 6b, 13)

Type specimen: Z. PAL. T. VIII-46.

Type horizon: Givetian.

Type locality: Poland, Holy Cross Mts., Jurkowice.

Derivation of the name: after the name of the locality Jurkowice.

Diagnosis. — Colony reptent. Corallites reach 8-9 mm in length, larger diameter reach 1.5-4.5 mm. Calyces oval, 4.5-6 mm in diameter. Walls 0.5-1.5 mm thick. Tabulae rare, vesiculous. Septal spines like those of *Syringopora*.

Material. — 2 colonies.

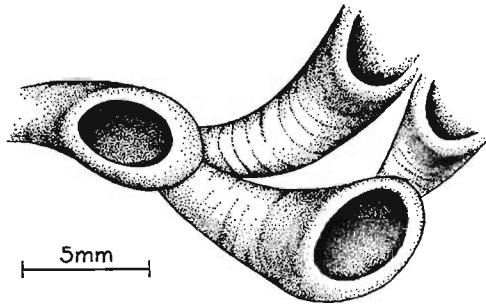


Fig. 13. *Grabaulites jurkowicensis* sp.n. (Z. PAL. T. VIII-46); $\times 10$.

Description. — Coralla incrusting skeleton of stromatoporoids. Corallum in shape of polygonal network, sides of meshes consist of 3 corallites. Corallites conical, short and large reach 8-9 mm in length, 1.5-4.5 mm in width. Calyces oval, in cross-section, 4.5-5.6 mm in diameter. Walls 0.5-1.5 mm thick, consist of concentric fibres. Epitheca thick, wrinkled. Tabulae vesicle-shaped, rare. Septal spines short, like these of *Syringopora*. Corallites multiplying by marginal budding on the walls of calyces.

Remarks. — *Grabaulites jurkowicensis* sp.n., is similar to *G. omoloniensis* Dubatolov, 1972, but differs from it in having larger diameters of corallites and thickness of wall, and in having tabulae vesiculous, not funnel — like.

Distribution. — Poland: Givetian (Jurkowice).

Grabaulites skalensis sp.n.

(Pl. XXI, Fig. 2; Text-fig. 6a)

Type specimen: Z. PAL. T. VIII-48.

Type horizon: Givetian.

Type locality: Poland, Holy Cross Mts., Skały.

Derivation of the name: after the name of the type locality.

Diagnosis. — Colony reptant. Corallites reach 4-4.5 mm in length, larger diameter reach 0.6-1.6 mm. Calyces oval, 2×1.6 mm in diameter. Walls consist of concentrically arranged fibres. Tabulae rare, vesicle-shaped. Septal spines like *Syringopora*. Corallites multiplying by marginal budding on the walls of calyces.

Material. — Fragment of a colony.

Description. — Colony incrusting a brachiopod shell. Corallites conical, short and large, reach 4-4.5 mm in length, 0.6-1.2 mm in width. Calyces oval 2×1.6 mm in diameter. Epitheca thick, wrinkled. Walls consist of concentrically arranged fibres. Tabulae rare, vesiculous. Septal spines like *Syringopora*, present on walls. Corallites multiplying by marginal budding on the walls of calyces.

Remarks. — *Grabaulites skalensis* sp.n. differs from *G. jurkowiczensis* sp. n. in having decidedly smaller corallites.

Distribution. — Poland: Givetian (Skały).

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ANNA STASIŃSKA

O NIEKTÓRYCH AULOPORIDA (TABULATA) Z DEWONU POLSKI

Streszczenie

Praca zawiera opis koralu Tabulata z rzędu Auloporida Sokolov z dewonu Gór Świętokrzyskich. Opisano 8 gatunków (w tym 3 nowe), należących do 2 rodzin i 3 rodzajów.

Rozwój ontogenetyczny prześlędzono na koralitach powstałych przez pączkowanie marginalne na ścianach. Ten sam sposób pączkowania marginalnego na ścianach stwierdzono u przedstawicieli 3 zbadanych rodzajów: *Aulopora*, *Mastopora* i *Grabaulites*.

АННА СТАСИНЬСКА

О НЕКОТОРЫХ AULOPORIDA (TABULATA) ИЗ ДЕВОНА ПОЛЬШИ

Резюме

В работе представлено описание кораллов Tabulata, отряда Auloporida Sokolov из девона Свентокшиских гор. Описано 8 видов (в том числе 3 новых), принадлежащих к 2 семействам и 3 родам.

Онтогенетическое развитие было прослежено на кораллитах, образовавшихся путем бокового почкования на стенках. Такой же способ бокового почкования наблюдался у представителей трех изученных родов: *Aulopora*, *Mastopora*, *Grabaulites*.

EXPLANATION OF PLATES

Plate XIX

- Fig. 1. *Aulopora serpens minor* Goldfuss. Z. PAL. T. VIII/1, $\times 5$. Grzegorzowice, Couvinian.
- Fig. 2. *Aulopora serpens maior* Goldfuss. Z. PAL. T. VIII/26, $\times 5$. Wydryszów, Givetian.
- Fig. 3. *Aulopora liniformis* Lecompte. Z. PAL. T. VIII/35, $\times 5$. Grzegorzowice, Couvinian.

Plate XX

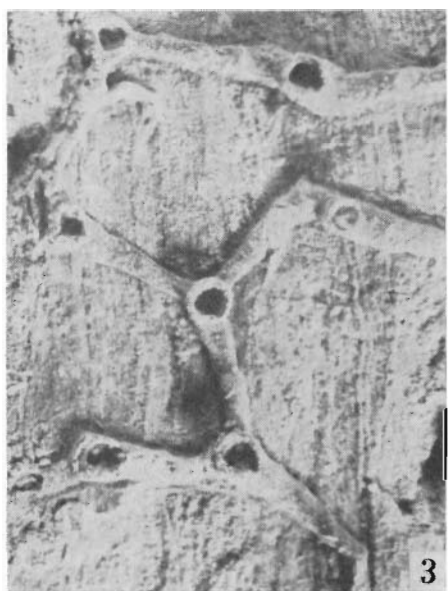
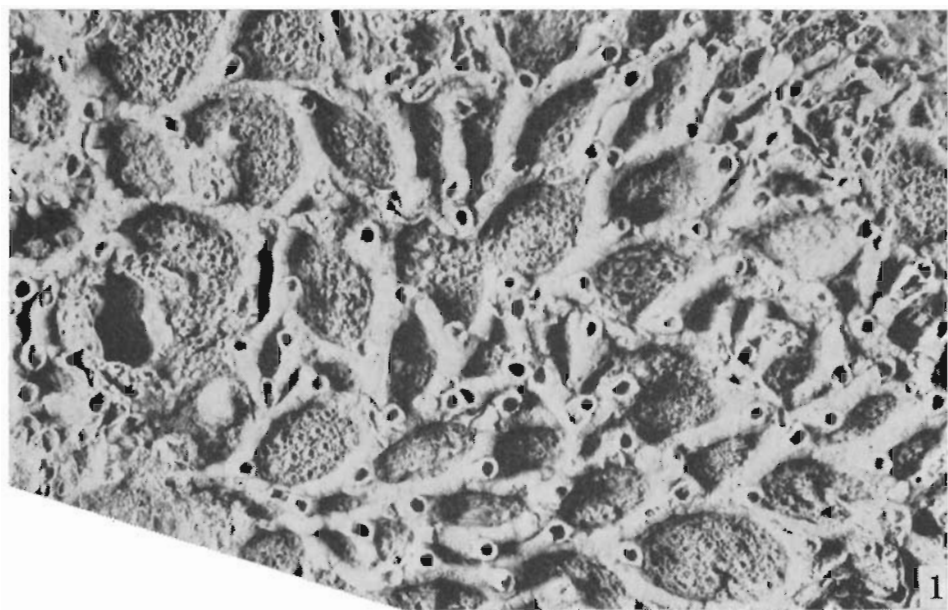
- Fig. 1. *Aulopora lataeformis* sp.n. Holotype, Z. PAL. T. VIII/42, $\times 5$. Skały, Givetian.
Fig. 2. *Mastopora spicata* (Goldfuss). Z. PAL. T. VIII/49, $\times 5$. Zbrza, Givetian.
Fig. 3. *Aulopora lata* Lecompte. Z. PAL. T. VIII/45, $\times 10$. Skały, Givetian.

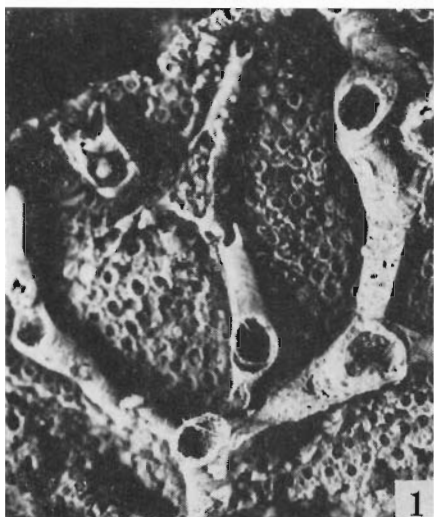
Plate XXI

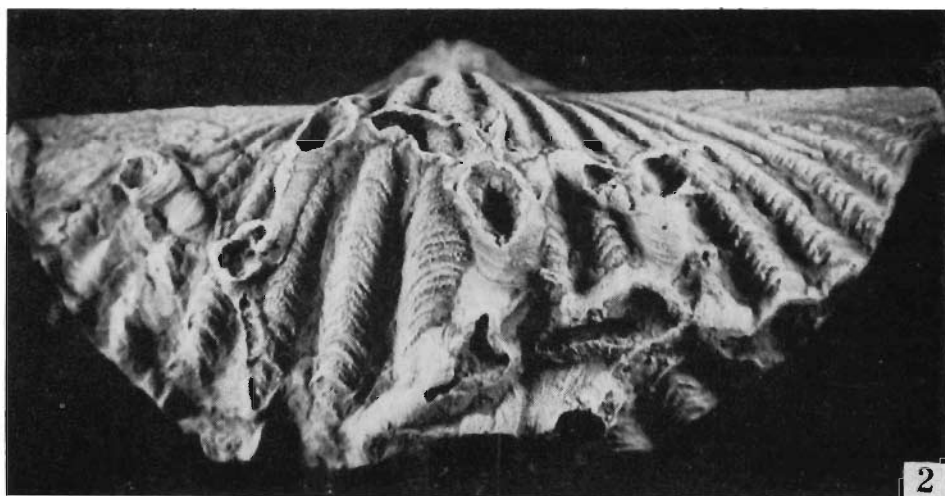
- Fig. 1. *Grabaulites jurkowicensis* sp. n. Holotype, Z. PAL. T. VIII/46, $\times 5$. Jurkowice, Givetian.
Fig. 2. *Grabaulites skalensis* sp.n. Holotype, Z. PAL. T. VIII/48, $\times 5$. Skały, Givetian.

Plate XXII

- Fig. 1. *Mastopora spicata* (Goldfuss). Z. PAL. T. VIII/49, $\times 30$. Two young corallites in cross-section. Zbrza, Givetian.
Fig. 2. *Aulopora serpens minor* Goldfuss. Z. PAL. T. VIII/1, $\times 30$. a cross-section showing radial structure of wall; b and c cross-sections showing formation of young corallites. Grzegorzowice, Couvinian.
Fig. 3. *Grabaulites jurkowicensis* sp.n. Z. PAL. T. VIII/49 a cross-section, $\times 10$; b fragment showing septal spines and structure of wall resembling that of *Syringopora*, $\times 40$. Jurkowice, Givetian.







Phot. M. Czarnocka

