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STRUCTURE AND BLASTOGENY OF *PALAEOFAVOSIPORA CLAUSA* (LINDSTRÖM, 1865), TABULATA, SILURIAN

Abstract. — New generic name, *Palaeofavosipora*, is proposed for preoccupied name *Favosipora* Stasińska, 1967. New monotypic family Palaeofavosiporidae is considered to be intermediate between the Auloporidae and Favositidae. *Palaeofavosipora clausa* multiplies by budding on the walls.

INTRODUCTION

A representative of the order Auloporida, *Palaeofavosipora clausa* (Lindstroöm), from the Wenlockian of Visby (Östergarn) in the Island of Gotland was described by the present author under the preoccupied name *Favosipora* (Stasińska, 1967). The latter is the younger homonym of a bryozoan *Favosipora* Mc Gillivary, 1885.

After re-examination of the original material it was possible to make some supplementary observations concerning the colony structure and ontogenetic development. Since the genus displays several characters which do not occur in other families assigned to the order Auloporida Sokolov, a new family Palaeofavosiporidae is proposed to include it.

The materials here described are housed in the Naturhistoriska Riksmussets, Stockholm (abbreviated as RM). The drawings were prepared by Mrs. K. Budzyńska, photographs by Miss E. Mulawa and the thin sections by Mrs. M. Nowińska (all from the Palaeozoological Institute of the Polish Academy of Sciences, Warsaw).

DESCRIPTION

Subclass **Tabulata**

Order **Auloporida** Sokolov, 1962

Family **Palaeofavosiporidae** fam.n.

Diagnosis. — As for the type species. Monotypic family.

Genus *Palaeofavosipora* nom.n.
pro *Favosipora* Stasińska, 1967

Type species: *Favosites clausus* Lindström, 1865.

Derivation of the name: similar to *Palaeofavosites* in having angular pores.

Diagnosis. — As for the type species (see below).

Remarks. — *Palaeofavosipora* (= *Favosipora*) has been formerly (Stasińska, 1967) assigned to the Romingeriidae which are characterized by occasional occurrence of pores. New investigations proved, however, that this assignment was incorrect as in *Palaeofavosipora* angular pores are present only. In this feature *P. clausa* much resembles *Palaeofavosites* (Favositidae, Palaeofavositinae). The astogeny in the new family proceeds much alike as in the Auloporidae (*Aulopora*, *Mastopora*) and Favositidae (*Palaeofavosites*, *Mesofavosites* and *Favosites*), i.e. by the budding on the wall. So, morphologically, the new family seems to be intermediate between the Auloporidae and Favositidae. However, the presence of angular pores do not allow to assign *Palaeofavosipora* to the Auloporidae where this feature is lacking. On the other hand the structure of colony which may be massive in places or composed of loosely arranged corallites prevents the assignment of *Palaeofavosipora* to the Favositidae. These facts are the basis to erect for *P. clausa* the new family, Palaeofavosiporidae.

Palaeofavosipora clausa (Lindström, 1865)
(Pl. XXIX, figs 1-6; pl. XXX, figs 1-4)

1865. *Favosites clausus* Lindström: p. 12.
1879. *Vermipora clausa* (Lindström); Nicholson, p. 13, pl. 6, fig. 1a-b.
1896. *Favosites clausus* Lindström: p. 7, pl. 1, figs 9-12; pl. 2, figs 13-18.
1967. *Favosipora clausa* (Lindström); Stasińska, p. 100, pl. 13, figs 1-4.
1975. *Favosipora clausa* (Lindström); Stasińska, p. 37.

Revised diagnosis. — Colony small, in places ramose, in others massive. Corallites loosely arranged or connected together, rounded or polygonal in cross-sections, up to 1.6 mm in diameter. Walls 0.1-0.4 mm thick, fine structure of walls radial. Epitheca thin, dark line between corallites clearly visible. Tabulae uneven, convex, occasionally incomplete. Angular pores 0.1 mm in diameter, present only in connected corallites. Septal apparatus in form of spines being the extensions of walls. Septal spines numerous. Colonies multiply by budding on wall.

Material. — Fragments of 19 colonies.

Supplemented description. — The colony begins with a protocorallite fixed to the substratum. The subsequent corallites rise upwards; they are loosely arranged and connected only in the point of budding. They are round in cross-sections and the epitheca is rather thick (pl. XXX, fig. 3). Tabulae are present. Septal spines originating as extensions of the wall, are numerous and directed upwards; they form vertical rows (pl. XXIX, fig. 5). The structure of the wall is radial. Corallites in places stand closely together forming massive parts of the colony much resembling that of Favositidae Dana (Favositinae Sokolov). In this agglomeration the wall of corallites is thin and the equally thin epitheca is reduced to a dark line. In cross-sections the corallites are polygonal. The microstructure of the wall, the structure of tabulae and septal spines are identical to those of the loosely arranged corallites. The main difference between the loosely arranged corallites and those forming agglomerations is the presence of angular pores in the latter. These pores connect two, sometimes three corallites, a feature very often seen in colonies of *Palaeofavosites*. In addition, the thickening of the wall existing around the angular pore — a characteristic feature of

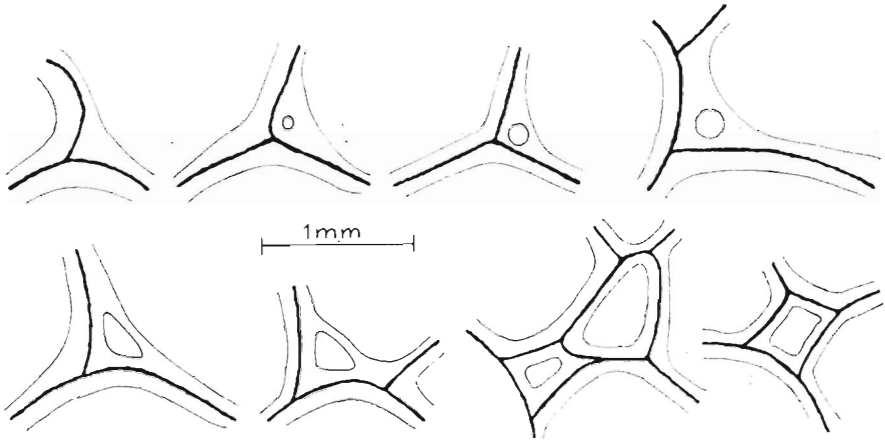

Fig. 1. *Palaeofavosites spiroddensis* Stasińska: formation of young corallite on the wall (ŁG 1325.II.28).

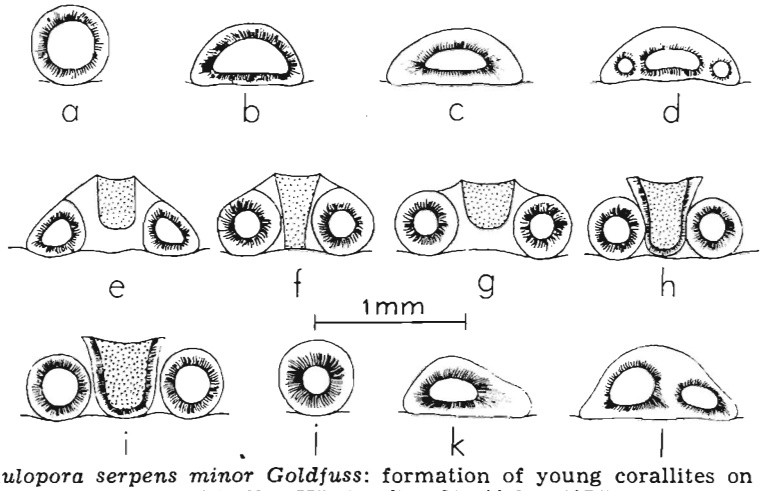

Fig. 2. *Aulopora serpens minor Goldfuss*: formation of young corallites on the wall (Z. PAL. T. VIII-1) (after Stasińska, 1974).

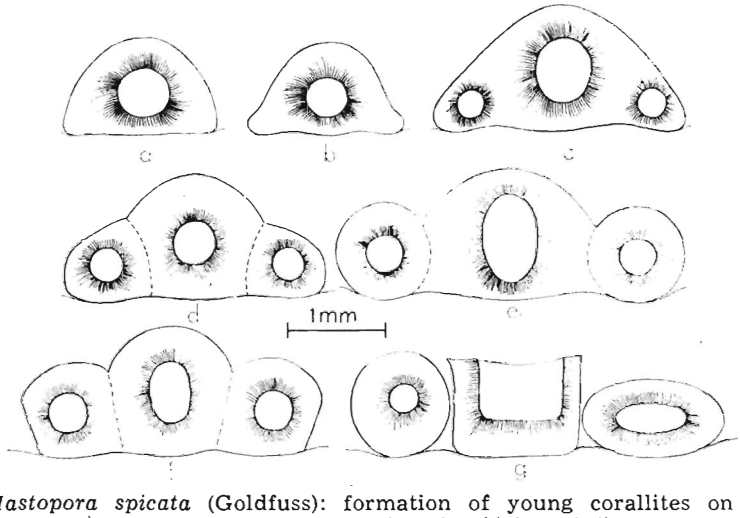

Fig. 3. *Mastopora spicata* (Goldfuss): formation of young corallites on the wall (Z. PAL. T. VIII-49) (after Stasińska, 1974).

Palaeofavosites — makes this similarity even more striking (pl. XXX, fig 1). Very often the angular pores pierce the wall at places where the buds are formed (pl. XXX, fig. 3).

Blastogeny. — Development of the colony begins with a protocorallite which consistes of a bubble-shaped, calcareous cover for the larva. The protocorallite is attached to the substratum. Lindström (1865) stated the auloporoid shape of protocorallite in *P. clausa*. Full astogeny of *Palaeofavosipora* is unknown as the completely preserved protocorallite with its proximal part intact has not been found so far. In contrast to that, the material concerning the blastogeny seems to be complete. The colony development proceeds by the budding on the wall. In the initial stage the thickening of the wall in the corner of the corallite is observed. This is followed by the appearance of a little depression which is round in cross-section and about 0.05 mm in diameter. Subsequently the young corallite secretes its wall separating it from parent corallite. At this stage the offset becomes triangular in cross-section (pl. XXX, fig. 4); it is situated between the neighbouring corallites and completely separated from its parent. By now it becomes distinctly recognizible and therefore this stage of blastogeny has formerly been considered to be the first one. This fact justifies the opinion suggesting the appearance of bud between the corallite walls.

The pattern of budding observed in *P. clausa* is similar to the budding pattern of favositids as *Palaeofavosites* (text-fig. 1), *Squameofavosites*, *Emmonsia* and *Michelinia* (Nowiński, 1976, text-figs 6—9), *Mesofavosites* and *Favosites*. The same type of budding has been found in Auloporidae as *Aulopora* (text-fig. 2), *Mastopora* (text-fig. 3) and in Grabaulitidae (Stasińska 1974, 1975).

The blastogeny of *P. clausa* demonstrates how the transition of a colony from the aulopore stage to the massive type of *Palaeofavosites* has been accomplished. In both cases the colony development follows the same pattern: it begins with a protocorallite whose shape and structure resembles very closely the corallites of *Aulopora*. The subsequent development of colony proceeds in both groups in the same manner — namely by the budding on the wall with the buds initiating on thickened parts of the calice walls. In *P. clausa* the new features such as the accumulation of corallites adhering one to another and the occurrence of connecting pores make their appearance in the distal part of colony. In subsequent stages of evolution these features spread on the entire colony. The level of integration in *P. clausa* was still low as compared with that of Favositida. This species seems therefore to represent an intermediate stage of evolution from *Aulopora* type of colony with the individuals fully independent to massive forms of *Palaeofavosites* type.

As to the problem why in the phylogeny of Favositida the angular pores moved from corners towards walls — the reasonable explanation seems to be as follows: the new individual budding in the corner of corallite could have been the obstacle in free communication between the neighbouring individuals.

The analysis of data concerning the colony structure and blastogeny in Auloporidae (*Aulopora serpens* Goldfuss, *A. liniformis* Lecompte, *A. lataeformis* Stasińska, *A. lata* Lecompte, *Mastopora spicata* (Goldfuss)), Favositidae and *Palaeofavosipora* strongly suggests that the latter genus is a link connecting both families. Thus this closely related group would represent one phyletic lineage.

Occurrence. — Sweden, Island of Gotland (Visby, Östergarn): Wenlockian.

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BUDOWA I BLASTOGENEZA *PALAEOFAVOSIPORA CLAUSA* (LINDSTRÖM, 1865), TABULATA, SYLUR

Streszczenie

Praca niniejsza dotyczy rodzaju z wenloku wyspy Gotland (Visby, Östergarn) opisanego pod nazwą pierwotną *Favosipora* Stasińska, 1967 i zaliczonego do rodziny Romingeriidae Sokolov. Ze względu na to, że nazwa rodzajowa okazała się zajęta, tutaj została zmieniona na *Palaeofavosipora* nom. n.

Na podstawie nowych obserwacji budowy i rozwoju kolonii, badany rodzaj nie może pozostać w składzie rodziny Romingeriidae, ponieważ posiada pory wyłącznie kątowe, jak u rodzaju *Palaeofavosites*. Rozwój koloni następuje przez pączkowanie boczne, z pączkiem pojawiającym się na zgrubiałej części ściany, jak u rodzajów *Aulopora*, *Mastopora*, *Palaeofavosites*, (fig. tekstowe 1—3; pl. XXX), *Mesofavosites* i *Favosites*. Rodzaj ten wykazuje zatem z jednej strony cechy rodziny Auloporidae, a z drugiej strony rodziny Favositidae. Jednakże ze względu na obecność por kątowych, nie znanych u żadnego przedstawiciela Auloporidae, nie może wejść w skład tej rodziny. Budowa kolonii tylko miejscami masywnej, a miejscami zbudowanej z koralitów luźno ułożonych (pl. XXIX, figs 1, 3) nie pozwala także na zaliczenie rodzaju *Palaeofavosipora* do rodziny Favositidae. Dla rodzaju tego zostaje stworzona nowa rodzina Palaeofavosiporidae. *Palaeofavosipora clausa* (Lindström) odznacza się typem kolonii o charakterze przejściowym od kolonii *Aulopora*, której osobniki nie utraciły swej indywidualności, do zwartej kolonii *Palaeofavosites* z osobnikami, które tę indywidualność w znacznym stopniu utraciły na rzecz silniejszego zintegrowania kolonii.

АННА СТАСИНЬСКА

СТРОЕНИЕ И БЛАСТОГЕНЕЗ СИЛУРИЙСКИХ ТАБУЛЯТ *PALAEOFAVOSIPORA CLAUSA* (LINDSTRÖM, 1865), TABULATA, СИЛУР

Резюме

Настоящая работа посвящена роду из венлока о-ва Готланд (Висбю, Эстергарн), описанному под первичным названием *Favosipora* Stasińska, 1967 и отнесенному первоначально к семейству Romingeriidae Sokolov. В связи с тем, что родовое название оказалось занятым, в настоящей работе она изменена на *Palaeofavosipora* nom. n.

Новые данные исследования строения и эволюции колоний доказывают, что указанный род не может оставаться в составе семейства Romingeriidae, так как обладает лишь угловыми порами, как у рода *Palaeofavosites*. Развитие колоний у типичного вида *P. clausa* (Lindström, 1965) происходит путем бокового почкования, с почкой, появляющейся на утолщенной части стекни, как у родов *Aulopora, Mastopora, Palaeofavosites* (фиг. в опис. части 1—3; табл. XXX), *Mesofavosites* и *Favosites*. Следовательно, этот род, с одной стороны, обладает чертами семейства Auloporidae, с другой — семейства Favositidae. Однако, учитывая наличие угловых пор, не наблюдаемых у представителей Auloporidae, он не может быть отнесен к этому семейству. Строение колонии, местами массивной, а местами состоящей из отдельных кораллитов (табл. XXIX, фиг. 1, 3), не позволяет также отнести род *Palaeofavosipora* к семейству Favositidae. В отношении этого рода создается новое семейство Palaeofavosiporidae. *Palaeofavosipora clausa* (Lindström), характеризуется колониями переходного типа между *Aulopora*, особи которой не потеряли своих индивидуальных черт, и *Palaeofavosites*, с особями утерявшими в большой степени свои индивидуальные признаки в пользу более сильной интеграции колоний.

EXPLANATION OF PLATES

Plate XXIX

Palaeofavosipora clausa (Lindström, 1865)
Sweden, Island of Gotland, Visby; Wenlockian

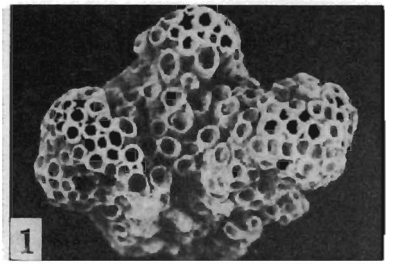
Fig. 1. Side-view of colony, × 2 (RM-1892).
Fig. 2. Cross-section showing angular pores, × 10 (RM-18039).
Fig. 3. Cross-section, × 14 (RM-18031).
Fig. 4. Cross-section showing angular pores and septal spines, × 20 (RM-18091).

Fig. 5. Cross-section of corallite showing radial fine structure of wall, × 65 (RM-1841).
Fig. 6. Cross-section showing a budding corallite and singular pores, × 20 (RM-18045).

Plate XXX

Palaeofavesipora clausa (Lindström, 1865)
Sweden, Island of Gotland, Visby; Wenlockian

Fig. 1. Cross-section of corallite showing angular pore, × 65 (RM-18089).
Fig. 2. Cross-section of a bud, × 65 (RM-18045).
Fig. 3. Cross-section of corallite showing a bud pierced by pore, × 65 (RM-1891).
Fig. 4. Cross-section showing two buds and septal spines, × 65 (RM-18089).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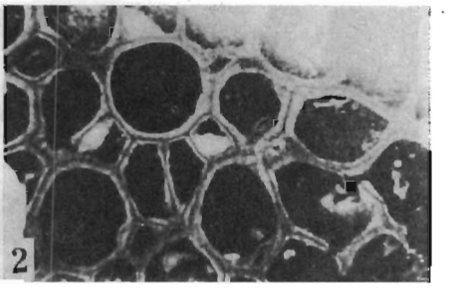
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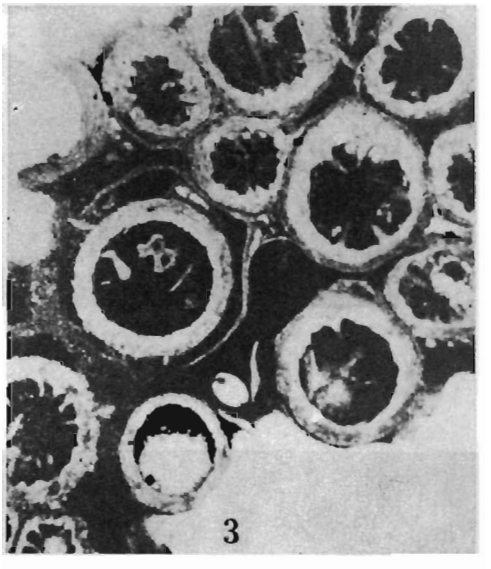
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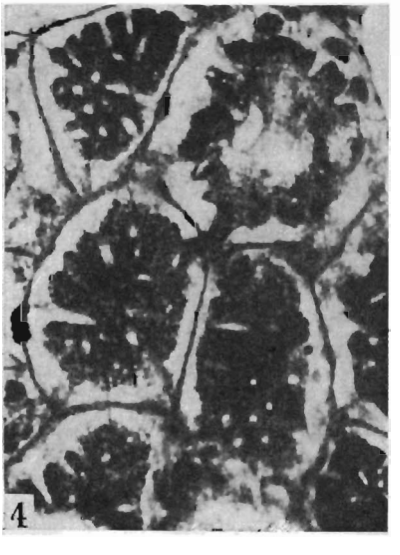
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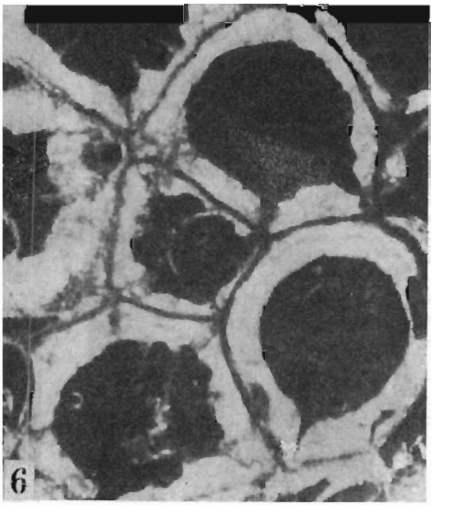
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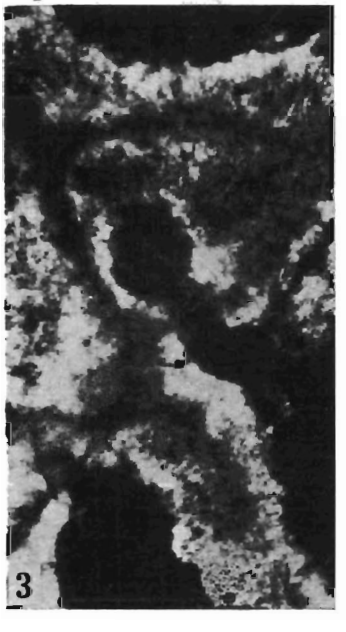
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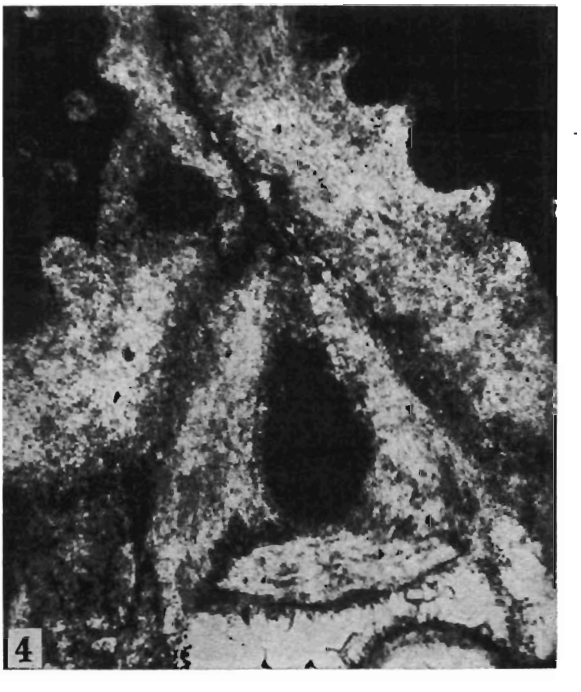
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