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DEVONIAN BRYOZOANS OF THE HOLY CROSS MOUNTAINS, POLAND

PART I. CTENOSTOMATA

Abstract. — Nine species and 3 subspecies of the Couvinian and Givetian bryozoans of the order Ctenostomata Busk, belonging to 5 genera: *Ropalonaria* Miller, *Vinella* Ulrich, *Allonema* Ulrich & Bassler, *Ascodictyon* Nicholson & Etheridge, Jr, and *Eliasopora* Bassler are described. Two of the described species have not been given names (*Vinella* sp. and *Ascodictyon* sp.), one is a new subspecies (*Allonema moniliforme parvum* n. subsp.) and five — new species (*Ropalonaria givetiana* n. sp., *Ascodictyon sparsiforme* n. sp., *Ascodictyon vinelliforme* n. sp., *Ascodictyon venustum* n. sp. and *Eliasopora devoniana* n. sp.). The specimens investigated come from the localities Skały and Grzegorzowice, situated in the eastern part of the Bodzentyn syncline. The problems of age, stratigraphic and geographical range, as well as ecological conditions of the Ctenostomata assemblage investigated are discussed.

INTRODUCTION

The bryozoans, elaborated in the present paper, come from the Łysogóry range of the Holy Cross Mountains (Góry Świętokrzyskie). I collected the most part of the material during the field work of 1954. Some of the specimens, encrusting the Brachiopoda, were obtained by the examination of numerous Middle Devonian brachiopods from Dr G. Biernat's collection under the binocular microscope. *Allonema moniliforme aggregatum* Ulrich & Bassler, preserved on the zoaria *Fistuliramus* sp., were supplied by Dr A. Stasińska and the specimens, attached to the corals *Pseudozonophyllum excentricum* and *P. longani* came from Professor M. Różkowska's collection. I express my thanks to all these persons for placing the specimens mentioned above at my disposal. The elaboration of this material was started in 1963. My work was carried out at the Palaeozoological Institute of the Polish Academy of Sciences, under the supervision of Professor R. Kozłowski whom I most

warmly thank for his continued advise and guidance. I would like also to express my thanks to Professor Z. Kielan-Jaworowska for reading the manuscript and a critical evaluation of the results of my investigations. My thanks are also due to Mrs K. Budzyńska for making the drawings from my pencil sketches and to Miss M. Czarnocka for taking photographs.

The collection described is housed at the Institute of Palaeozoology of the Polish Academy of Sciences for which the abbreviation Z. Pal. is used and it is numbered Br. III/1-156. It makes up the first part of a monographic elaboration of the Devonian bryozoans from the Holy Cross Mountains.

The present paper is the first elaboration of the Middle Devonian Ctenostomata from the Holy Cross Mountains. Devonian Bryozoa have been mentioned by Gürich (1896), Sobolev (1904, 1909), Różkowska (1953, 1954), Pajchlowa (1957) and others. These informations are however very scarce and mostly restricted to mentions in the lists of fauna or, sometimes, to descriptions of a few species, mostly unnamed, belonging to the orders: Cyclostomata Busk, Trepostomata Ulrich and Cryptostomata Vine. The presence of the Ctenostomata was stated only by Pajchlowa (1957) in the list of the Devonian fauna of the Grzegorzowice-Skały section (in complex XXII).

The Ctenostomata, described in the present paper, were discovered during the preparation and cleaning of materials, coming from other orders of the Bryozoa. The discovery of some specimens, encrusting the other bryozoans, was a stimulus to the continuation of the search for them. As a result, 9 species and 3 subspecies of epizoic Ctenostomata were identified. In addition to the zoaria of bryozoans of other orders, the shells of the brachiopods, the stems of the crinoids and the skeletons of the corals made up their substrata. The specimens studied in the present paper, were collected mostly in the outcrops and diggings in the region of Skały where Givetian deposits are developed in the shale facies. In the area of Grzegorzowice, only two forms: *Allonema moniliforme aggregatum* Urlich & Bassler and *Ascodictyon sparsiforme* n. sp. were identified in the mudstones of the Lower Couvinian. A list of species and outcrops which the Ctenostomata investigated come from is shown in Table 1.

MATERIAL

The Ctenostomata are small bryozoans, encrusting the surface of other organisms. They occur in different associations, sometimes formed by two or three species. In many instances, an assemblage consists, in addition to Ctenostomata, of the bryozoans of other orders or, of orga-

Table 1

List of Ctenostomata in the Devonian of the Holy Cross Mountains

Localities and stratigraphy / Species	Grzegorzowice	Skały			
		Complexes			
	III	XIII	XIV	XV	XXII
		Trenches			
	34	72	73	76	119
Ropalonaria givetiana n. sp.	−	−	+	−	+
Vinella sp.	−	−	+	−	+
Allonema moniliforme moniliforme (Whiteaves)	−	+	+	−	−
A. moniliforme aggregatum Ulrich & Bassler	+	+	−	−	−
A. moniliforme parvum n. subsp.	−	+	−	−	+
Ascodictyon sparsiforme n. sp.	+	+	+	+	+
A. vinelliforme n. sp.	−	−	+	−	+
A. venustum n. sp.	−	−	−	−	+
Ascodictyon sp.	−	−	−	−	+
Eliasopora cf. *siluriensis* (Vine)	−	+	+	−	−
E. stellata (Nicholson & Etheridge, Jr)	−	+	+	−	−
E. devoniana n. sp.	−	−	−	−	+

+ present, − absent.

nisms, belonging to other groups of invertebrates (Vermes, Crinoidea, Ostracoda, Trilobita, Tetracoralla and others).

The assemblage of Ctenostomata described here comprises 156 specimens which are preserved mostly in the form of calcareous or, sometimes, limonitized molds. Nine species and 3 subspecies, assigned to 5 genera were identified in our collection. They are: *Ropalonaria* Miller (1 new species), *Vinella* Ulrich (1 unnamed species), *Allonema* Ulrich & Bassler (3 subspecies, in this number, 1 new), *Ascodictyon* Nicholson & Etheridge, Jr (4 species, in this number, 3 new and 1 unnamed) and *Eliasopora* Bassler (3 species, in this number, 1 new). The greatest number of specimens fall to *Allonema moniliforme moniliforme*

(Whiteaves) (37 specimens), *Ascodictyon venustum* n. sp. (26 specimens) and *A. sparsiforme* n. sp. (24 specimens). The best-preserved specimens are those of: *Allonema moniliforme aggregatum* Ulrich & Bassler, *Eliasopora stellata* (Nicholson & Etheridge, Jr) and *E. devoniana* n. sp.

CHARACTERISTICS OF OUTCROPS

The material under study comes from the Grzegorzowice-Skały section (cf. Gürich, 1896; Sobolev, 1904, 1909; Biernat, 1954; Kielan, 1954; Różkowska, 1954; Stasińska, 1954; Pajchlowa, 1957). The recent geological elaboration of this section was done by Pajchlowa (1957). Of the Lower and Middle Devonian deposits, in this area, she recognized 28 lithological-faunistic complexes, denoting them with Roman numerals from I to XXVIII, while the trenches and outcrops, investigated in this area — with Arabic figures from 1 to 135. The Ctenostomata investigated come from the Lower Couvinian, Grzegorzowice beds, found at Grzegorzowice (complex III, trench 34) and from the Givetian Skały beds from Skały (complex III, trench 72; complex XIV, trench 73; complex XV, trench 76 and complex XXII, trench 119) (cf. Fig. 1).

Grzegorzowice. — This locality is situated in the Dobruchna River valley, about 5 km. NE of Nowa Słupia. Among a fairly differentiated fauna, excavated from the Lower Couvinian, Grzegorzowice beds, the Ctenostomata were found only in trench 34[1].

Trench 34. — The Bryozoa, occurring next to the colonies of the Tabulata which predominate here, were found in this trench, about 20 m. long, in mudstones with marly-calcite nodular assemblages, passing, in the top part, into flat lenses. A certain number of specimens, belonging to *Fistuliramus* sp. (Cyclostomata), was supplied by the material, collected in this trench. Outer surfaces of this species are encrusted by many epizoic forms, among them, also by *Allonema moniliforme aggregatum* Ulrich & Bassler and *Ascodictyon sparsiforme* n. sp. (2 specimens preserved on the coral *Pseudozonophyllum* sp.). The corals *Pseudozonophyllum excentricum* and *P. longani* are encrusted by 2 specimens of the total number of 18 representatives of the former species, while the remaining 16 are encrusted on the zoaria of *Fistuliramus* sp.

Skały. — This locality is situated on the eastern slope of the Dobruchna River valley, about 2 km. to the north of Grzegorzowice and about 7 km. to the north-east of Nowa Słupia. As a result of several years of excavations at Skały, a rich and varying palaeontological material has been collected (Stromatoporoidea, Tabulata, Tetracoralla, Brachiopoda, Bryozoa, Trilobita, Ostracoda, etc.) and, to a considerable extent,

[1] The geological interpretation of the trenches, described here, was based on Pajchlowa (1957).

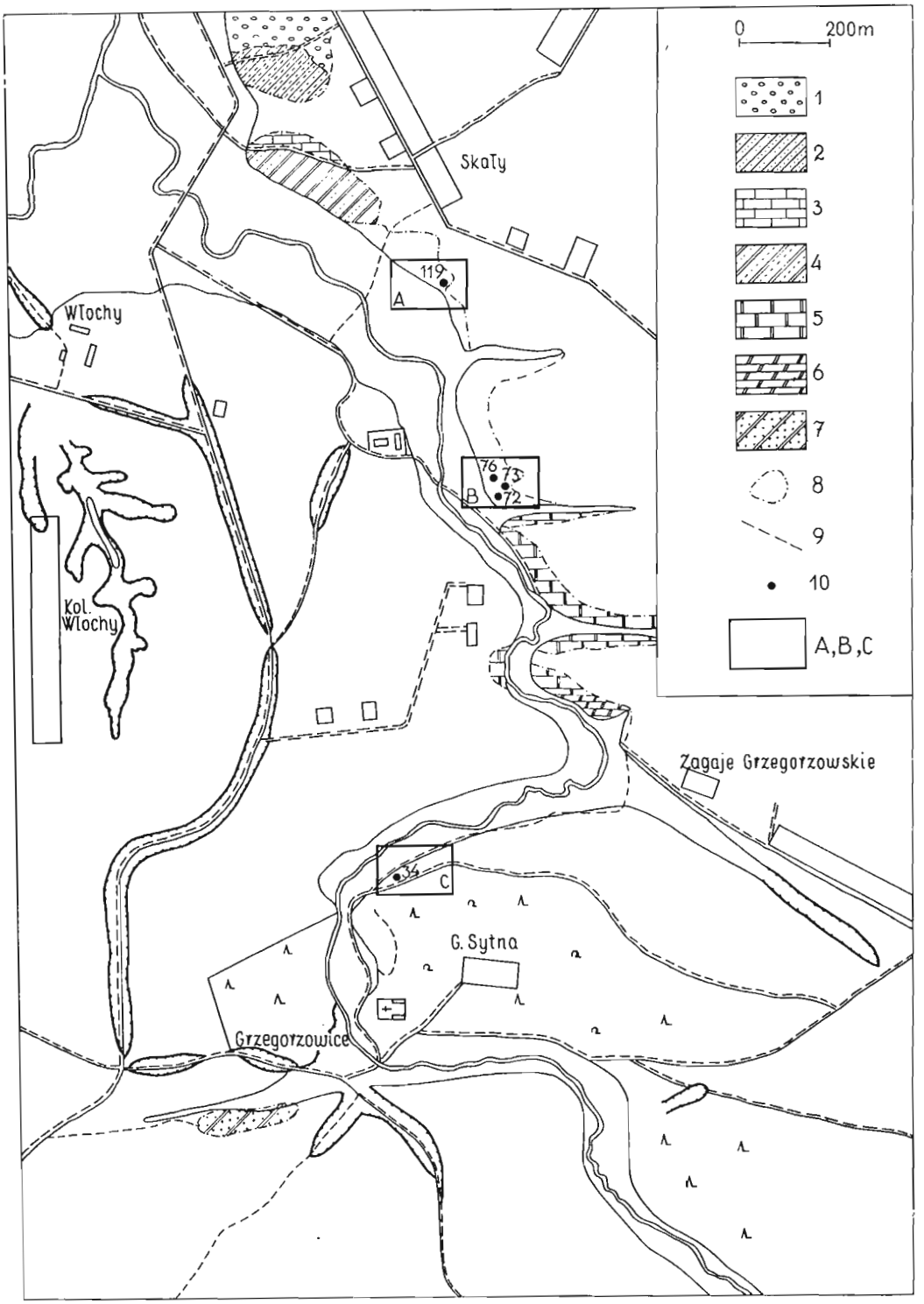
elaborated by different authors. Numerous Bryozoans differentiated are in various states of preservation. According to the preliminary taxonomic identification, 3 genera with a small number of specimens have so far been distinguished among the Cyclostomata (*Corynotrypa* Bassler, *Hederella* Hall, *Fistulipora* McCoy); 3 genera (*Dyoidophragma* Duncan, *Leioclema* Ulrich, *Amplexopora* Ulrich) of the Trepostomata, marked by the greatest number of individuals; 9 genera (*Fenestella* Lonsdale, *Loculipora* Hall, *Polypora* McCoy, *Semicoscinium* Prout, *Penniretepora* d'Orbigny, *Acanthoclema* Hall, *?Orthopora* Hall, *Petaloporella* Prantl, *Sulcoretepora* d'Orbigny), belonging to the Cryptostomata which — in this assemblage — constitute a group with a small number of species and specimens. Ctenostomata are most numerously represented. Among them, 9 species and 3 subspecies have been identified. They come from the following four trenches: 72, 73, 76 and 119, outcropped in the area of Skały.

Trench 72. — This trench, 18 m. long, has been dug on the boundary of two complexes, No. XIII (coral limestone) and No. XIV (brachiopod shale). Six species of the Ctenostomata, that is: *Allonema moniliforme moniliforme* (Whiteaves), *A. moniliforme aggregatum* Ulrich & Bassler, *A. moniliforme parvum* n. sp., *Ascodictyon sparsiforme* n. sp., *Eliasopora* cf. *siluriensis* (Vine) and *E. stellata* (Nicholson & Etheridge, Jr), come from marly shales and marls, outcropped here. All these species occur on the shells of brachiopods.

Trench 73. — Within this trench, over 5 m. long, the Ctenostomata are numerously represented in marls and shales full of brachiopods. Among them, the following 7 species have been identified: *Ropalonaria givetiana* n. sp., *Vinella* sp., *Allonema moniliforme moniliforme* (Whiteaves), *Ascodictyon sparsiforme* n. sp., *A. vinelliforme* n. sp., *Eliasopora* cf. *siluriensis* (Vine) and *E. stellata* (Nicholson & Etheridge, Jr). The species, collected in this trench, are preserved on the surface of ventral and dorsal shells of brachiopods of the genera *Atrypa* and *Schizophoria* or on the fragments of stems of Crinoidea.

Trench 76. — A fauna, consisting mostly of corals, brachiopods and trilobites has been taken out of marls and shale clays, with limestone insets, which was outcropped on an about 5 m. long stretch. Ctenostomata are represented by only one species, *Ascodictyon sparsiforme* n. sp., whose zoaria are disposed on the inner and outer surfaces of the shells of *Atrypa subzonata.*

Trench 119. — Four series of shales occur in this trench over 7 m. long. The central series, that is, argilaceous shale with marly mudstone, appeared to be most abounding in the Bryozoa. In addition to rock-building bryozoans, numerous Brachiopoda and Crinoïdea, as well as — less numerous — Tabulata, Tetracoralla, Trilobita, Gastropoda, Lamellibranchiata and Ostracoda have been recorded. Of the Bryozoa, the most abun-


0 200m
1
2
3
4
5
6
7
8
9
10
A,B,C
Skały
Włochy
Kol. Włochy
119
A
76
73
72
B
Zagaje Grzegorzowskie
C
G. Sytna
Grzegorzowice

dant are here the two genera of the Trepostomata: *Leioclema* Urlich (over 6,000 specimens) and *Amplexopora* Ulrich (over 1,200 specimens). The Cyclostomata are non-numerous. Only 3 genera, represented by a small number of specimens, have been identified. Nine genera of Cryptostomata, mostly represented by only one species, have been identified. On the other hand, particular species are represented by different numbers of specimens. Ctenostomata from the layers of the trench under study constitute the most differentiated assemblage as regards the variety of species. The following 8 species have been here identified in this trench: *Ropalonaria givetiana* n. sp., *Vinella* sp., *Allonema moniliforme parvum* n. subsp., *Ascodictyon sparsiforme* n. sp., *Ascodictyon vinelliforme* n. sp., *Ascodictyon venustum* n. sp., *Ascodictyon* sp. and *Eliasopora devoniana* n. sp.

ECOLOGICAL CONDITIONS

The Ctenostomata, elaborated in the present paper, constituted a part of sessile, benthonic organisms of a natural biotope. The occurrence of these organisms, as epizoic forms, depends on the presence of other ones in this biotope since some of them provided, after their death, a substratum to which the zoaria of the Ctenostomata could be attached. Those were, the corals of the Tetracoralla, the shells of the Brachiopoda, the stems of the Crinoidea or the zoaria of Bryozoa of other orders. However, Ctenostomata have not been found on the Tabulata, Gastropoda and Lamellibranchiata which occurred in the same layers. Conditions, depicting a certain selection of the substratum are shown in Table 2.

The Ctenostomata attached themselves mainly, if not exclusively, to dead organisms. This is proved, for instance, by the distribution of the zoaria on both the dorsal and ventral shells of the Brachiopoda, as well as on both the inner and outer surfaces of such a shell. A marine environment, in which the described species lived, was probably marked by a not very great depth (about 100 m.), characteristic of the neritic zone, by a normal salt content and considerable resources of oxygen and light. That was an environment whose waters were not

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Fig. 1. — Geological sketch of outcroppings in the Grzegorzowice-Skały section (after Pajchlowa, 1957, slightly changed). Variegated sandstone: *1* conglomerate, Givetian and Frasnian(?), Nieczulice series; *2* clayey shale, Givetian, Pokrzywianka series; *3* reef limestone, Świetomarz series; *4* sandstone and shale, Skały series; *A* clayey shale of complex XXII; *B* coral limestone and brachiopods shale of complexes XIII, XIV, XV; *5* Amphipora dolomite, Couvinian; *6* slab dolomites, Grzegorzowice beds; *C* marl and mudstone of complex III, Lower Devonian; *7* sandstone and shale; *8* boundaries of outcrops; *9* dislocations; *10* trenches with the Ctenostomata.

Table 2

List of encrusting Ctenostomata in the Devonian of the Holy Cross Mountains

Species \ Encrusted groups	Tetracoralla	Brachiopoda	Bryozoa	Crinoidea
	Numbers of specimens found			
Ropalonaria givetiana n. sp.	—	5	—	4
Vinella sp.	—	—	—	4
Allonema moniliforme moniliforme (Whiteaves)	—	37	—	—
A. moniliforme aggregatum Ulrich & Bassler	2	—	16	—
A. moniliforme parvum n. subsp.	—	1	—	7
Ascodictyon sparsiforme n. sp.	2	22	—	2
A. vinelliforme n. sp.	—	—	—	10
A. venustum n. sp.	—	—	—	26
Ascodictyon sp.	—	—	—	1
Eliasopora cf. *siluriensis* (Vine)	—	10	—	—
E. stellata (Nicholson & Etheridge Jr)	—	4	—	—
E. devoniana n. sp.	—	—	—	3

very mobile, this being also indicated by the lithological character of its deposits (mudstones, marls). A considerable variety of faunistic assemblages, preserved in lithologically different deposits, observed in particular trenches, testifies to the sedimentological and ecological changes which occurred in this environment. The list of accompanying fauna, occurring together with the Ctenostomata is presented in Table 3.

Grzegorzowice. — The Ctenostomata are represented by only two species (*Allonema moniliforme aggregatum* Ulrich & Bassler and *Ascodictyon sparsiforme* n. sp.), coming from the same trench (complex III, trench 34). The species, mentioned above, occur within accompanying fauna, consisting of the Tetracoralla, Tabulata, Trilobita, Brachiopoda, etc. Some animals which lived in this environment are highly differentiated specifically, for instance, the Tetracoralla (Różkowska, 1954), Tabulata (Stasińska, 1954), Trilobita (Kielan, 1954). A relatively poor differentiation of the Ctenostomata is difficult to explain.

Skały. — Most part of the Ctenostomata, described from this locality (complex XIII, trench 72; complex XIV, trench 73; complex XV, trench

76; complex XXII, trench 119), was supplied by four trenches, dug in the Givetian deposits of the Skały beds. All identified species have been found in the complexes discussed (Table 1), occurring in the greatest numbers in trenches 72, 73 and 119. As epizoic organisms, they were particularly associated with assemblages of the accompanying fauna, inhabiting a given biotope (Table 3). A general character of the fauna

Table 3

List of fauna occurring with Ctenostomata in the Devonian of the Holy Cross Mountains

Groups	Grzegorzowice	Skały			
	III	XIII	XIV	XV	XXII
	34	72	73	76	119
Foraminifera	—	—	+	—	—
Tabulata	⊕	—	—	+	+
Tetracoralla	⊕	—	--	+	+
Gastropoda	—	—	—	—	+
Lamellibranchiata	—	—	—	—	+
Crinoidea	+	+	+	—	⊕
Brachiopoda	⊕	⊕	⊕	⊕	⊕
Bryozoa	+	+	+	+	⊕
Trilobita	⊕	—	—	+	+
Ostracoda	+	—	+	—	+

Legend: Roman numerals indicate complexes, Arabic — trenches (after Pajchlowa, 1957); + present, ⊕ in great quantity, — absent.

and sediments, observed in particular trenches seems to indicate a fact that the lithological and biofacial conditions were subject to frequent changes. A relatively great variety of animal groups of which Bryozoa (Ctenostomata, Cyclostomata, Trepostomata, Cryptostomata) and Brachiopoda are marked by a strong specific differentiation point out a rather calm character of the basin inhabited and conditions, favorable to the development.

In the material elaborated, numerous species are preserved, belonging to different organisms which form natural associations. Particularly numerous assemblages of this type are observed on larger specimens of the accompanying fauna, the latter providing simultaneously a substratum to which not only the delicate zoaria of Ctenostomata, but also other small, epizoic organism can attach themselves. The coral *Pseudozonophyllum* is the best example of such natural association. Assemblages of various encrusting organisms are preserved on their surface. In addition to the Ctenostomata (*Allonema moniliforme parvum* n. sp., *Ascodictyon*

sparsiforme n. sp., *Ascodictyon* sp.), one of such assemblages consists of the Cyclostomata (*Stomatopora* Bronn, *Hederella* Hall, *Hederopsis* Bassler, ?*Ceramoporella* Ulrich) and the Trepostomata (*Dyoidophragma* Duncan, *Leioclema* Ulrich). The Tetracoralla, Annelids tubes and Crinoidea have been identified among other organisms.

STRATIGRAPHIC AND GEOGRAPHICAL RANGE AND AGE OF THE FAUNA DESCRIBED

The Ctenostomata described, among which 50 per cent are new species, represent an endemic assemblage, limited to the Middle Devonian of the Holy Cross Mountains (Table 4). However, three species so far

Table 4

Stratigraphic and geographical distribution of Ctenostomata in the Middle Devonian of the Holy Cross Mountains

Species \ Countries and age	Europe								N. America							
	England				U.S.S.R.				Canada				U.S.A.			
	O	S	D	C	O	S	D	C	O	S	D	C	O	S	D	C
Ropalonaria givetiana n. sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Vinella sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Allonema moniliforme moniliforme (Whiteaves)	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—
A. moniliforme aggregatum Ulrich & Bassler	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—
A. moniliforme parvum n. subsp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ascodictyon sparsiforme n. sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A. vinelliforme n. sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A. venustum n. sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ascodictyon sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eliasopora cf. *siluriensis* (Vine)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E. stellata (Nicholson & Etheridge, Jr)	—	—	—	—	—	—	—	—	—	—	+	—	—	—	+	—
E. devoniana n. sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend: *O* Ordovician, *S* Silurian, *D* Devonian, *C* Carboniferous, + present, — absent.

known from the Palaeozoic sediments of Europe and North America, that is: *Allonema moniliforme moniliforme* (Whiteaves) (the Devonian, Canada), *A. moniliforme aggregatum* Ulrich & Bassler (the Devonian, the USA), and *Eliasopora stellata* (Nicholson & Etheridge, Jr) (the Devonian, Canada, the USA) were identified in this assemblage. The occurrence of the American species in the Ctenostomata assemblage from Poland is maybe only apparent which results from a fact that their skeletons retained taxonomic characters in common with American species but they could differ in the morphology of soft parts which disappeared.

Most species, being endemic, cannot serve as a basis for a recognition of the age of sediments in which they occur. This can be determined on the basis of other fossils, accompanying them (Tetracoralla, Brachiopoda, Trilobita, etc.). According to them, the Grzegorzowice beds (complex III, trench 34) are of the Lower Couvinian age, while those of Skały (complex XIII, trench 72; complex XIV, trench 73; complex XV, trench 76; complex XXII, trench 119) — are Givetian.

SYSTEMATIC PART

Order **Ctenostomata** Busk, 1852

Suborder **Stolonifera** Ehlers, 1876

Family **Ropalonariidae** Bassler, 1953

Genus *Ropalonaria* Ulrich, 1879

Originally, the genus *Ropalonaria* Ulrich was assigned by Ulrich (1890*b*) to the family Ascodictyoniidae with a reservation that it may represent an independent family. In 1900, Nickles and Bassler, influenced by Ulrich's suggestions, erected the family Rhopalonariidae which hereafter was taken into account in the first taxonomic division of fossil bryozoans of the order Ctenostomata, prepared by Ulrich and Bassler (1904). In 1944, the relationship of a few fossil representatives of this order with the Recent Ctenostomata has been questioned by Condra and Elias who placed the genus *Rhopalonaria* among the incertae sedis. On the other hand, this family was left within the Ctenostomata by Bassler (1953) who called it the Ropalonariidae Bassler, 1953, basing this name on a prior name of the genus *Ropalonaria* Ulrich, 1879 and preserving its original spelling.

Type species: Ropalonaria venosa Ulrich, 1879.

Stratigraphic range: Ordovician — Permian.

Ropalonaria givetiana n. sp.
(Pl. I, Fig. 3; Text-fig. 2)

Holotypus: Specimen No. Br. III/7885; Pl. I, Fig. 3, Text-fig. 2.
Stratum typicum: Givetian (complex XXII, trench 119).
Locus typicus: Skały, Holy Cross Mountains, Poland.
Derivatio nominis: givetiana — found in the Givetian.

Diagnosis. — Fusiform or club-shaped internodes non-numerous, 0.4-0.75 mm. long and 0.07-0.1 mm. wide; stolons relatively long; pinnate arrangement of the zoarium not very distinct.

Material. — Nine, not very well-preserved specimens; 4 of them settled on small, multi-joint fragments of the Crinoidea stems and 5 — on inner surfaces of ventral shells of *Atrypa variabilis* Biernat.

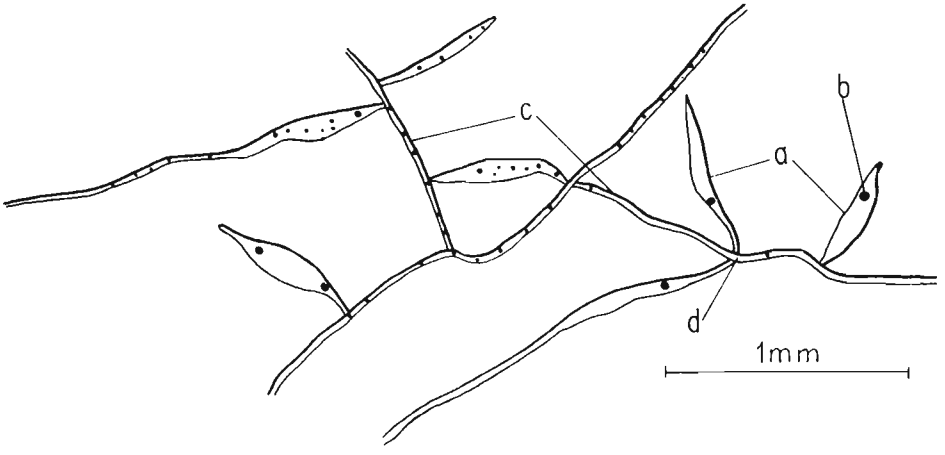

Fig. 2. — *Ropalonaria givetiana* n. sp. Fragment of a zoarium with a partially preserved perforation of internodes and stolons: *a* internodes, *b* communication scar, *c* stolons, *d* node. Skały, complex XXII, trench 119; Z. Pal. No. Br.III/7885.

Description. — Zoarium irregularly arranged, prostrating and fairly strongly adnate owing to a partial embedding in the surface of the shell on which it is settled. A pinnate arrangement of the zoarium indistinct. Internodes few, fusiform or club-like, on the average 1-3 on a 2 mm. space, their length amounting to 0.4-0.75 mm. and width — to 0.07-0.1 mm. The angle of inclination of the internode to the stolons varies within limits of 70° and 110°. Tubular stolons, connected with each other, are relatively long and covered with several fine pores which, due to a clay coating, are not always well visible. Diameters of pores are considerably smaller than widths of stolons and amount to about 1/3 of such a width or, sometimes, even less. The surface of internodes is more or less porous. Communication scars, mostly filled with a slightly darker matrix are difficult to observe. Usually, 1 to 2 or, seldom, more communication scars, mostly subterminally disposed, are preserved on an internode.

Variability. — Internodes, more or less fusiform to club-like in shape, are subject to the greatest changes. In this connection, there is a certain range of their dimensions. The number of communication scars, visible on internodes, varies between 1 and 2, sometimes, a few. The angle of inclination of internodes to a stolon varies within limits of 70° and 110°.

Discussion. — *Ropalonaria givetiana* n. sp. displays a certain similarity to *Rhopalonaria irregularis* Fritz, 1944, which is manifested mostly by an irregular arrangement of the zoarium and approximately equal dimensions. This is depicted by the length of internodes which, in American species, amounts to 0.5 mm. and, in Polish, to 0.4-0.75 mm. and by the number of internodes, over the length of 2 mm., which, in American specimens, is 3 and, in Polish, 1-3. The irregularity in the arrangement of the zoaria with a tendency to a radial disposition, characteristic of *R. irregularis* (cf. Fritz, 1944) occurs on a fragment of one of our specimens. These species differ, however, in their age as *R. irregularis* from New Mexico is the late Upper Devonian while *R. givetiana* n. sp. — the Givetian.

A certain irregularity in the pinnate arrangement of the zoarium has also been recorded, by Ulrich and Bassler (1904), in *Rhopalonaria venosa* Ulrich, 1879, described from the Richmond group in the States of Ohio and Indiana. Condra and Elias (1944), describing two new species: *Rhopalonaria graphicus* Condra & Elias, 1944 from the Wabaunsee group, Pennsylvanian, Kansas, and *R. dendriformis* Condra & Elias, 1944 from the Admire group, Permian, Nebraska, also draw one's attention to the occurrence of irregularly pinnate zoaria in these species.

Ropalonaria givetiana n. sp. displays a certain morphological similarity to *Rhopalonaria tenuis* Ulrich & Bassler, 1904 (the Devonian, Hamilton formation). The difference consists in the length of the stolons which, in the latter species, are considerably shorter and in the smaller diameter of the internodes which, in *R. tenuis,* amounts to 0.5 mm. and, in *R. givetiana* n. sp., to 0.07-0.1 mm.

Occurrence. — Skały, Holy Cross Mountains, complex XIV, trench 73; complex XXII, trench 119, Givetian.

Family **Vinellidae** Ulrich & Bassler, 1904
Genus *Vinella* Ulrich, 1890

The genus *Vinella* was described by Ulrich (1890*a*) from the upper part of the Trenton shales at St. Paul, Minnesota. Nickles and Bassler (1900) assigned it to the Ascodictyonidae Ulrich, 1890. The family Vinellidae was erected for this genus by Ulrich and Bassler (1904). The same taxonomic view was accepted in many later works by, for instance, Bassler (1906, 1911, 1934), Premik (1924) and others. A return of the

genus *Vinella* to the family Ascodictyonidae was suggested by Condra and Elias (1944). This opinion was not shared by Bassler (1953) who left *Vinella* within the Vinellidae. The present author is of the opinion that the group of species, included in the familly Vinellidae does not display any fundamental morphological differences in relation to the group of species, attributed to the Ascodictyidae Miller, 1889 and, therefore, according to Condra and Elias, a common family Ascodictyidae Miller, 1889 should be assumed for both groups discussed. However, in view of contradictory opinions, so far expressed by the students of this group, and of her own, inadequate material, the present writer does not introduce changes to the systematic division of the Ctenostomata, elaborated by Bassler in 1953.

Type species: *Vinella repens* Ulrich, 1890.

Stratigraphic range: Ordovician — Cretaceous.

Vinella sp.

(Pl. I, Fig. 2; Text-fig. 3)

Material. — Four, not very well-preserved specimens, settled on the fragments of stems of the Crinoidea; one of them (Pl. I, Fig. 2), together with *Ascodictyon vinelliforme* n. sp. and *A. venustum* n. sp., encrusts the stem of the crinoid.

Description. — Zoarium consisting of slender, long stolons, undulating or straight. Stolons slightly embedded in the superficial part of the crinoid skeleton, 0.04-0.06 mm. in diameter. They branch dicho-

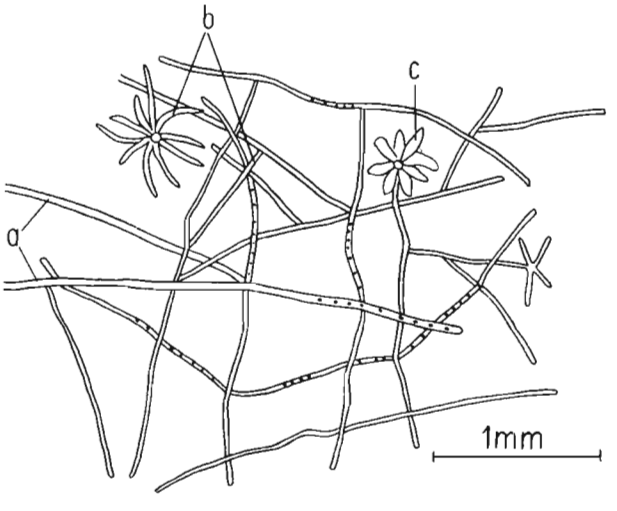

Fig. 3. — Association of zoaria of the three species encrusting a crinoid stem (a semidiagram): *a Vinella* sp., *b Ascodictyon vinelliforme* n. sp., *c Ascodictyon venustum* n. sp. Skały, complex XXII, trench 119; Z. Pal. No. Br.III/7899.

tomously and, only exceptionally, are arranged radially around the central node. A more or less distinct row of pores, disposed lengthwise and at almost equal, small distances from each other, are visible along the stolons.

Variability. — It concerns mostly the length of particular sections of stolons. Besides, within one specimen, stolons are bifurcating or radially arranged.

Discussion. — The specimens described seem to be related to *Vinella repens* Ulrich, although no distinct tendency is observed in them to the differentiation of stolons into segments by constrictions. Stolons of Polish specimens are almost identical in width over their entire length and are smaller than those of *Vinella repens*, described by Ulrich and Bassler (1904) from the *Phylloporina* layers of the Black River sediment at St. Paul, Minnesota. The diameter of stolons of the Polish zoaria amounts to 0.04—0.06 mm. and of the American ones — to 0.06-0.11 mm. Their simple structure makes our specimens, to a certain extent, similar to the representatives of the genus *Condranema* Bassler, for instance, *Condranema carbonarium* (Ulrich & Bassler) from the Lower Coal Measures, Seville, Illinois (Condra & Elias, 1944). The main difference is primarily that the stolons of the *Condranema* bifurcate not so frequently, are uniformly wide and, sometimes, distributed without any definite order, while the stolons of the *Vinella* sp. bifurcate more frequently and display a tendency to a radial arrangement, as well as to the differentiation into segments.

Occurrence. — Skały, Holy Cross Mountains, complex XIV, trench 73; complex XXII, trench 119, Givetian.

Genus *Allonema* Ulrich & Bassler, 1904

It is only the stolons that, in the fossil state, are preserved in this genus. They are characterized, to a considerable extent, by the differentiation into sausage-like segments, called, vesicles, links, etc. which form communication internodes. These segments are disposed in a single row and resemble a string of beads. They may bifurcate with different frequencies. The genus *Allonema* was, together with the *Vinella* Ulrich and *Condranema* Bassler (pro *Heteronema* Ulrich & Bassler), assigned by Ulrich and Bassler to the family Vinellidae Ulrich & Bassler, and not to the Ascodictyidae Miller. They did it on the basis of an absence of delicate, tubular communication stolons by means of which particular vesicles are connected to each other in species of the genus *Ascodictyon* Nicholson & Etheridge, Jr.

The material under study shows close affinities of the genera *Allonema* and *Vinella*. *Allonema* seems to be a form more advanced in its

development and with the differentiation of stolons manifested to a much greater extent. *Vinella,* in which the differentiation of stolons by constrictions was only initiated, may be regarded as an ancestor of *Allonema.* A full development of this character was reached by particular species of the latter genus.

Allonema is represented in the collection studied by *A. moniliforme aggregatum* Ulrich & Bassler and *A. moniliforme parvum* n. subsp.

Type species: Allonema botelloides Ulrich & Bassler, 1904.

Stratigraphic range: Silurian — Carboniferous.

Allonema moniliforme moniliforme (Whiteaves, 1891)

(Pl. IV, Fig. 1; Pl. VI, Figs. 1, 6; Text-figs. 4 *a-c*)

1904. *Allonema moniliforme* (Whiteaves); E. O. Ulrich & R. S. Bassler, A revision of the Paleozoic Bryozoa, Pt. 1, p. 282, Pl. 65, Fig. 14 (non Pl. 67, Fig. 9).

Material. — Thirty seven variously preserved specimens in the form of smaller or larger aggregations of bead-like stolons; all specimens are settled on inner and outer surfaces of the shells of the following brachiopods: *Atrypa variabilis* Biernat, *Desquamatia subzonata* Biernat, *Schizophoria striatula* (Schlotheim), *Schellvienella umbraculum* (Schlotheim).

Description. — Chains of bead-like stolons, prostrating on the shells of the Brachiopoda, consist of fine, usually elongated segments, 4-6 of them over a 2 mm. length. The width of the segments is mostly 2-3 times smaller than their length. They are subelliptic or, less frequently, club-like in outline. They occur mostly in the form of uniserial rows, consisting of a few, for instance, 6, 8, 9, 14, etc. distinctly separated segments. They seldom preserve the traces of small communication scars which are disposed subterminally on a proximal or distal end of a segment. The degree of swelling of segments is insignificant. The walls of segments do not display any distinct perforation and their surface is smooth which may be caused by a comparatively poor state of preservation. Stolons are widely spaced and run somewhat irregularly. Sometimes, single stolon rows intersect or cross each other, forming a sort of a net with more or less definitely shaped mesh, sometimes, approaching a triangle. Stolons branch off stichotomously but their frequency of branching is insignificant.

Variability. — The variability concerns the dimensions and shapes of the segments which are smaller or larger, elliptic or club-like. There are different numbers of segments, forming particular stolonar sections and, therefore, lengths of stolons are also different. A certain sort of discretion predominates in the manner and frequency of branching of stolons (cf. Text-figs. 4 *a—c*).

Discussion. — Polish specimens, compared with those, described in 1891 by Whiteaves from the Devonian of the Hay River in Canada (Ulrich & Bassler, 1904) differ mainly in not forming irregular aggregations of segments. The specimens of *Allonema moniliforme moniliforme*

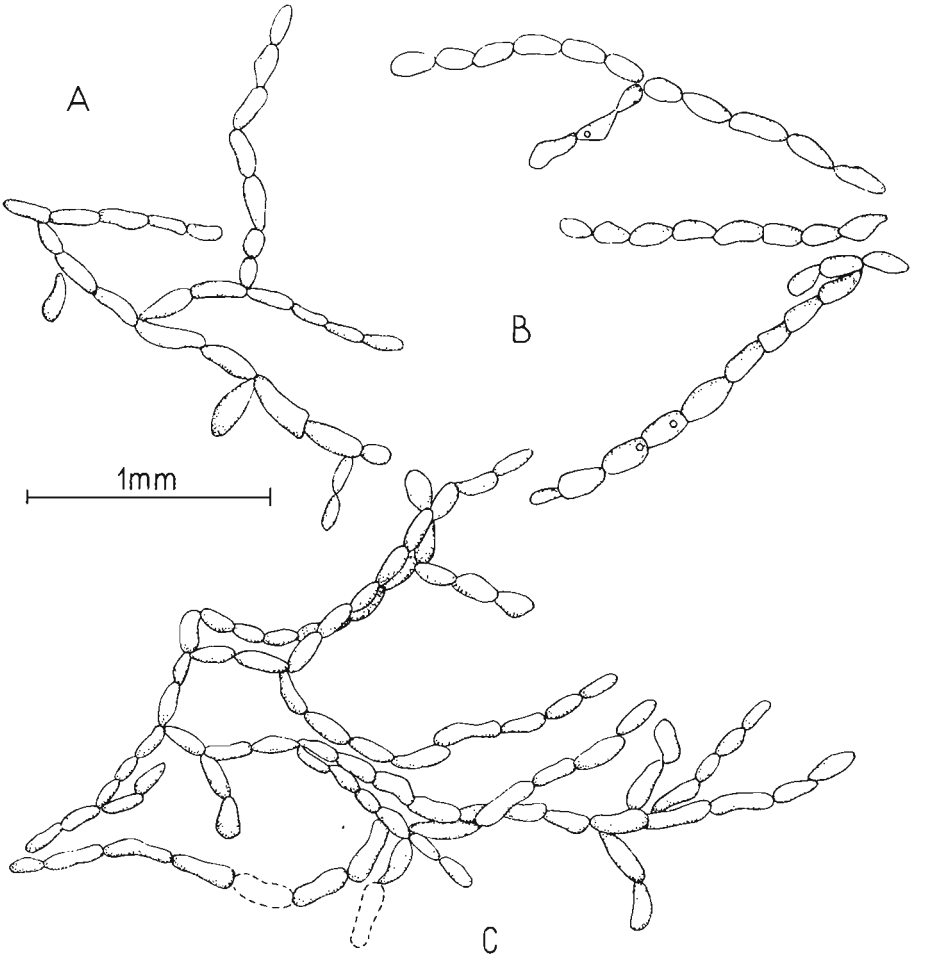

Fig. 4. — *Allonema moniliforme moniliforme* (Whiteaves). Fragments of three zoaria, showing the variability in the arrangement of bead-like branchings, consisting of segments (internodes) different in shape and size. Skały, complex XIII, trench 72; *A* Z. Pal. No. Br.III/7920; *B* Z. Pal. No. Br.III/7926; *C* Z. Pal. No. Br.III/7915.

(Whiteaves) from the Holy Cross Mountains differ from the subspecies *A. moniliforme aggregatum* Ulrich & Bassler (cf. p. 29) in their smaller variability of the shape of internodes and in considerably smaller dimensions which, sometimes, are 2-3 times smaller. In addition, they differ in a slighter branching and wider spacing of the beady stolons, consisting mostly of a larger number of segments. A similarity consists in the dimensions of the branching angle of stolons which, in both subspecies, is similarly variable: acute, obtuse or right.

Occurrence. — Skały, Holy Cross Mountains, complex XIII, trench 72; complex XIV, trench 73, Givetian. In North America: the *Schizophoria striatula* horizon in the Devonian of the Hay River area, Canada.

Allonema moniliforme aggregatum Ulrich & Bassler, 1904

(Pl. V, Figs. 1, 2; Text-fig. 5)

1904. *Allonema moniliforme* var. *aggregatum* new variety; E. O. Ulrich & R. S. Bassler, A revision of the Paleozoic Bryozoa, Pt. 1, pp. 282—283, Pl. 67, Fig. 9 (non Pl. 65, Fig. 14).

Material. — Eighteen well-preserved specimens, of this number, 16 encrusting branch-like zoaria of *Fistuliramus* sp. and, sometimes, spreading over an area of about 3 sq. cm. and 2 occurring on the corals of *Pseudozonophyllum excentricum* and *P. longani* over an area of about 1 sq. cm. Specimens of this subspecies occur in numerous associations.

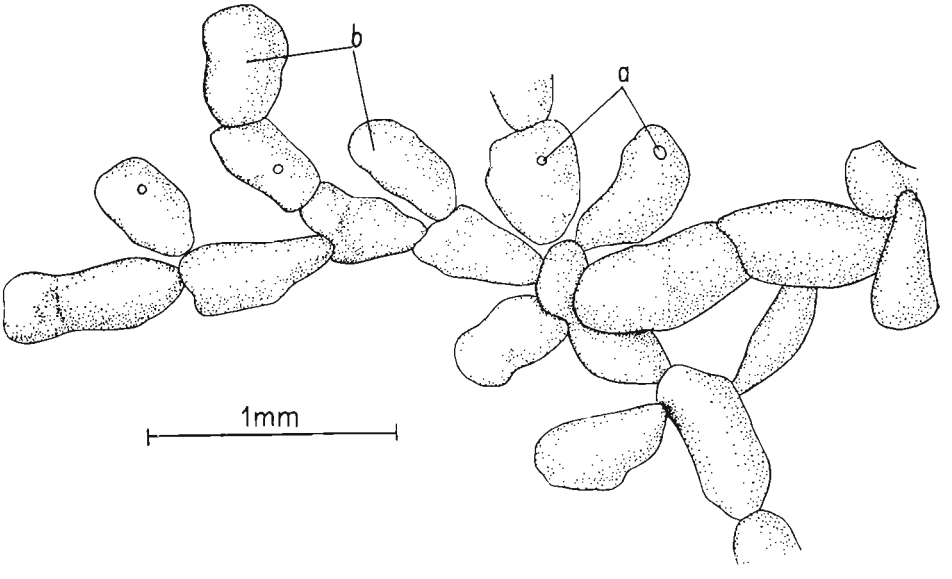

Fig. 5. — *Allonema moniliforme aggregatum* Ulrich & Bassler. Fragment of a zoarium with the communication scars (*a*) preserved on a few internodes (*b*); Grzegorzowice, complex III, trench 34; Z. Pal. No. Br.III/8211.

Description. — Only modified stolons in the form of bead-like chains, consisting of segments, are preserved in the zoarium. Segments are swollen, variable in dimensions and shape which may be pear-like, club-like, fusiform, or other, but mostly elongated and, only exceptionally, rounded. Segment walls are marked by a distinct porosity with very fine foramina, scattered over the entire area. Traces of communication scars, distributed either in the proximal, or distal end, or even in the central part of a seg-

ment, are preserved on some segments. Segments are disposed in uniserial rows, branching mostly by a bifurcation, less frequently, by a trifurcation and, only exceptionally, in any other manner. Lateral rows of segments are situated at an angle of 30—90° to an initial row. In general, a considerable and variable frequency of branching can be observed. Bead-like chains of segments develop in general in one layer and only exceptionally in two or three layers covering one another.

Variability. — The subspecies described displays a considerable variability which has already been pointed out by Ulrich and Bassler (1904, p. 283). It is manifested by a considerable differentiation of internodes

Table 5

Dimensions and shape of segments of *Allonema moniliforme aggregatum* Ulrich & Bassler

Coll. Z. Pal Cat. No.	Length (mm)	Width (mm)	Shape
Br. III/8210	0.80	0.40	pear-like
	0.75	0.30	club-like
	0.70	0.30	club-like
	0.80	0.50	fusiform
	0.90	0.45	fusiform
	1.00	0.45	club-like
	0.40	0.30	rounded
	0.65	0.40	elliptical
	0.45	0.10	club-like
	0.50	0.45	fusiform
Br. III/8211	0.60	0.28	pear-like
	0.43	0.24	elliptical
	0.62	0.24	club-like
	0.70	0.30	club-like
	0.50	0.20	fusiform
	0.60	0.40	club-like
	0.50	0.20	club-like
	0.70	0.28	elliptical
	0.42	0.28	elliptical
	0.52	0.30	club-like
Br. III/8216	0.40	0.20	club-like
	0.70	0.23	club-like
	0.60	0.38	pear-like
	0.72	0.40	elliptical
	0.60	0.32	elliptical
	0.65	0.40	club-like
	0.64	0.48	elliptical
	0.32	0.15	club-like
	0.40	0.30	pear-like
	0.58	0.30	fusiform

in respect to their size and shape, to the extent of the swelling of segments, as well as to the manner and frequency of branching.

Discussion. — *Allonema moniliforme aggregatum* Ulrich & Bassler differs from *A. botelloides* Ulrich & Bassler, 1904, described from the Silurian of the Island of Gotland, in its mostly larger internodes which are longer, wider and more convex. Within bead-like chains, they make up clearly separated internodal links and, besides, they differ in more frequent branchings. A considerable variability of the shape of internodes and a porosity of their walls constitute a character, shared by both these subspecies.

The subspecies described here differs from *A. waldronense* Ulrich & Bassler, 1904, known from the Silurian Waldron shales, Niagaran, Indiana, in its straight and often bifurcating chains of internodes which are more regular in shape and, in general, larger. A considerable variability of the shape of internodes is a common character of both forms compared. Club-like, fusiform and pear-shaped internodes predominate among Polish specimens, while specimens of *A. waldronense* have internodes which are globular, elliptic, pear-like and bilobate in outline.

Occurrence. — Grzegorzowice, Holy Cross Mountains, complex III, trench 34 — Couvinian; Skały, complex XIII, trench 72 — Givetian. North America: USA, Genesee County, New York, the Hamilton formation.

Allonema moniliforme parvum n. subsp.
(Pl. VI, Fig. 4; Text-fig. 6)

Holotypus: Specimen No. Br.III/7918; Pl. VI, Fig. 4.
Stratum typicum: Givetian (complex XXII, trench 119).
Locus typicus: Skały, Holy Cross Mountains, Poland.
Derivatio nominis: *parvus* (Lat.) = small; a subspecies with small internodes.

Diagnosis. — Internodes moderately swollen, small; there are 12-18 of them over a 2 mm. length; they form bead-like, unilaminar rows.

Material. — Eight well-preserved specimens, of this number, 7 settled on multi-segmental fragments of the Crinoidea stems and 1 — on the outer surface of the ventral shell of *Schizophoria striatula* (Schlotheim).

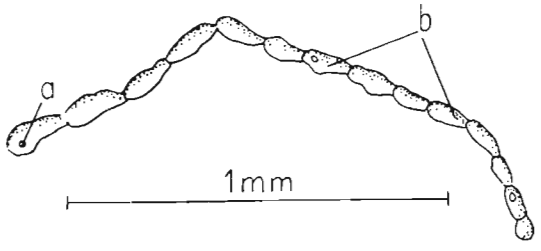

Fig. 6. — *Allonema moniliforme parvum* n. sp. Fragment of a zoarium with the communication scars (*a*) preserved on a few internodes (*b*): Skały complex XIII, trench 72; Z. Pal. No. Br.III/7913

Description. — Extremely delicate form, built of fine, bead-like segments, forming slender rows. Segments are club-like, elliptic or rounded in outline and moderately swollen. Twelve to eighteen segments may be counted along a 2 mm. length. Communication scars are seldom preserved and, usually, they are subterminally distributed over a distal part of a segment. Stolons, with a chain-like arrangement of their internodes, are straight or slightly undulating. They intersect and cross each other and, sometimes, in places where they are more densely accumulated, they form a sort of a net with wide mesh or, indefinite and disorderly, but always unilaminar, aggregates of stolons. Stolons rarely ramify by the bifurcation.

Table 6

Dimensions and shape of internodia of some species of *Allonema* Ulrich & Bassler

Species	Internodia			Age
	Length (mm)	Width (mm)	Shape	
Allonema botelloides Ulrich & Bassler, 1904	0.5	0.25	sausage-like	Silurian, isle of Gotland, Sweden
A. botellus (Vine 1884)	0.5	0.1-1.15	club-like	Silurian, isle of Gotland, Sweden; Silurian, Wenlock slates, England
A. moniliforme moniliforme (Whiteaves, 1891)	0.5	0.2	elliptical	Devonian, Hay River, Canada
	0.3-0.5	0.1-0.2	elliptical	Middle Devonian, Holy Cross Mts, Poland
A. moniliforme aggregatum Ulrich & Bassler, 1904 . . .	—	—	—	Middle Devonian, Hamilton formation, New York, USA
	0.4-1.0	0.2-0.48	club-like	Middle Devonian, Holy Cross Mts, Poland
A. moniliforme parvum n. subsp. . .	0.1	0.4	club-like	Middle Devonian, Holy Cross Mts, Poland
A. waldronense Ulrich & Bassler, 1904	0.5	0.3	elliptical, pear-like, bilobate	Silurian, Waldron shale, Niagaran group, Indiana, USA
A. subfusiforme Ulrich & Bassler, 1904	0.4-1.0	0.22-0.6	bottle-like	Silurian, isle of Gotland, Sweden
A. ? minimum Ulrich	0.1-0.28	0.1	semicircular, oval, pear-like	Carboniferous, Upper Coal Measures, Illinois, USA

Variability. — It mostly concerns the non-uniform dimensions of internodes , 12-18 of them being distributed along a 2 mm. stretch, and their shape which may be club-like, elliptic or round.

Discussion. — *Allonema moniliforme parvum* n. subsp. differs from *A. moniliforme moniliforme* (Whiteaves) and from *A. moniliforme aggregatum* Ulrich & Bassler, in very small dimensions of internodes. Particularly important differences are recorded in *A. moniliforme aggregatum* in which 3-6 internodes are distributed over 2 mm., while in *A. moniliforme parvum* — 12 to 18. There are also considerable differences in a manner and intensity of branching and spreading of stolons.

Occurrence. — Skały, Holy Cross Mountains, complex XIII, trench 72; complex XXII, trench 119 — Givetian.

Family **Ascodictyidae** Miller, 1889
Genus *Ascodictyon* Nicholson & Etheridge, Jr, 1877

The genus *Ascodictyon* Nicholson & Etheridge, Jr has so far been described only from the Palaeozoic sediments of USA (Nicholson & Etheridge, Jr, 1877; Ulrich & Bassler, 1904; Condra & Elias, 1944) and Great Britain (Vine, 1881; 1882; 1884).

In the collection under study, it is represented by the following species: *Ascodictyon vinelliforme* n. sp., *A. venustum* n. sp., *A. sparsiforme* n. sp. and *Ascodictyon* sp.

Type species: *Ascodictyon fusiforme* Nicholson & Etheridge, Jr, 1877.

Stratigraphic range: Silurian — Permian.

Ascodictyon sparsiforme n. sp.
(Pl. I, Fig. 1; Pl. II, Fig. 4; Text-fig. 7)

Holotypus: Specimen No. Br.III/7974; Pl. II, Fig. 4.

Stratum typicum: Givetian (complex XIV, trench 73).

Locus typicus: Skały, Holy Cross Mountains, Poland.

Derivatio nominis: sparsiforme — a species most resembling of *Ascodictyon sparsum* Ulrich & Bassler.

Diagnosis. — Zoarium with strongly developed, loosely distributed vesicles, arranged by ones or by pairs on both sides of thin stolons.

Material. — Twenty six better or worse preserved specimens of which 22 are settled on inner and outer surfaces of shells of *Atrypa variabilis* Biernat, *Desquamatia subzonata* Biernat, *Schizophoria striatula* (Schloth.), 2 on the coral *Pseudozonophyllum* sp., 2 on the fragments of stems of the Crinoidea. Some specimens occur in association with other organisms.

Description. — The zoarium consists of slender, tubular stolons which connect large, strongly swollen vesicles. Stolons are mostly straight and not very numerous. Lateral ramifications are perpendicular to the main

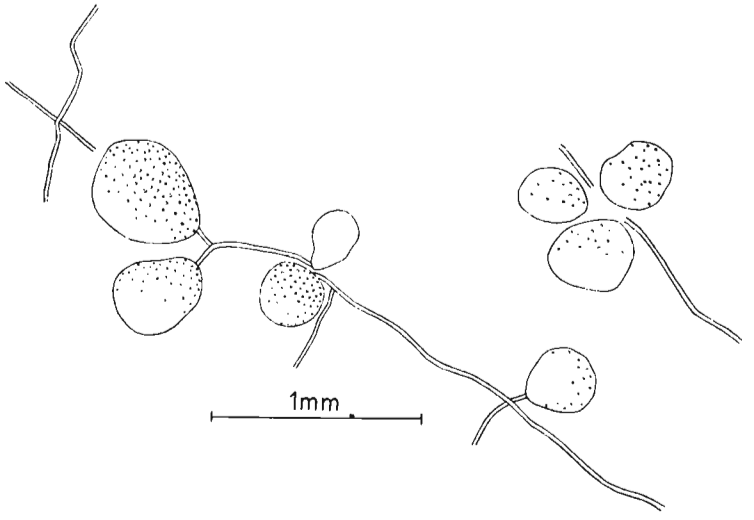

Fig. 7. — *Ascodictyon sparsiforme* n. sp. Fragment of a zoarium with strongly convex vesicles and preserved foramina. Skały, complex XIV, trench 73; Z. Pal. No. Br.III/7974.

stolon. Vesicles may be arranged singly or by pairs on both sides of the stolon. In exceptional cases they are distributed by pairs along the stolon and on one of its sides only. Vesicles are round, oval or pear-like in shape and they may be of a considerable size, their diameter amounting to 0.16—0.54 mm. Distances between particular vesicles can be either very short, or amount to 2 mm. and even more. The walls of vesicles, visible in damaged specimens, are fairly thick and they are equal to or even exceed the diameter of the stolon.

Variability. — The shape and size of the stolons display a considerable variability. In addition to round forms, there are also oval and pear-like. Vesicles are disposed singly or by pairs on both sides of the stolon, or by pairs along the stolon.

Discussion. — In a general pattern of structure, *Ascodictyon sparsiforme* n. sp. approaches mostly *Ascodictyon sparsum* Ulrich & Bassler from the Carboniferous of the USA. It differs from it mainly in vesicle diameters which are much longer in the Polish species (0.16-0.54 mm.) than in the American one (0.15-0.25 mm.). Besides, the shape of vesicles of the Polish zoaria displays a higher degree of variability, they may be oval, round and pear-like. The American species have vesicles which are round in outline. Similarities are, on the other hand, recorded in the manner of the arrangement of vesicles, in the degree of their swelling and in the development of slender, tubular stolons.

Occurrence. — Grzegorzowice, Holy Cross Mountains, complex III, trench 34 — Couvinian; Skały, complex XIII, trench 72; complex XIV, trench 73; complex XV, trench 76; complex XXII, trench 119 — Givetian.

Ascodictyon vinelliforme n. sp.
(Pl. III, Figs. 1, 2; Text-fig. 8)

Holotypus: Specimen No. Br.III/7893; Pl. III, Figs. 1, 2.
Stratum typicum: Givetian (complex XXII, trench 119).
Locus typicus: Skały, Holy Cross Mountains, Poland.
Derivatio nominis: *vinelliforme* — a species approaching the genus *Vinella*.

Diagnosis. — Stellate groups mostly comprising 7-8 very narrow and long vesicles which, in the vicinity of the central nucleus, are slightly extended and swollen; a single row of pores is preserved along the vesicles.

Material. — Ten poorly preserved specimens, partially embedded in the outer surface of the Crinoidea stems.

Description. — Zoaria consist of very narrow, elongated vesicles, distributed in a stellate manner and connected by stolons. A single, oblong row of pores may be observed on some better-preserved vesicles. A single stellate group mostly consists of 7-8, sometimes 10, vesicles

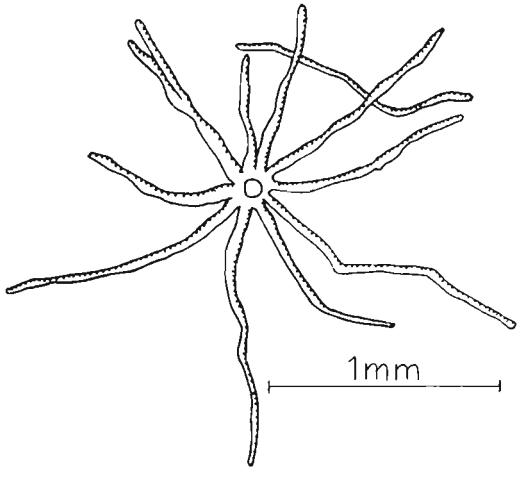

Fig. 8. — *Ascodictyon vinelliforme* n. sp. Fragment of a zoarium, showing one stellate group. Skały, complex XIV, trench 73; Z. Pal. No. Br.III/7899.

which are connected to each other in the radiation point where a mildly embedded nucleus may be observed. Particular vesicles are long and, in the vicinity of nuclei, slightly inflated. Their loose ends are somewhat narrower or, very seldom, bifurcate. An average vesicle diameter amounts to 0.02-0.03 mm. There are different distances between stellate groups of vesicles. They are situated either near each other, or are considerably spaced and connected by long stolons. The diameters of the stolons approach those of narrower parts of vesicles. Stolons intersect each other and do not display any clear and definite design of distribution.

Variability. — It concerns mainly the pattern of the stellate groups of vesicles, the number of vesicles they contain and their lengths. The diameters of these groups and distances between them are also variable; 1-3 such groups may occur over 3 mm.

Discussion. — *Ascodictyon vinelliforme* n. sp. displays the greatest similarity to *A. radiciforme* (Vine), described by Bassler (1906) from the Rochester shales (Lower Silurian) of USA. Both species have similar diameters of their stellate groups and they approach each other in the number, shape and the extent of swelling of their vesicles. Despite these considerable similarities, the present author cannot regard Polish specimen conspecific with the American one on account of both their varying age and a vast distance between the localities of their occurrence.

Occurrence. — Skały, Holy Cross Mountains, complex XIV, trench 73; complex XXII, trench 119 — Givetian.

Ascodictyon venustum n. sp.
(Pl. III, Figs. 3, 4; Text-fig. 9)

Holotypus: Specimen No. Br.III/8203; Pl. III, Figs. 3, 4.
Stratum typicum: Givetian (complex XXII, trench 119).
Locus typicus: Skały, Holy Cross Montains, Poland.
Derivatio nominis: *venustus* (Lat.) = beautiful, for a harmonious arrangement of vesicles.

Diagnosis. — Zoarium with stellate groups of fusiform vesicles, disposed around the central cavity; in a single group there are 8-13 vesicles; vesicles have single rows of pores arranged lengthwise; particular groups of vesicles are connected by a system of slender stolons.

Material. — Mostly poorly preserved zoaria, occurring on the surfaces of 26 specimens of multi-segmental crinoid stems.

Description. — A zoarium consists of elongated vesicles arranged in stellate groups, connected with each other by stolons. Over 10 stolons, situated around a small, circular cavity which is surrounded by a more or less distinctly visible rim, occur in particular groups. Vesicles are fusiform or lobular. Mostly, their smallest diameter is observed half-way their length. Their swelling is most conspicuous in the region of the central cavity and it decreases towards the distal end. Owing to such a development, an entire stellate group reaches its largest height in a central part. Vesicles with various lengths occur within one group. The vesicles may be 2 times longer and, sometimes, they reach even greater lengths. The surface of vesicles is granulated, poorly preserved, very small pores, arranged in a single, variously regular row, being sometimes visible on it. Diameters of groups, in general, do not exceed 2 mm. Particular groups are 1-3 mm. distant from each other and connected by slender, straight stolons. They occur in various numbers,

ramify and intersect or cross each other and, in places where they are most densely accumulated, they form a sort of a net.

Variability. — It concerns the different diameters of stellate groups, amounting to 1, 1.5 or 2 mm. Particular vesicles are mostly fusiform but sometimes also lobular and of other shapes and are either short or long. There are also considerable differences in the distribution of individual groups: some of them occur close to each other, others are distant up to 3 mm. In some parts of the zoarium, stolons are few, in others — numerous.

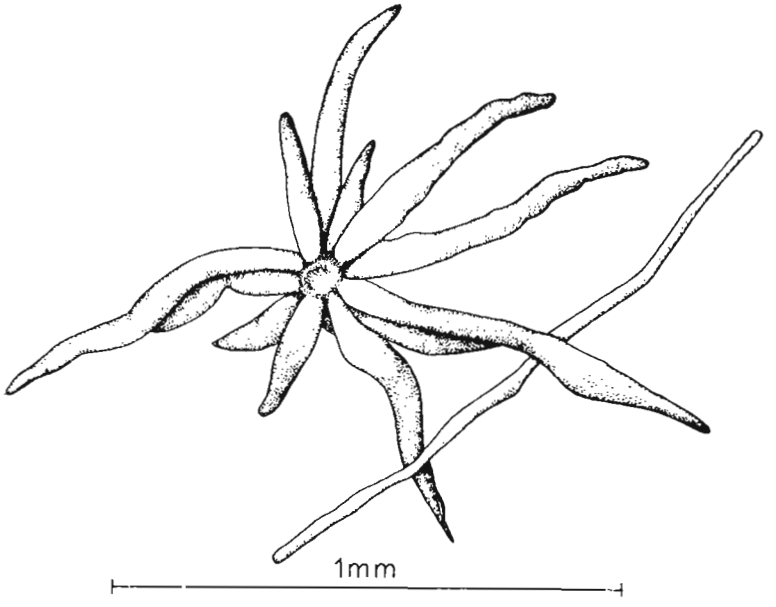

Fig. 9. — *Ascodictyon venustum* n. sp. Fragment of a zoarium showing one stellate group and a part of a stolon. Skały, complex XXII, trench 119; Z. Pal. No. Br.III/8201.

Discussion. — *Ascodictyon venustum* n. sp. differs from *A. radiciforme* (Vine) in having more solid stellate groups, in wider vesicles with relatively high degree of swelling and in a considerably stronger structure of the stolonar system.

Occurrence. — Skały, Holy Cross Mountains, complex XXII, trench 119, Givetian.

Ascodictyon sp.
(Pl. II, Fig. 2)

Material. — One specimen with two stellate groups preserved on a Crinoidea stem.

Description. — Elongated, almost tubular vesicles, are radially disposed around the central cavity 0.25 mm. in diameter. Vesicles are

compactly arranged, adhering to each other and placed in two planes. They are variable in length but with an approximately identical width over the entire length. The trace of the vesicles is slightly undulate and their loose ends are rounded. They are insignificantly inflated. The central depression is surrounded by a low rim. In the upper plane, there are about 15 vesicles. The diameter of the stellate group amounts to about 3 mm.

Variability. — Mostly, it is manifested in the length of vesicles, which may be short or longer.

Discussion. — The specimen described is most similar to *Ascodictyon multiradiata* (Ulrich & Bassler). A stellate group of tubular vesicles, a similar number of vesicles and an identical arrangement in two layers are common for both forms. In both species, vesicles diverge from a central depression (of the same diameter) which is surrounded by a low rim. A main difference consists in the fact that our specimen lacks a distinct arrangement of vesicles in groups, consisting of 3-5 vesicles each, as it may be observed in *Ascodictyon multiradiata* (Ulrich & Bassler).

Occurrence. — Skały, Holy Cross Mountains, complex XXII, trench 119 — Givetian.

Genus *Eliasopora* Bassler, 1952

Eliasopora has been erected by Bassler (1952) to include some representatives of *Ascodictyon* Nicholson & Etheridge, Jr. It is characterized by the development of oval vesicles, arranged in stellate clusters and connected with each other by stolons. In the Holy Cross Mountains material, the genus *Eliasopora* Bassler is represented by the following species: *Eliasopora* cf. *siluriensis* (Vine), *E. stellata* (Nicholson & Etheridge, Jr) and *E. devoniana* n. sp.

Type species: Eliasopora stellata (Nicholson & Etheridge, Jr, 1877).

Stratigraphic range: Silurian — Lower Carboniferous.

Eliasopora cf. *siluriensis* (Vine, 1881)
(Pl. VI, Fig. 3; Text-fig. 10)

Material. — Ten specimens, mostly poorly-preserved, in many cases, limonitized; usually they encrust the outer surface of the shells of *Schizophoria striatula* (Schloth.) and *Desquamatia subzonata* Biernat. One of them occurs in an association with *Ascodictyon sparsiforme* n. sp.

Description. — The zoarium consists of vesicles and slender, tubular stolons. Vesicles are mostly pear-like or oval with acuminate inner ends.

The degree of vesicle swelling is moderate or, in some cases, considerable. Vesicles are 0.2-0.44 mm. long, their largest width amounting of 0.1-0.26 mm. Vesicles are usually arranged loosely in groups, consisting of 2-8 vesicles each, mostly of 4-5. The distribution of individual vesicle groups is not uniform. Beside groups arranged so densely that they touch

Fig. 10. — *Eliasopora* cf. *siluriensis* (Vine). Fragment of zoarium with a few stellate groups and a stolon net. Skały, complex XIII, trench 72; Z. Pal. No. Br.III/7966.

each other, there are also others about 1, 2 or 2.5 mm. distant from each other. Stolons, connecting vesicles, are usually uniformly thick over the entire length and on the average this figure is 0.02 mm. They run along a straight or slightly undulate line, intersect each other and, in places where they are most densely accumulated, they form an irregular net.

Variability. — It concerns mostly the different shape of vesicles which may be pear-like or oviform, the dimensions of vesicles and their numbers in particular groups. The distribution of vesicle groups and the length of single sections of stolons, which connect them, are also variable.

Discussion. — *Eliasopora* cf. *siluriensis* from Poland resembles *Eliasopora siluriensis*, described by Ulrich and Bassler (1904) from the Silurian of North America, in its outline, in its almost identical dimen-

sions and in the distribution of vesicles and stolons. They differ in the fact that a single group in the Polish specimens consists of 2-8 and most frequently, of 4-5 vesicles, while the American specimens have 4-8, although, similarly to the Polish specimens, most frequent figures are 4-5.

The species described can be also compared with the American, Middle Devonian *Eliasopora stellata* (Nicholson & Etheridge, Jr). In both species, similarities consist in the radial arrangement of vesicles and in a manner of distributing them and connecting by linking stolons which form an irregular net. *Eliasopora* cf. *siluriensis* differs from *E. stellata* in the manner in which vesicles are arranged and in proportions, occurring in particular groups, as well as in the shape of vesicles.

Occurrence. — Skały, Holy Cross Mountains, complex XII, trench 72; complex XIV, trench 73 — Givetian.

Eliasopora stellata (Nicholson & Etheridge, Jr, 1877)
(Pl. II, Fig. 3; Pl. IV, Fig. 2; Text-fig. 11)

1877. *Ascodictyon stellatum* Nich. & Eth., Jun.; H. A. Nicholson & R. Etheridge, On Ascodictyon..., p. 464, Pl. 19, Figs. 1-6.
1881. *Ascodictyon stellatum*, Nich. & Eth., Jr; G. R. Vine, Silurian uniserial Stomatoporae..., p. 618.
1892. *Ascodictyon stellatum* Nicholson & Etheridge, Jr; G. R. Vine, British Palaeozoic..., p. 89.
1893. *Ascodictyon stellatum* Nicholson & Etheridge, Jr; E. O. Ulrich, On Lower Silurian Bryozoa..., p. 113, Fig. 8a.
1897. *Ascodictyon stellatum* Nicholson & Etheridge, Jr; G. B. Simpson, A handbook of the Genera..., p. 603, Fig. 220.
1900. *Ascodictyon stellatum* Nicholson & Etheridge, Jr; J. M. Nickles & R. S. Bassler, A synopsis of American..., p. 172.
1904. *Ascodictyon stellatum* Nicholson & Etheridge, Jr; E. O. Ulrich & R. S. Bassler, A revision..., Pt. 1, p. 287, Pl. 68, Fig. 9, 10.
1953. *Eliasopora stellata* (Nich. — E.); R. S. Bassler in R. C. Moore, Treatise..., p. 36, Fig. 9, 2.

Material. — Four fairly well-preserved specimens, encrusting the brachiopod shells; two of them encrust the inner and outer surfaces of the ventral shells of *Atrypa variabilis* Biernat, one — the outer surface of the dorsal shell of *Douvillina interstrialis* (Phillips) and one — the outer surface of the dorsal shell of *Productella subaculeata* Murchison.

Description. — Zoaria consist of distinct stellate groups of vesicles, bound together by a system of delicate stolons. A number of vesicles forming a single stellate group amounts to 3-6, exceptionally to 7 or more. The walls of vesicles are distinctly perforated by fine foramina sometimes displaying a linear disposition. Vesicles can be pear-like, club-like, oviform or oval in shape. In general, they are fairly compactly disposed within a stellate cluster whose diameter usually does not

exceed 1 mm. Distances between groups vary even within one specimen. In some parts, groups are so densely distributed that they touch each other, in other parts they may be considerably spaced, for instance, the distance may amount to 2 mm. The system of connecting stolons may be observed in places where stellate clusters are more spaced. Stolons are shaped like thin tubes, more or less uniform in thickness, running in various directions, intersecting each other and forming an irregular net.

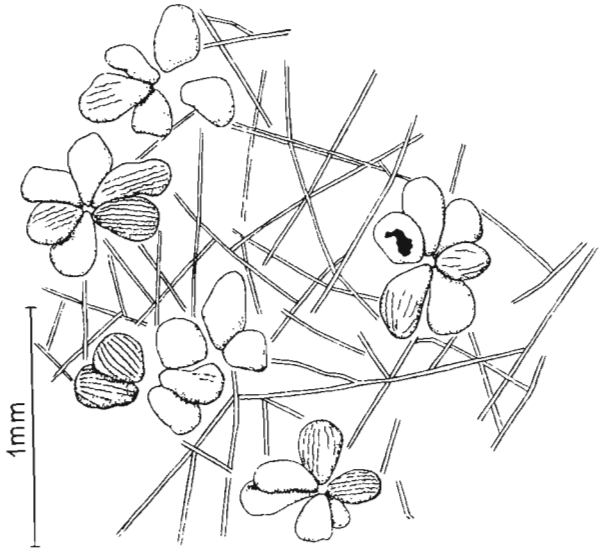

Fig. 11. — *Eliasopora stellata* (Nicholson & Etheridge, Jr). Fragment of a zoarium with a few stellate groups and a stolon net. Foramina, linearly disposed, are visible on some vesicles. Skały, complex XIII, trench 72; Z. Pal. No. Br.III/7987.

Variability. — It concerns the differences in the size, shape and degree of swelling of vesicles, the non-uniform dimensions of stellate groups, the number of vesicles forming particular groups, as well as different distances between individual groups. A non-uniform distribution of these groups is related with different lengths of the connecting stolons.

Discussion. — In its characters, the species described reminds of *Eliasopora siluriensis* (Vine, 1881). Likewise, it displays several features similar to those of *E. florealis* (Ulrich & Bassler, 1904) (cf. Table 7).

Occurrence. — Skały, Holy Cross Mountains, complex XIII, trench 72; complex XIV, trench 73 — Givetian. North America: USA, Hamilton formation, Eighteen Mile Creek and other localities in the State of New York; Canada: Thedford (Widder) and adjoining localities in the Province of Ontario.

Table 7

Comparison of *Eliasopora stellata* (Nich. & Eth.), *E.florealis* (Ulr. & Bassler) and *E.* cf. *siluriensis* (Vine)

Characters	Species	*E. stellata* (Nich. & Eth., 1877)		*E. florealis* (Ulr. & Bassler, 1904)	*E.* cf. *siluriensis* (Vine, 1881)
		Poland	U.S.A.		
Vesicles	Shape	pear-like, club-like, oval	oval, pear-like	—	pear-like
	Diameter	0.08—0.2 mm.	—	—	0.1-0.2 mm
	Length	0.3—0.5 mm.	—	—	0.3-0.5 mm
	Wall	perforated	perforated	—	—
Stellate groups	Number of vesicles	3—6, sometimes more	3—6, sometimes more	—	2—8, most often 4—5
	Diameter	1 mm.	nearly 1 mm.	about 0.5 mm.	—
	Distribution of vesicles	adhering exactly	—	—	—
	Distance between the vesicles	various: 0.0—2.0 mm.	—	smaller than 1 mm.	2.5 mm or more
Connecting stolons	Diameter	0.03—0.04 mm	—	—	0.03 mm
	Pattern	net-like	net-like	—	—
	Other characters	moderately stift	stift, perforated	—	stift

Eliasopora devoniana n. sp.

(Pl. II, Fig. 1; Pl. VI, Figs. 2, 5; Text-fig. 12)

Holotypus: Specimen No. Br. III/8010; Pl. II, Fig. 1; Pl. VI, Figs. 2, 5, Text-fig. 12.

Stratum typicum: Givetian (complex XXII, trench 119).

Locus typicus: Skały, Holy Cross Mountains, Poland.

Derivatio nominis: devoniana = occurring in the Devonian.

Diagnosis. — The zoarium consists of numerous, densely distributed stellate groups, containing 8-12 and, exceptionally, more vesicles each; the shape, degree of swelling, length and width of vesicles — different; connecting stolons thin, not numerous.

Material. — Three specimens growing upon small fragments of the Crinoidea stems; 2 of them well-preserved.

Description. — Large, strongly differentiated vesicles, disposed in distinct stellate groups around a rounded central depression. Stellate

Table 8

Comparison of *Eliasopora devoniana* n. sp. and *E. radians* (Nicholson & Etheridge, Jr)

Characters	Species	*Eliasopora devoniana* n. sp.	*Eliasopora radians* (Nicholson & Etheridge, Jr, 1877)
Vesicles	Shape	Elongated, fusiform, club-like and others.	Elongated, lingulate, fusiform, with extended bases
	Diameter	Max. 0.4 mm.	—
	Length	1 mm. or more	—
	Wall	Perforated on the entire surface, foramina disposed linearly.	Perforated, one row of foramina along a vesicle.
Stellate groups	Number of vesicles	8-12 or more	A few, 10, 15-20
	Diameter	1-2 mm.	—
	Pattern of vesicle distribution	They adhere to each other over the entire or a considerable part of their length.	They adhere to each other over a $^1/_2$ of their length.
	Distances between stellate groups	Densely distributed, touching each other.	Spaced, not touching each other.
Connecting stolons	Diameter	0.04 mm	—
	Manner of distributing	—	Thin, anastomotic, forming a net.

groups are densely distributed and touch each other with outer margins of vesicles. Group diameters amount to 1-2 mm., usually one of the diameters being longer than the other. A group consists of 8-12 and, sometimes, even more vesicles. The shape of vesicles within a group may be different. For the most part, vesicles are elongated, fusiform, or club-like. The length and width of vesicles considerably vary; next to short ones, there are also 2 times longer and next to narrow ones — 2 or more times wider. The degree of swelling of vesicles is considerable. Their maximum length amounts to 1 mm. or, in exceptional cases, much

more and their maximum diameter — to 0.4 mm. The entire surface of the vesicle walls is distinctly perforated. Very fine foramina are linearly disposed. Stolons, connecting vesicles, are seldom preserved in the form of thin threads, sometimes occurring on the surface of stellate groups. Over their entire length, they are uniform in width (about 0.04 mm.).

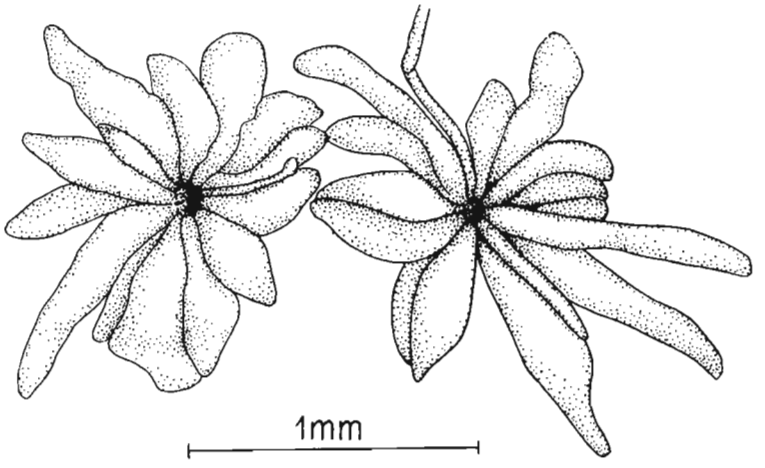

Fig. 12. — *Eliasopora devoniana* n. sp. Fragment of a zoarium, presenting two stellate groups and two impressions of stolons. Skały, complex XXII, trench 119; Z. Pal. No. Br.III/8010.

Variability. — It is manifested by a variable shape, size and degree of the swelling of vesicles. Certain differences may also be observed in the dimensions of stellate groups and in the density of their distribution.

Discussion. — *Eliasopora devoniana* n. sp. is most similar to *E. radians* (Nicholson & Etheridge, Jr, 1877) (cf. Table 8).

Occurrence. — Skały, Holy Cross Mountains, complex XXII, trench 119 — Givetian.

Palaeozoological Institute
of the Polish Academy of Sciences
Warszawa, December, 1963

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BRYOZOA DEWOŃSKIE GÓR ŚWIĘTOKRZYSKICH

CZĘŚC I. CTENOSTOMATA

Streszczenie

WSTĘP

Praca niniejsza jest pierwszym opracowaniem środkowo-dewońskich Ctenostomata z pasma łysogórskiego Gór Świętokrzyskich. Opisane tutaj mszywioły pochodzą z profilu Grzegorzowice-Skały, którego stratygrafia została opracowana ostatnio przez Pajchlową (1957). Pajchlowa wydzieliła dla utworów dolnego i środkowego dewonu tego profilu 28 litologiczno-faunistycznych kompleksów skalnych opierając się na przebadanych 135 przekopach, szybikach i odsłonięciach. Opisywane Ctenostomata pochodzą z dolno-kuwińskich warstw grzegorzowickich z Grzegorzowic (kompleks XIII, przekop 34) i z żyweckich warstw skalskich ze Skał (kompleks XIII, przekop 72; kompleks XIV, przekop 73; kompleks XV, przekop 76; kompleks XXII, przekop 119) (p. tekst angielski: Tabela 1, s. 13 i Fig. 1, s. 16).

Zidentyfikowano 9 gatunków i 3 podgatunki należące do 5 rodzajów: *Ropalonaria* Miller, *Vinella* Ulrich, *Allonema* Ulrich & Bassler, *Ascodictyon* Nicholson & Etheridge Jr. i *Eliasopora* Bassler. Wśród opisanych gatunków dwa nie zostały nazwane (*Vinella* sp., *Ascodictyon* sp.), jeden jest podgatunkiem nowym (*Allonema moniliforme parvum* n. subsp.), a pięć gatunkami nowymi (*Ropalonaria givetiana* n. sp., *Ascodictyon sparsiforme* n. sp., *A. vinelliforme* n. sp., *A. venustum* n. sp., *Eliasopora devoniana* n. sp. (p. tekst angielski: Tabela 1, s. 13). Wszystkie rozpoznane gatunki jako formy epizoiczne porastały, poza zoariami mszywiołów innych rzędów, skorupki brachiopodów, łodygi liliowców i szkielety koralowców.

Zbadane Ctenostomata, wśród których połowę stanowią gatunki nowe, są w przeważającej części formami endemicznymi. Mają one ograniczone rozprzestrzenienie czasowe i przestrzenne do środkowego dewonu Gór Świętokrzyskich (p. tekst angielski, Tabela 4, s. 20). Tylko 4 gatunki znane są z utworów paleozoicznych Europy i Ameryki Północnej.

DIAGNOZY NOWYCH FORM

Rodzaj *Ropalonaria* Ulrich, 1879

Ropalonaria givetiana n. sp.

(Pl. I, fig. 3; Tekst-fig. 2)

Diagnoza. — Wrzecionowate lub maczugowate internodia nieliczne, o długości od 0,4 do 0,75 mm i szerokości od 0,07 do 0,1 mm; stolony stosunkowo długie; pierzasty układ zoarium niezbyt wyraźny.

Rodzaj *Allonema* Ulrich & Bassler, 1904

Allonema moniliforme parvum n. subsp.

(Pl. VI, fig. 4; Tekst-fig. 6)

Diagnoza. — Internodia umiarkowanie nabrzmiałe, małych rozmiarów, w 2 mm od 12 do 18; tworzą paciorkowate jednowarstwowe szeregi.

Rodzaj *Ascodictyon* Nicholson & Etheridge, Jr, 1877

Ascodictyon sparsiforme n. sp.

(Pl. I, fig. 1; Pl. II, fig. 4; Tekst-fig. 7)

Diagnoza. — Zoarium o silnie rozwiniętych pęcherzach, luźno rozmieszczonych, ustawionych pojedynczo lub parami po obydwu stronach cienkich stolonów.

Ascodictyon vinelliforme n. sp.

(Pl. III, fig. 1, 2; Tekst-fig. 8)

Diagnoza. — Ugrupowania radialne najczęściej obejmują 7 do 8 bardzo wąskich i długich pęcherzy, nieznacznie poszerzonych i nabrzmiałych w okolicy centralnego jądra; wzdłuż pęcherzy zachowuje się jeden rząd porów.

Ascodictyon venustum n. sp.

(Pl. III, fig. 3, 4; Tekst-fig. 9)

Diagnoza. — Zoarium o pęcherzach wrzecionowatych ułożonych w stelarne ugrupowania wokoło centralnego zagłębienia; w jednym ugrupowaniu od 8 do 13 pęcherzy; pęcherze o jednym rzędzie por ułożonych podłużnie; ugrupowania pęcherzy połączone systemem cienkich stolonów.

Rodzaj *Eliasopora* Bassler, 1953

Eliasopora devoniana n. sp.

(Pl. II, fig. 1; Pl. VI, fig. 2, 5; Tekst-fig. 12)

Diagnoza. — Zoarium złożone z licznych, gęsto rozmieszczonych ugrupowań stelarnych, zawierających od 8 do 12 pęcherzy każde, wyjątkowo więcej; kształt, stopień nabrzmienia, długość i szerokość pęcherzy różne; stolony łączące cienkie, bardzo nieliczne.

МАРИЯ КЕПУРА

ДЕВОНСКИЕ МШАНКИ СВЕНТОКРЖИСКИХ ГОР (ПОЛЬША)

ЧАСТЬ I. CTENOSTOMATA

Резюме

ВВЕДЕНИЕ

Настоящая работа является первым изучением средне-девонских Ctenostomata из лысогурского района Свентокржиских Гор. Описанные мшанки происходят из разреза Гржегоржовице-Скалы, стратиграфия которого установлена Пайхлевой (Pajchlowa, 1957). На основании исследования 135 перекопов, шурфов и обнажений, Пайхлева в образованиях нижнего и среднего девона выделила в этом разрезе 28 литолого-фаунистических комплексов. Описанные Ctenostomata происходят из гржегоржовицких слоев в местности Гржегоржовице (комплекс III, перекоп 34) и из скальских слоев живета в местности Скалы [комплекс XIII, перекоп 72; комплекс XIV, перекоп 73; комплекс XV, перекоп 76; комплекс XXII, перекоп 119) (см. английский текст: Таб. 1 и Фиг. 1, стр. 13 и 16).

Определено 9 видов и 3 подвида принадлежащих к 5 родам: *Ropalonaria* Miller, *Vinella* Ulrich, *Allonema* Ulrich & Bassler, *Ascodictyon* Nicholson & Etheridge, Jr. и *Eliasopora* Bassler. Среди описанных видов, двум не дано названия (*Vinella* sp., *Ascodictyon* sp.), один это новый подвид (*Allonema moniliforme parvum* n. subsp.), а пять становят новые виды (*Ropalonaria givetiana* n. sp., *Ascodictyon sparsiforme* n. sp., *A. vinelliforme* n. sp., *A. venustum* n. sp., *Eliasopora devoniana* n. sp.) (см. английский текст: Таб. 1, стр. 13). Все изученные виды — это эпизоичные формы, которые поселялись на зоариях иных мшанок, на поверхности раковин брахиопод, стебелей морских лилий и на скелетах кораллов.

Изученные Ctenostomata, среди которых половина это новые виды, становят преимущественно эндемичные формы. Их распространение по времени и пространству ограничено к среднему девону Свентокржиских Гор (см. английский текст: Таб. 4, стр. 20). Только четыре вида известны из палеозойских отложений Европы и Северной Америки.

ДИАГНОЗЫ НОВЫХ ФОРМ

Род *Ropalonaria* Ulrich, 1879

Ropalonaria givetiana n. sp.

(Пл. I, фиг. 3; Текст-фиг. 2)

Диагноз. — Интернодия немногие веретенообразные или же в виде палицы, длины 0,4 — 0,75 мм и ширины 0,07 — 0,1 мм; столоны довольно длинные; перистое расположение зоарии не очень четкое.

Род *Allonema* Ulrich & Bassler, 1904

Allonema moniliforme parvum n. subsp.

(Пл. VI, фиг. 4; Текст-фиг. 6)

Диагноз. — Интернодия умеренно вздутые, малых размеров, в числе 12 — 18 в 2 мм; образуют однослойные ряды в виде бусов.

Род *Ascodictyon* Nicholson & Etheridge, Jr. 1877

Ascodictyon sparsiforme n. sp.

(Пл. I, фиг. 1; Пл. II, фиг. 4; Текст-фиг. 7)

Диагноз. — Зоария с сильно развитыми пузырями, свободно расположенными поодиночке или парами по обеим сторонам тонких столонов.

Ascodictyon vinelliforme n. sp.

(Пл. III, фиг. 1, 2; Текст-фиг. 8)

Диагноз. — Радиальные группировки по большей части вмещают 7 — 8 узких и длинных пузырей, незначительно поширенных и вздутых в области центрального ядра; вдоль пузырей сохраняется один ряд пор.

Ascodistyon venustum n. sp.

(Пл. III, фиг. 3, 4; Текст-фиг. 9)

Диагноз. — Зоария с веретенообразными пузырями, составляющими стелярные группировки вокруг центрального углубления; в одной группировке находится от 8 до 13 пузырей; пузыри имеют один ряд пор продольно расположенных; группировки пузырей соединены системой тонких столонов.

Род *Eliasopora* Bassler, 1953

Eliasopora devoniana n. sp.

(Пл. II, фиг. 1; Пл. VI, фиг. 2, 5; Текст-фиг. 12)

Диагноз. — Зоария состоит из многих, густо расположенных стелярных группировок; каждая из них имеет 8 — 12 пузырей и только исключительно может их быть больше; форма, степень вздутья, длина и ширина пузырей неодинаковые; соединяющие столоны немногие и тонкие.

PLATES

Plate I

Ascodictyon sparsiforme n. sp.

Fig. 1. Fragment of a zoarium encrusting the inner surface of the ventral shell of *Desquamatia subzonata* Biernat; × 15. Skały, complex XIV, trench 73; Z. Pal. No. Br. III/7968.

Fig. 2. Association of fragmentary zoaria of three species of the Ctenostomata, encrusting a crinoid stem: *A Vinella* sp., *B Ascodictyon vinelliforme* n. sp., *C Ascodictyon venustum* n. sp.; × 25. Skały, complex XXII, trench 119; Z. Pal. No. Br. III/7899.

Ropalonaria givetiana n. sp.

Fig. 3. Fragment of a zoarium, encrusting a crinoid stem; × 20. Skały, complex XXII, trench 119; Z. Pal. No. Br. III/7885, holotype.

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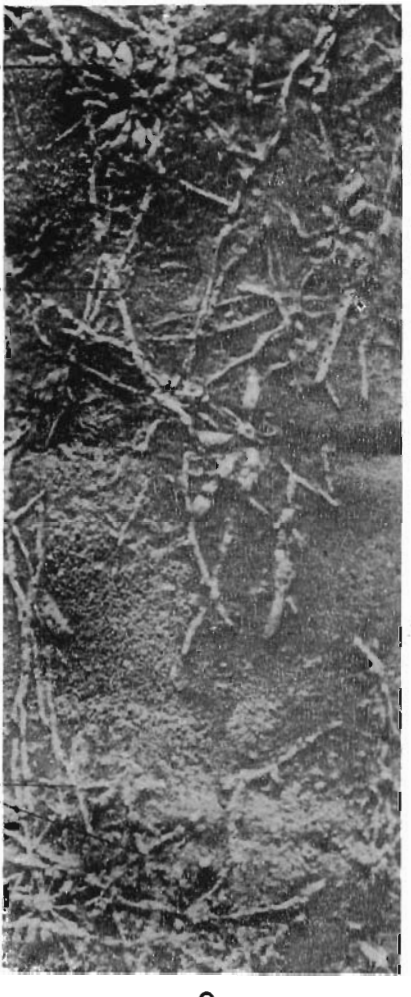

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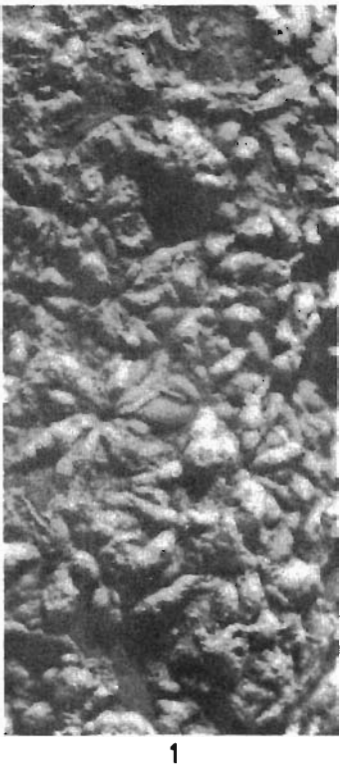
Phot. M. Czarnocka



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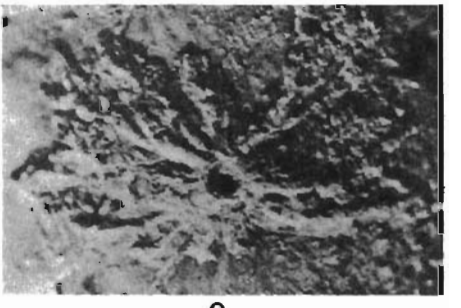

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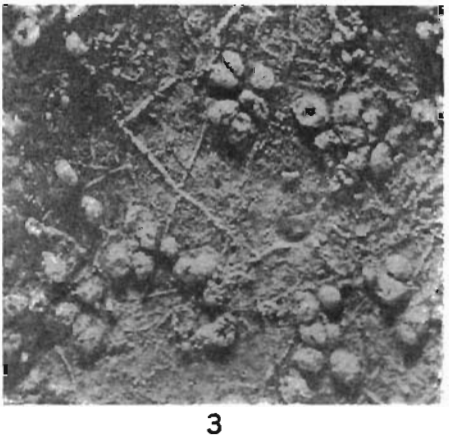

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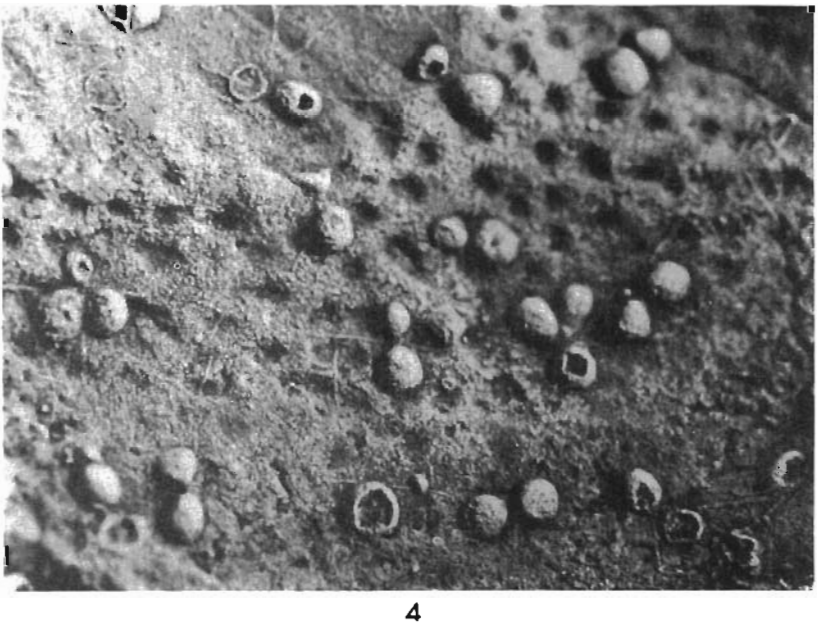

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Plate II

Eliasopora devoniana n. sp.

Fig. 1. Fragment of a zoarium, encrusting a crinoid stem; × 10. Skały, complex XXII, trench 119. Z. Pal. No. Br. III/8010.

Ascodictyon sp.

Fig. 2. Fragment of a zoarium with one stellate group, encrusting a crinoid stem; × 20. Skały, complex XXII, trench 119; Z. Pal. No. Br. III/8009.

Eliasopora stellata (Nicholson & Etheridge, Jr)

Fig. 3. Fragment of a zoarium, encrusting the inner surface of the ventral shell of *Atrypa variabilis* Biernat; × 15. Skały, complex XIV, trench 73; Z. Pal. No. Br. III/7999.

Ascodictyon sparsiforme n. sp .

Fig. 4. Fragment of a zoarium, encrusting the inner surface of the ventral shell of *Schizophoria striatula* (Schloth.); × 15. Skały, complex XIV, trench 73; Z. Pal. No. Br. III/7974, holotype.

Plate III

Ascodictyon vinelliforme n. sp.

Fig. 1. Fragment of a zoarium with a few stellate groups, encrusting a crinoid stem; × 15. Skały, complex XXII, trench 119; Z. Pal. No. Br. III/7893.

Ascodictyon vinelliforme n. sp.

Fig. 2. Magnified fragment of the same zoarium as in Fig. 1; × 30. Skały, complex XXII, trench 119; Z. Pal. No. Br. III/7893.

Fig. 3. Association of fragmentary zoaria of the two species of the Ctenostomata, encrusting a crinoid stem: *A Ascodictyon venustum* n. sp., *B Ascodictyon vinelliforme* n. sp.; × 15. Skały, complex XXII, trench 119; Z. Pal. No. Br. III/8203.

Ascodictyon venustum n. sp.

Fig. 4. Magnified fragment of the same zoarium as in Fig. 3 *A*; × 25. Skały, complex XXII, trench 119; Z. Pal. No. Br./8203.

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Phot. M. Czarnocka

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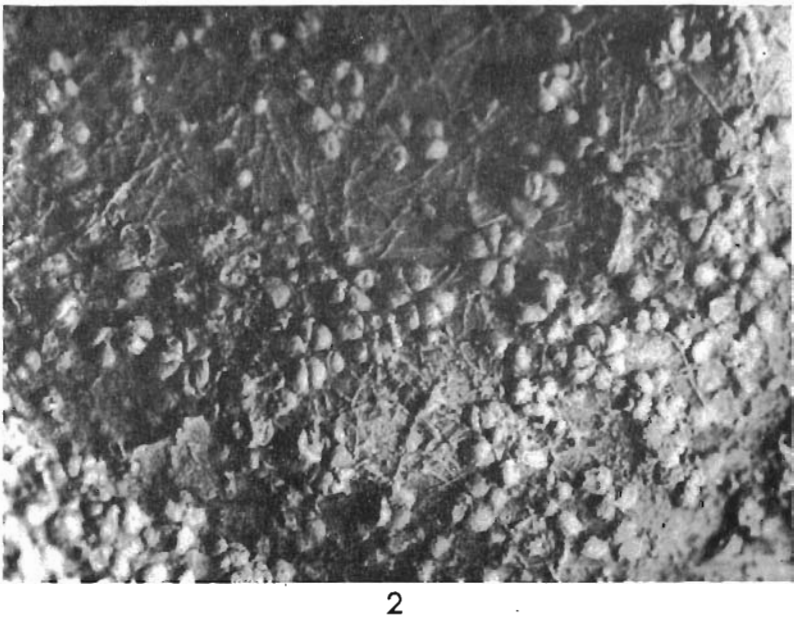

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Phot. M. Czarnocka

Plate IV

Allonema moniliforme moniliforme (Whiteaves)

Fig. 1. Fragment of a zoarium, encrusting the outer surface of the dorsal shell of *Schizophoria striatula* (Schloth.); × 12. Skały, complex XIV, trench 73; Z. Pal. No. Br. III/7938.

Eliasopora stellata (Nicholson & Etheridge, Jr)

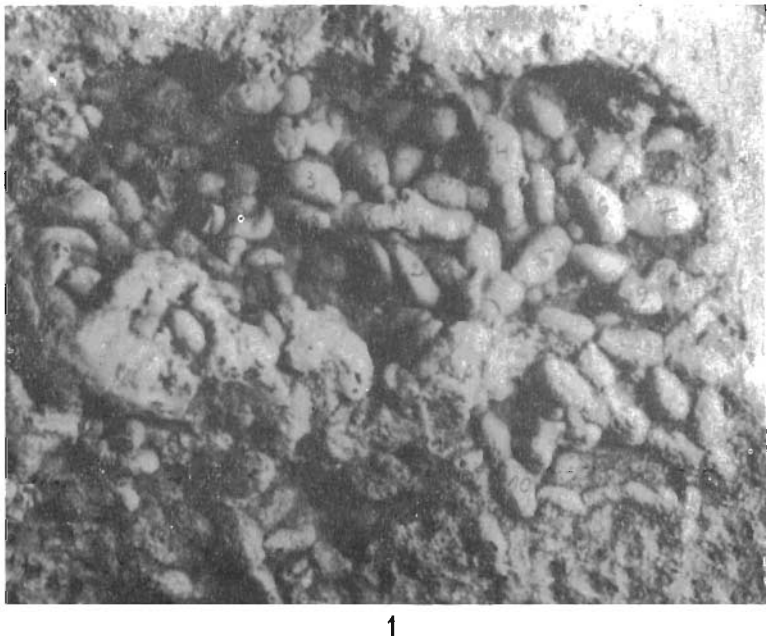
Fig. 2. Fragment of a zoarium, encrusting the inner surface of the ventral shell of *Atrypa variabilis* Biernat; × 12. Skały, complex XIII, trench 72; Z. Pal. No. Br. III/7987.

Plate V

Allonema moniliforme aggregatum Ulrich & Bassler

Fig. 1. Fragment of a zoarium, encrusting the outer surface of *Fistuliramus* sp. (Cyclostomata); × 15. Grzegorzowice, complex III, trench 34; Z. Pal. No. Br. III/8216.

Fig. 2. Fragment of a zoarium, encrusting the outer surface of *Fistuliramus* sp. (Cyclostomata); × 15. Grzegorzowice, complex III, trench 34; Z. Pal. No. Br. III/8210.



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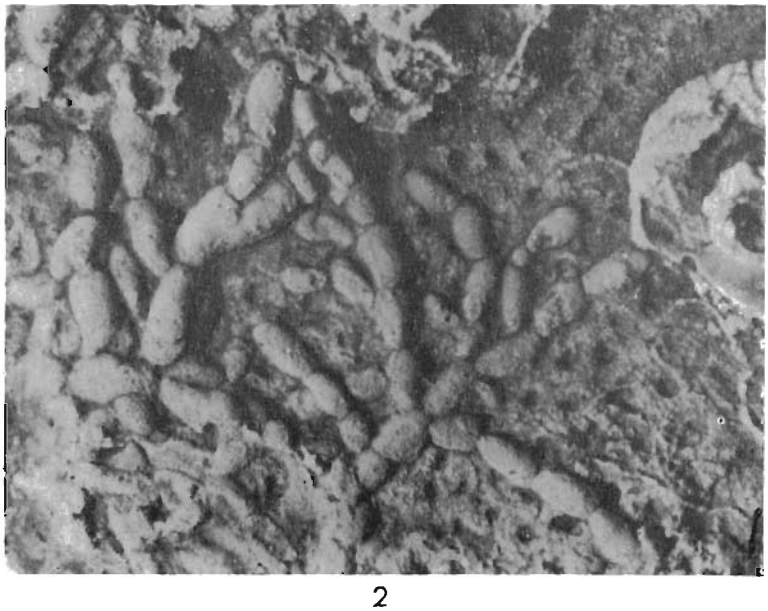

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Phot. M. Czarnocka

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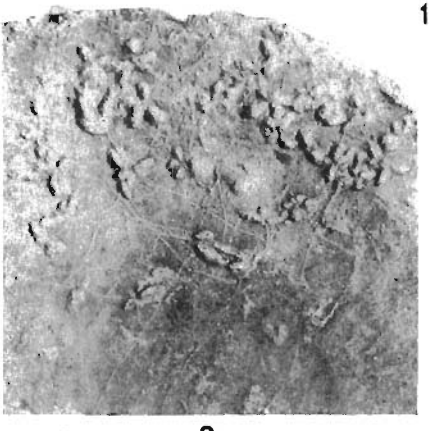

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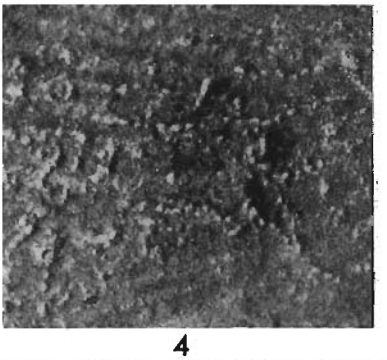

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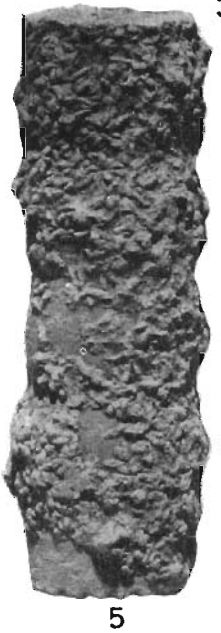

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Phot. M. Czarnocka

Plate VI

Allonema moniliforme moniliforme (Whiteaves)

Fig. 1. Fragment of a zoarium, encrusting the outer surface of the shell of *Schizophoria striatula* (Schloth.); × 10. Skały, complex XIV, trench 73; Z. Pal. No. Br. III/7922.

Eliasopora devoniana n. sp.

Fig. 2. Zoarium, encrusting a crinoid stem; × 8. Skały, complex XXII, trench 119; Z. Pal. No. Br. III/8011.

Eliasopora cf. *siluriensis* (Vine)

Fig. 3. Fragment of a zoarium, encrusting the inner surface of the shell of *Desquamatia subzonata* Biernat; × 8. Skały, complex XIII, trench 72; Z. Pal. No. Br. III/7966.

Allonema moniliforme parvum n. subsp.

Fig. 4. Fragment of a zoarium, encrusting the outer surface of the ventral of *Schizophoria striatula* (Schloth.); × 12. Skały, complex XXII, trench 119; Z. Pal. No. Br. III/7918.

Eliasopora devoniana n. sp.

Fig. 5. Zoarium, encrusting a crinoid stem; × 5. Skały, complex XXII, trench 119; Z. Pal. No. Br. III/8010.

Allonema moniliforme moniliforme (Whiteaves)

Fig. 6. Fragment of zoarium, encrusting the outer surface of the brachiopod shell; × 10. Skały, complex XIII, trench 72; Z. Pal. No. Br. III/7932.