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A NEW TRIASSIC SCLERACTINIAN CORAL FROM THE HIGH TATRA MOUNTAINS (WESTERN CARPATHIANS, CZECHO-SLOVAKIA)

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Abstract: A new stylophyllid coral genus, *Meandrostylophyllum*, is characterized by meandroid colony, extremely reduced septal apparatus, and vesicular endotheca consistuting the main component of the skeleton. Its affiliation to the *Meandrostylis* phylogenetical stock is discussed. The genus has been found in the coral assemblage from fossiliferous Fatra Formation (the uppermost part of the Triassic sequence in the Krížna Nappe) in the West Tatra Mts.

Key words: Scleractinia, *Stylophyllidae*, Late Triassic, carbonatic build-ups, Western Carpathians.

Introduction

The aim of the paper is to describe a new genus from a very diversified coral group, *Stylophyllina Beauvais*, and characterize the co-occuring organic assemblage as well as some paleoecological aspects of their environment. Corals are known as a rather frequent element of Upper Triassic communities in the Tatra Mts. (Goetel, 1917; Radwański, 1968; Gaździcki, 1974; Michalík, 1978, 1979, 1980, 1982). The taxonomical description of this fauna (Roniewicz, 1974) presented a wide spectrum of the most common species, the rare elements still waiting in collections for their identification among recrystallized skeletons of unclear structure.

The present contribution has been done within the frame of scientific collaboration between Slovak and Polish Academies of Sciences in the years 1988–1989, in both our working places in Bratislava and Warsaw. The taxonomical part has been made by E. Roniewicz, while paleoenvironmental and geological characteristics by J. Michalík.

The material described here, collected by J. Michalík, has been deposited in Slovak National Museum in Bratislava (under acronyme SNM Z-20075).

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Coral buildups in the Fatra Formation

During the Late Triassic, the northern part of the Central West Carpathians emerged. The Rhaetian transgression affected only southern zone of this arid belt (Fatric- and the southernmost Tatric Domains). The originating shallow near-shore marine basin has been isolated from the open sea by an extensive carbonate platform belt on the south. Hot and dry climate of the neighbouring continent affected the sedimentation and life in this basin, which gave rise to the late Rhaetian Fatra Formation (Michalík, 1978, 1979, 1980, 1982). Its sequence consists of bituminous organodetrital and organogenic carbonates occurring in more or less gradational cycles. The cycles, often beginning with erosional clastic base, are usualy terminated by oolitic, chemogeneous (primary dolomite) or biostromal layer. The terrigenic admixture in the sediment was low, due to its being trapped by a relief of shore lowlands, and aridity of the climate.

The Fatra Formation sequence has been divided (Michalík et al., 1979; Gaździcki et al., 1979) into five informal members (basal beds, lower biostromatic beds, barren beds, upper biostromatic beds, transitional beds). The "basal beds" consist of dark pelites, dolomites and coquinal limestones with "Swabian" regime of sedimentation, frequent oscillations of sea-level and storms considerably affecting unprotected shallow-bottom sediments and their benthic faunas. Despite this, these benthic associations with primitive interactions (immature communities) tended to evolve into biostromal- and even biohermal complexes, being repeatedly destroyed, both by bioerosion and environmental events (Michalík 1979, 1982). A regressive episode in the middle of the Fatra Formation ("barren interval") and a similar, smaller event in its uppermost part divided the biostromal development into three "biostromes": the lower, the upper, and the inconsistently developed, uppermost one in the "transitional beds".

The biostromal associations consisted of corals, calcisponges, calcareous algae and of other organisms. The corals from the Fatra Formation, as well as from several contemporaneous environments of the Alpine-Carpathian shelf, have been described by Roniewicz (1974, 1989). However,

detailed studies of the history of coral dispersion, evolution of biohermal associations, and West Carpathian coral paleobiogeography have been not done until, yet.

The biostromal horizons of the Fatra Formation cropping out in southern foothills of the West Tatra Mountains, yield relatively well-preserved remnants of the coral fauna. Following scleractinian species have been recorded in the sites Juráňova Valley, Posledná Lúka below Mount Veľká Furkaška, Suchá Valley, Smoliacke Hrádky, Bobrovček: *Meandrostylophyllum vesiculare* gen. et sp. n., *Pamiroseris rectilamellosa* (WINKLER), *Retiophyllia paraclathrata* RONIEWICZ, *Retiophyllia sellae* (STOPPANI), *Retiophyllia* sp., and *Astraeomorpha confusa* (WINKLER). With the exception of the first of them, all other species are common in the Rhaetian biostromes of the Krížna Unit in the Tatra Mountain area (Roniewicz, 1974).

The fauna in question comes from the uppermost biostrome, cropping out in the uppermost part of the Bobrovček – Hrádky section. This locality is a bare road escarpment in the southern slope of the hill called Smoliacke Hrádky. It lies at the foot of the Babky Hill (West Tatra Mts.) near the villages Bobrovček and Jalovec (Liptov Basin).

The sequence encovered in this outcrop (Fig. 1) is divided by fault zones into three sections. The lower one (beds No. 1–7 in the Fig. 2) contains basal beds of the Fatra Formation and the transition to the "lower biostrome" beds (Michalík et al., 1979). It is about three meters thick, consisting of dolomicrites, micrites and biomicrites with frequent fragments of bivalve shells. Their share becomes greater upwards. Two layers (4, 7) contain clasts of bivalves, gastropods and crinoids, and even superficial ooids. *Gandinella falsofriedli* SALAJ & BORZA and SAMUEL is the dominant foraminifer in the spectrum of microfossils. Sedimentary environment of these rocks was moderately agitated.

The second section (beds 11–21 in the Fig. 2) consists mostly of the "barren interval" beds (Michalík et al., 1979): micrites and dolomicrites with only fragmented microfossil remnants. The uppermost beds (19–21) of this section are formed by organodetrital (biomicrite) limestone with frequent gastropods and bivalve shells. The abundance of dolomicrites, redeposited calcarenites and biorudites, as well as fragments of fossils prove for sedimentation during regressional event. The upper part of this section originates during a new stabilization of the marine regime.

Above another dislocation, Fatra Formation sequence continues by micritic and biomicritic limestones (beds No. 30–36), containing diverse, but infrequent foraminifers (Fig. 2). Macrofaunal remnants are represented by gastropods and

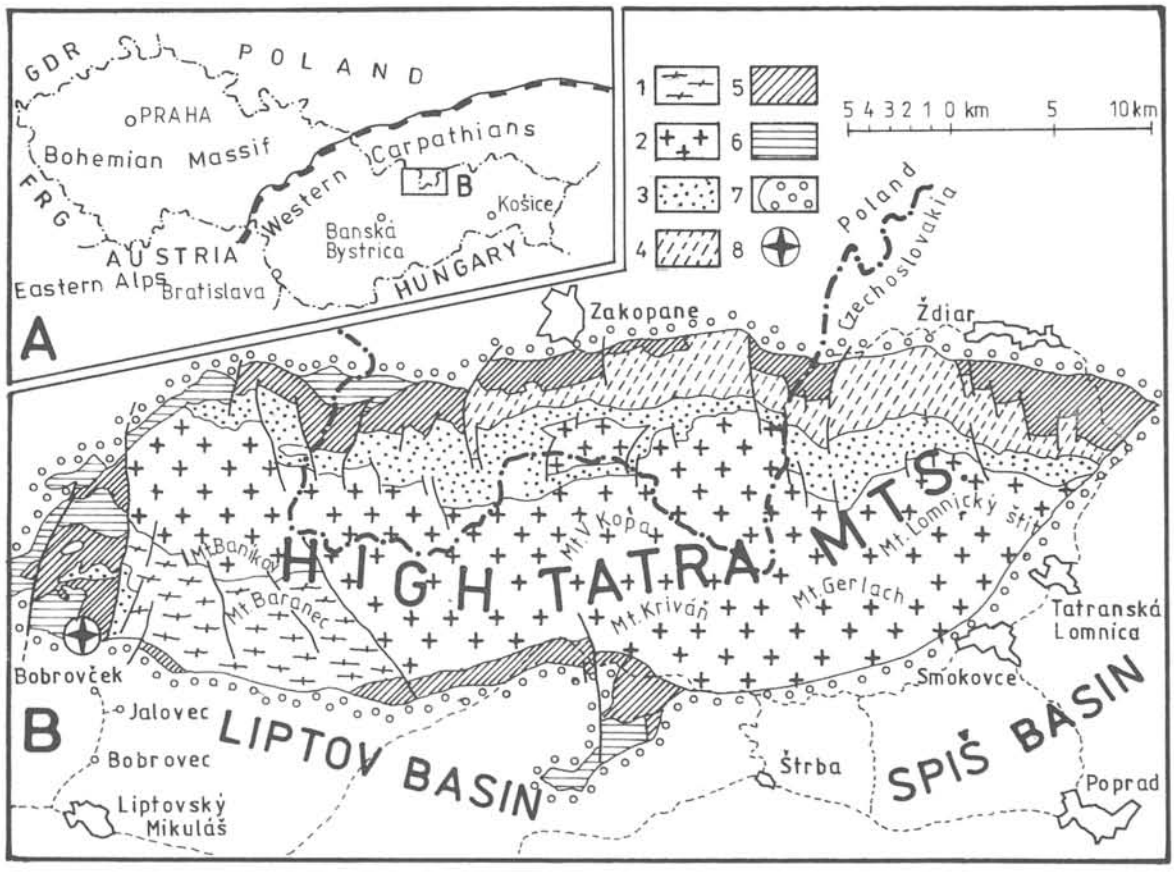

Fig. 1. Localization of the area investigated in the scheme of the Czecho-Slovakia (A) and in a geological sketch of the High Tatra Mountains. Legend: 1 – crystalline schists; 2 – granitoids; 3 – Mesozoic para-autochthonous sedimentary cover; 4–5 – partial nappes of the Krížna Unit, 6 – Choč Nappe, 7 – Paleogene sedimentary cover; 8 – Smoliacke Hrádky section.

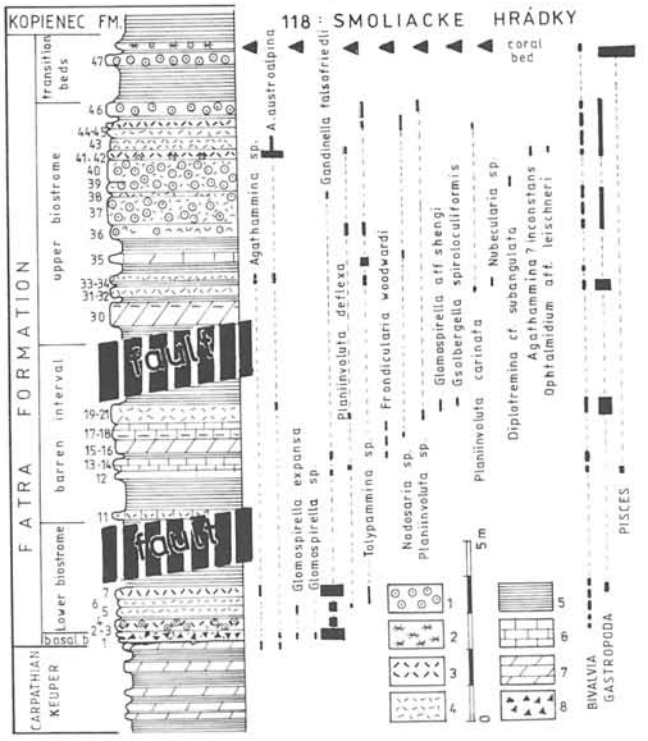

Fig. 2. Lithological column of the Fatra Formation sequence at the Smoliacke Hrádky site, Rhaetian, Krížna Nappe, West Tatra Mountains. Foraminifers determined by Dr. O. Jendrejáková.
Legend: 1 – oolite beds; 2 – coral bed; 3 – biomicrital limestones (biosparrudites, biocalcarenites); 4 – biomicritic limestones (grainstones, packstones); 5 – marls and marlstones; 6 – micritic limestones (mudstones); 7 – dolomites (dolomicrosparites and dolomicrites); 8 – sedimentary breccias.

bivalve shell fragments. Two thick oolite beds (the lower one is 195 cm, the upper 140 cm thick) separated by 175 cm of sparites and biomicrosparites contain rounded clasts of older rocks and mollusc shells, calcite and chamosite ooids, shells of bivalves, gastropods, and echinoderm skeletal fragments. The coral bearing bed is one of the highest ones. The topmost layer contains abundant fish teeth. Dr. Duffin has estimated an association comparable with those described in Duffin and Gaździcki (1977): ?*Sargodon tomicus* PLIENINGER, *Acrodus minimus* AGASSIZ, *Gyrolepis albertii* AGASSIZ, *Colobodus* sp., *Birgeria acuminata* (AGASSIZ), *Saurichthys longidens* AGASSIZ and other teeth along with an "excellent suite of dermal denticles".

Taxonomic description

Sub-order *Stylophyllina* BEAUVAIS, 1981
Family *Stylophyllidae* FRECH

Genus *Meandrostylophyllum* nov.
Type species: *M. vesiculare* gen. et sp. nov.

Derivation of the name: from its resemblance to *Meandrostylis* and *Stylophyllum*.

Diagnosis: Meandroid corallites in series, poorly delimited. Wall in collines simple, discontinuous, formed by a single row of septal spines and sclerenchyme. Radial elements dissociated into septal spines. Septal spines discontinuous vertically. Vesicular dissepiments large and abundant. The genus is monotypical.

Stratigraphic and geographic ranges: (Late?) Rhaetian, Fatra Formation, tectonic units derived from the Fatric paleogeographic zone, West Tatra Mountains area.

Remarks: *Meandrostylophyllum* and *Meandrostylis*, the only meandroid genera of the family *Stylophyllidae*, differ from each other ones in the degree of reduction of the septal apparatus. The new genus shows that the range of morphological diversity in the family *Stylophyllidae* extends to the colony structure of an extremely integrated type (see Roniewicz 1989 for characteristics of the stylophyllid skeletal structures).

The genera *Meandrostylis* and *Meandrostylophyllum* illustrate several typical trends in the development of skeleton structure in Triassic stylophyllids. Their species represent the following types of structure:

1. *Meandrostylis irregularis* FRECH, 1890 has bladelike radial elements only slightly dissociated adaxially into septal spines, complete septothecal wall and ceriomeandroid colony;

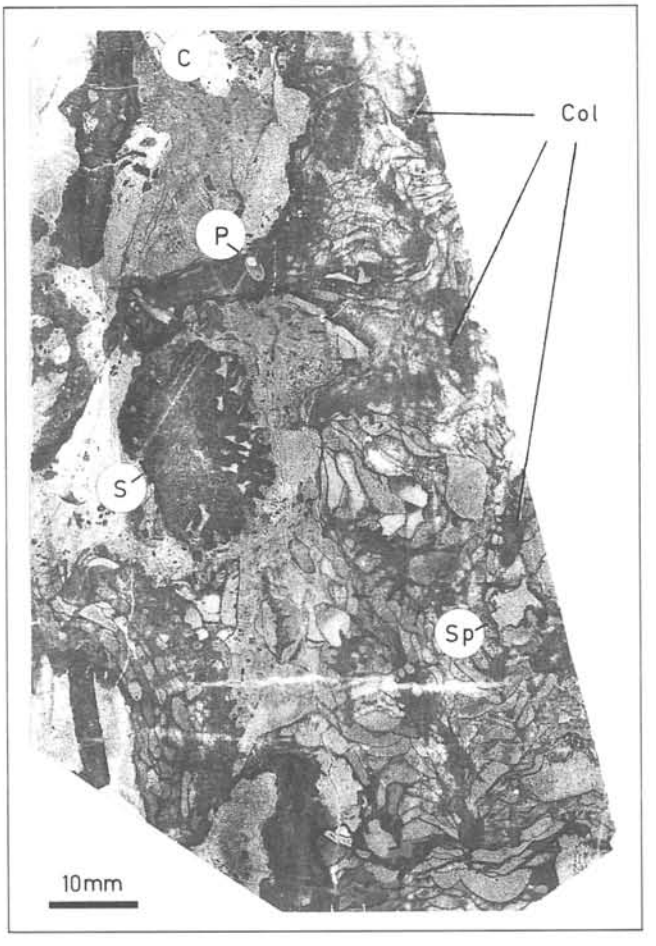

Fig. 3. *Meandrostylophyllum vesiculare* gen. et sp. n. Holotype colony in transverse polished section close to the calicular surface. Note the corallum of *Stylophyllum* sp. (S) and skeleton damage mentioned in the text. Specimen SNM Z-20075, x 1.
C – damage of uncertain origin; Col – collines; P – polychaete boring; S – *Stylophyllum* sp.; Sp – traces of a sponge activity (?). See also Fig. 4. Photo E. Roniewicz.

2. *M. frechi* HAAS, 1909 and *M. kochi* (BEAUVAIS and POULTON 1980) have blade-like radial elements with isolated free septal spines in the adaxial and peripheral parts; colonies are cerioid or asteroid, depending the wall development. The structure of radial elements in these species resemble those of trabecular corals. This feature distinguishes them from the type species of the *Meandrostylophyllum;*

3. *Meandrostylophyllum vesiculare* gen. and sp. n. has radial elements in the form of isolated spines rarely joined into any blade-form structures; colony is meandroid (or astraeoid-meandroid), calices poorly detectable, as the wall is incomplete, and the course of radial elements is unclear. In such a situation, dissepimental tissue built of large vesicular elements dominates in the formation of the colony skeleton.

Thus, it is the discontinuity of radial elements and septal spines which differentiates *Meandrostylophyllum* from the genus *Meandrostylis,* while the collines with the simple wall and the endotheca are of the same types in the both and, at the same time, they differ from those in the rest of the family. The structural similarity is so close that the type species of the new genus could be regarded as a species from the periphery of the *Meandrostylis* range of structural diversity. The genera differ each from other in the same degree as *Stylophyllopsis* from *Stylophyllum* (for stylophyllid structure see Roniewicz, 1989).

In discussion on *Meandrostylis – Meandrostylophyllum* relationships, their geographical ranges could be of certain value: *Meandrostylis* has been known as typical of the Zlambach Beds (*M. irregularis* FRECH, *M. frechi* HAAS) and restricted to the Northern Calcareous Alps. Recently, its geographical range has been extended to the Northern America (being described from British Columbia, Canada under the junior synonymic name *Coelomeandra,* with the type species *C. kochi* by Beauvais and Poulton, 1980). It has never been cited from the Asiatic part of Tethys, and its stratigraphical range seems to be restricted to the uppermost Triassic. With the exception of *Meandrostylis irregularis,* comparatively frequent in the Salzkammergut Region in the northern Calcareous Alps, other species are rare. As to *Meandrostylophyllum,* with its characteristic, vesiculous skeleton that rather hardly could be overlooked, it remains a rare faunistic element in the Carpathians. It seems to be a genus restricted to narrow geographical and stratigraphical ranges.

It can be assumed, that the radiation in the range of the genus *Meandrostylis,* taking place during a short interval of the upper Norian or Rhaetian, showed striking multidirectional tendencies in skeleton development, and gave origin in the Fatric Domain of the Northern Tethyan Shelf to a new genus, named here as *Meandrostylophyllum.*

A formation of a loose skeleton structure in the *Meandrostylis – Meandrostylophyllum* phyletic line is consistent with a general tendency observed in Rhaetian stylophyllids. During the Carnian, simple stylophyllids (*Stylophyllopsis)* showed a tendency to dissociate their relatively compact septa into septal spines. However, it was only during the Rhaetian when the forms having scarce and completely isolated septal spines and abundant endotheca developed. These were diverse species of solitary and colonial *Stylophyllum (S. paradoxum, S. polyacanthum, S. vesiculatum),* and a type species of the *Meandrostylophyllum.* An opposite tendency is presented by a late Norian stylophyllid genus, *Monstroseris* MELNIKOVA (1989) with massive, homogeneous colony skeleton, built of septal spines and hypertrophied sclerenchyme deposit infilling all interspine space.

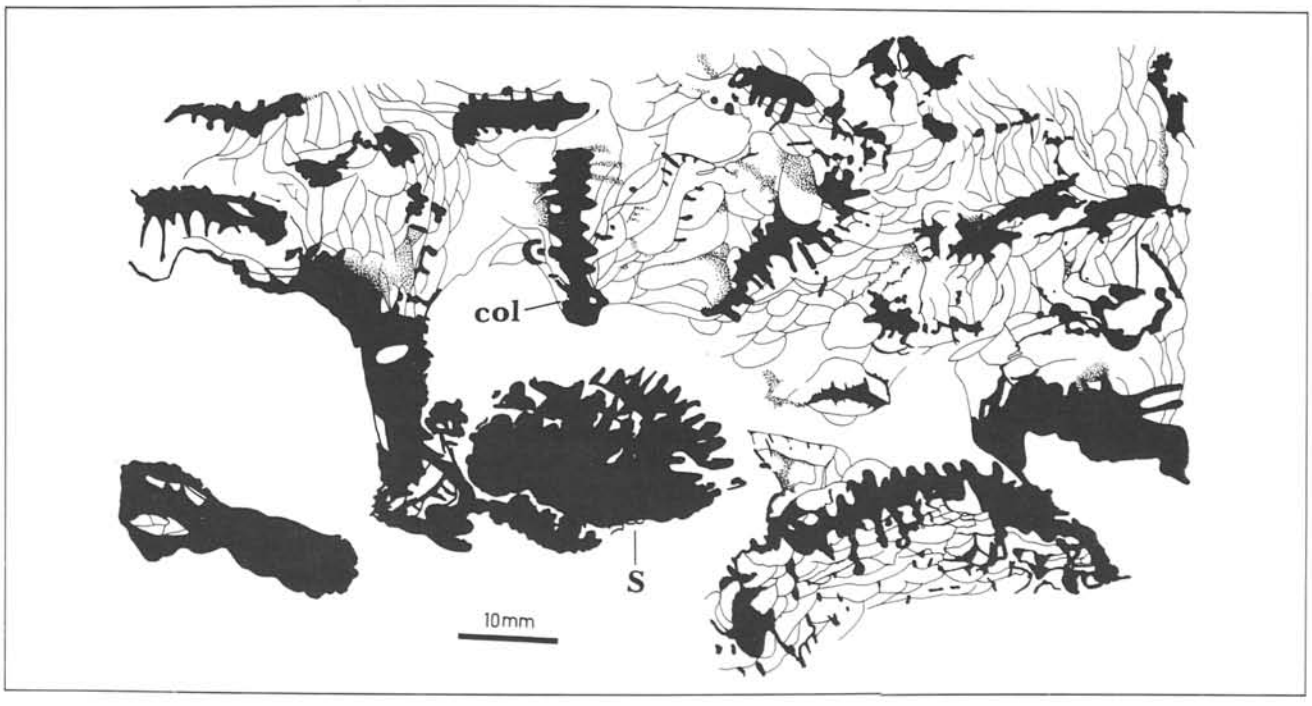

Fig. 4. *Meandrostylophyllum vesiculare* gen. et sp. n. Holotype colony drawing in transverse section close to the calicular surface, showing discontinuous collines (col) and thin, abundant dissepimenta, corallum of *Stylophyllum* sp. (S) is incorporated in the colony. SNM Z-20075. See also Fig. 3. Original E. Roniewicz.

Meandrostylophyllum vesiculare gen. and sp. nov.
Figs. 3, 4, and 5

Holotype: SNM Z-20075, figured as above.

Type locality: Smoliacke Hrádky Hill, Jalovská dolina Valley, Western Tatra Mts., Czechoslovakia (section No. 118 in Michalík, 1977).

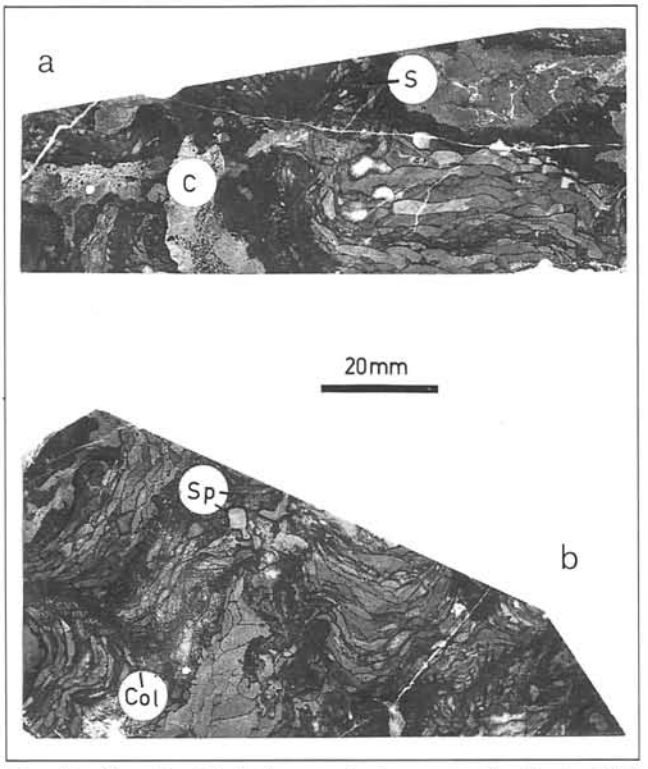

Fig. 5. *Meandrostylophyllum vesiculare* gen. et sp. n. Two aspects (a, b) of the holotype colony in longitudinal polished sections. SNM Z-20075, x 1.
For explanation see Fig. 3. Photo E. Roniewicz.

Type horizon: Rhaetian Fatra Formation limestones, Krížna Nappe (Fatric paleogeographical zone).

Derivation of the name: vesiculare – from vesicular structure of the colony skeleton.

Diagnosis: astraeoid-meandroid; usually, series 10–15 *mm* wide. Cca 10 septa per 10 *mm* in the wall region. Cca 10 dissepiments in 10 *mm* in the longitudinal section, too.

Material: the holotype colony only.
Dimensions (in *mm*):

colony h	cca 70
colony d	cca 120
width of the series	(5) 10–15 (20)
distance between calicular centres	cca 15–20
number of septa in collines	10–12 per 10 *mm*
number of dissepiments in longitudinal section	7–13/10 *mm*

Description: colony massive, corallite boundaries undefined. Calices shallow, surrounded by a small elevation and showing a tendency to monolinear distribution in series which are incompletely separated by discontinuous collines. Radial elements represented by isolated septal spines. Generally, the spines are vertically discontinuous and short, and relatively thinn (300–600 μm). In the collines, some of them are fused by stereome to form rudimentary septal blades or incomplete wall. The wall is formed exclusively by subvertical septal spines and stereome. Dissepiments large, uneven, continuous throughout the wall region between the corallites. They are distributed subhorizontally with a slight elevation in the wall region.

Remarks: A corallum of *Stylophyllum* sp. with well developed, radially arranged and thick septa, is incorporated in the holotype colony. The colony has been strongly damaged by diverse corroding factors, some of them being identified as activity of sponges and polychaetes.

Occurrence: as for the holotype.

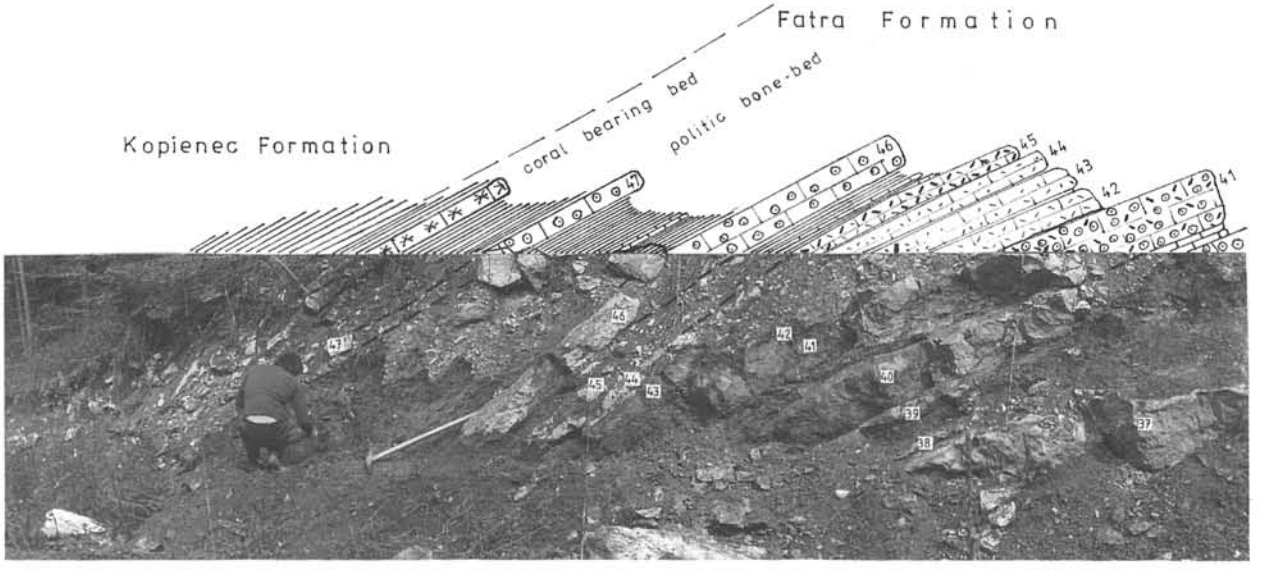

Fig. 6. A view on the western (uppermost) part of the Smoliacke Hrádky section. For the lithological symbols see the Fig. 2. Photo J. Michalík.

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