

NEW TRACE FOSSILS FROM THE OUTER CARPATHIAN FLYSCH (CZECHOSLOVAKIA)

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Abstract

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This article reviews two finds of new fossil traces. The new fossil trace *Godulaichnium jurkova* n. ichnosp. was found in the drill core of borehole NP 540 (UNIGEO Ostrava, leg. Dr. A. Jurková), situated in the Middle Bečva river valley within the Silesian nappe. The rocks of the drill core were found to originate in the Istebna Formation (Upper Cretaceous). The second trace fossil *Oravaichnium hrabei* n. ichnosp. has its origin in the Zlín Formation of the Bystrica Unit of the Magura flysch (Eocene) and was discovered in a quarry situated some 2 km east of Oravská Lesná.

Key words: Trace fossils, Cretaceous, Palaeogene, Carpathian Flysch, Czechoslovakia.

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Introduction

In the course of exploratory drilling conducted in the Beskids, Dr. A. Jurková discovered fossil traces at a depth of 353.70 m in borehole NP 540 (UNIGEO Ostrava) drilled in the Istebna Formation (Upper Cretaceous of the Godula nappe) and committed the specimen to the authors for further investigation. This new trace fossil species was termed, therefore, *Godulaichnium jurkova* n. ichnosp. in honour of the late Dr. Alena Jurková.

In borehole NP 540, the new trace fossil occurs in two instances within an area of a few centimetres near the bedding planes at the depth indicated. In close proximity to the newfound trace fossil, there are abundant minute fossil traces of *Godulaichnium tenue* merely 0.7 to 1 mm wide. The new fossil trace is 3 to 5 mm in width. At the depth interval mentioned, the rocks consist of dark grey, very fine-grained sandy claystone, the beds dipping at an angle of 30°.

During geological mapping for the Dionysus Štúr Geological Survey of Bratislava, trace fossils not yet described were found in a quarry situated some 2 km east of the village of Oravská Lesná. They were given the new generic and species name *Oravaichnium hrabei* n. ichnosp. in honour of the late professor Sergei Hrabě, distinguished zoologist at the Department of Zoology of Purkyně University in Brno. The generic name was chosen according to the place of occurrence — the Orava region in northwestern Slovakia. The trace was recognized on the lower bedding plane of a platy, greenish-grey, fine-grained, calcareous sandstone of the Zlín Formation of the Bystrica Unit in the Magura flysch (Eocene). The trace is 2 to 3 mm wide, of cylindrical shape (positive hyporelief).

Systematic description

Ichnogenus *Godulaichnium* Plička, 1986

Type specimen: *Godulaichnium tenue* Plička, 1986

Remarks: A cylindrical, slightly flattened burrow with a centrally positioned longitudinal groove, branching at some points. The course of the trace is slightly curved, its

length exceeds 12 cm. It was first found in the Godula Beds of the Silesian nappe and its generic name was derived from these beds (M. Plička, 1986). The trace is a positive hyporelief. By its appearance, the fossil trace somewhat resembles that of the genus *Subphyllochora* Göttinger and Becker, 1932; however, it markedly differs from the latter mainly by its size and the longitudinal median groove.

Godulaichnium jurkovae n. ichnosp.

Photos 1, 2, 3, Figs. 3, 4

Holotype: Sample No Ge 255550 (drill core fragment), deposited at the Moravian Museum in Brno.

Type locality: Middle river Bečva valley, borehole NP 540, (UNIGEO, Ostrava).

Type level: Dark grey, very fine-grained sandy, finely micaceous, non-calcareous claystone of the Istebna Formation, Upper Cretaceous, Silesian nappe.

Derivation of the name: To the memory of the distinguished geologist Dr. Alena Jurková, UNIGEO Ostrava.

Material: two specimens (drill core fragments), deposited among the collections of the Geological and Palaeontological Department of the Moravian Museum in Brno.

Diagnosis: A cylindrical, slightly flattened trace, with a distinct longitudinal median groove. The trace is gently twisted. It is 3–5 mm wide, without transverse sections. The length exceeds 9 cm. The trace occurs on the lower surface of the claystone as a positive hyporelief.

Description: Dichotomous trace, 3–5 mm wide, slightly curved, in places at an angle of 90°, with a longitudinal sharp median groove that gives the impression of two parallel adjoining strings. The course of the trace is slightly sinuous. The trace appears as a positive hyporelief.

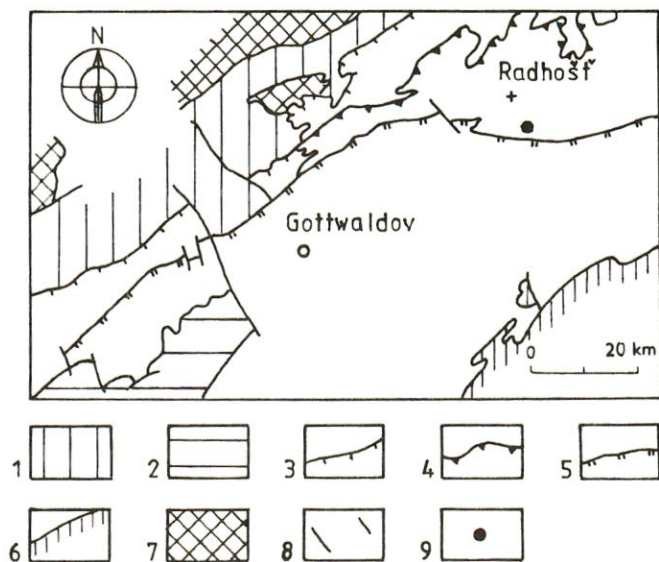


Fig. 1. Geological scheme of the place of occurrence of the new fossil trace *Godulaichnium jurkovae* n. ichnosp. - borehole NP 540. The 1 : 1,000,000 tectonic map of Czechoslovakia by T. Buday et al., 1960, was used. 1 - Neogene of the Carpathian Foredeep; 2 - Neogene of the Vienna Basin; 3 - Overthrust line of the Ždánice-Subsilesian Unit; 4 - Overthrust line of the Magura nappe; 5 - Inner Klippen belt; 6 - Palaeozoic deposits of the Bohemian Massif (Lower Carboniferous - Culm, Devonian); 7 - Finding place of the new trace fossil.

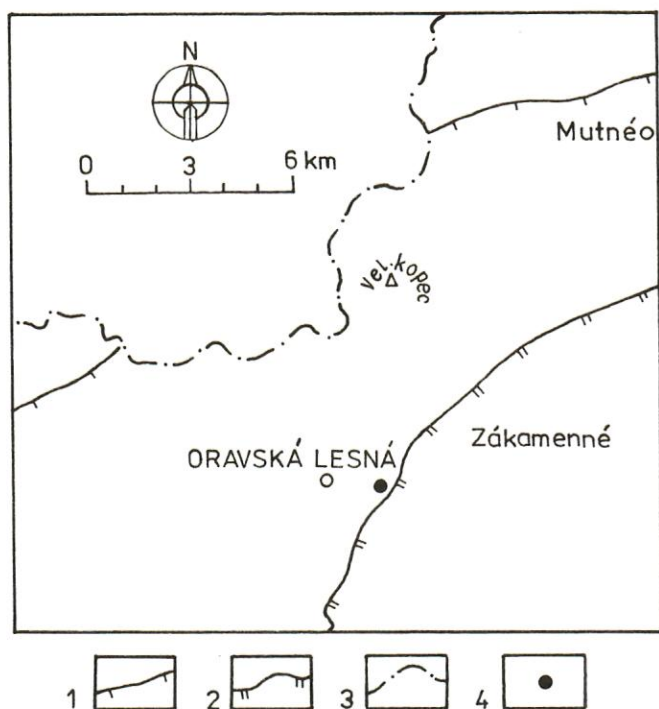


Fig. 2. Geological scheme of the place of occurrence of the new fossil trace *Oravaichnium hrabei* n. ichnogen. n. ichnosp. in a quarry east of Oravská Lesná. Section from the 1 : 200,000 geological map of Czechoslovakia, map sheet M-34-XX Trstená, by Z. Roth, 1959. The boundary of the overthrust of the Bystrica Unit NW of the village of Mutná is plotted a new in accordance with the courses of joint zones and the results of geophysical survey (M. Plička - Č. Tomek, preparation for the press). 1 - Overthrust line of the Bystrica Unit; 2 - Overthrust line of the Oravská-Magura Unit; 3 - state frontier; 4 - Place of occurrence of the new trace fossil.

Remarks: The new fossil trace is identical in shape with the fossil trace of *Godulaichnium tenue* Plička, 1986, which, however, is much smaller in size than the new-found trace. Considering that the new trace could be identified on a small surface only (on a drill core), it cannot be ascertained whether it branches like the trace of *Godulaichnium tenue* even though such branching can be assumed to exist. By its shape, the new trace somewhat resembles the fossil trace of *Aulichnites parkensis*. The latter, however, is of much larger size, shows no branching and occurs in sandy sediments such as those in the Inner Carpathian Palaeogene in Slovakia, Važec locality (M. Plička, 1987). The fossil trace of *Aulichnites parkensis* is up to 10 mm wide.

Sediment: Dark grey, non-calcareous, very finely sandy, finely micaceous claystone, locally with intercalated fine laminae of fine-grained clayey sandstone to siltstone.

Assemblage: Abundant minute traces of *Godulaichnium tenue*, 0.7–1 mm wide, with a distinct longitudinal median groove were found, in vertical direction, in close proximity to the new fossil trace on the bedding plane. These traces locally intersect and show branching. They occur as positive hyporeliefs identically with the new fossil trace on the lower bedding plane (specimen No Ge 25552, photo 3). In one instance (Fig. 4, specimen No Ge 25551), the fossil trace of *Godulaichnium tenue* having a width of 1 mm traverses the bed obliquely to the trace of *Godulaichnium jurkovae* n. ichnosp. (photo 2). Where these two traces approach each other, the fossil trace of *Godulaichnium jurkovae* n. ichnosp. has

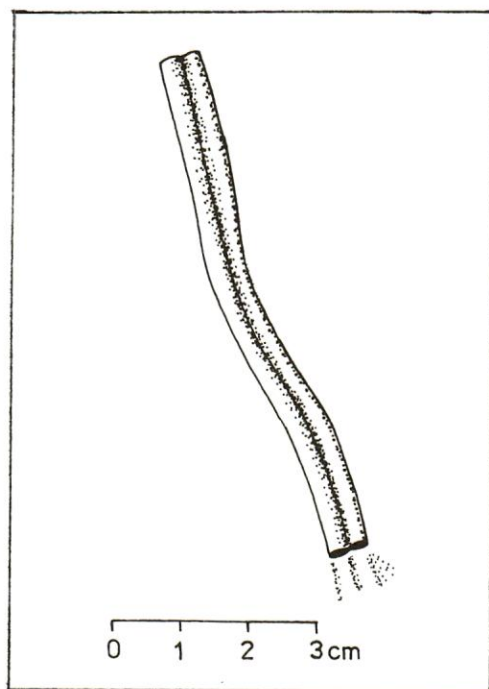


Fig. 3. *Godulaichnium jurkovae* n. ichnosp., Holotype, specimen. Sample No Ge 25550, borehole NP 540, Istebna Formation of the Silesian nappe (Upper Cretaceous).

peeled off the lower bedding plane, forming but a negative hyporelief at this point. A part of the small fossil trace of *Godulaichnium tenue* has similarly peeled off there.

Origin: The fossil trace was probably produced by the activity of marine animals of small size creeping on the clayey surface of the sea-bottom.

Occurrence: Istebna Formation of the Godula nappe, Carpathian flysch, Upper Cretaceous.

Ichnogenus *Oravaichnium* n. ichnogen.

Type specimen: *Oravaichnium hrabei* n. ichnosp.

Derivation of the name: After Orava, a region in northwestern Slovakia.

Diagnosis: A cylindrical trace on the lower bedding plane of the sandstone (positive hyporelief) of constant trace width, not branching. The trace is 2–3 mm wide, displays a winding course with frequent crossings.

Remarks: By its appearance, the new-found fossil trace recalls that of the genus *Planolites* Nicholson, 1873, the width of which, however, averages 6–9 mm. The new fossil trace of *Oravaichnium* n. ichnogen. most closely resembles in size the fossil trace of the genus *Popradichnium* Plička, 1983, that, by contrast to the new-found fossil trace, is characterized by frequent swellings in its course and by apparent branching (M. Plička, 1983, 1987).

Oravaichnium hrabei n. ichnospec.

Photos 4, 5, Fig. 5

Holotype: Sample No Ge 26017, deposited at the Moravian Museum in Brno.



Photo 1. *Godulaichnium jurkovae* n. ichnosp., positive hyporelief, holotype, sample No Ge 25550, fragment of a drill core. Non-calcareous claystone of the Istebna Formation of the Silesian nappe, Upper Cretaceous, borehole NP 540.



Photo 2. *Godulaichnium jurkova* n. ichnosp. in close proximity to the fossil trace of *Godulaichnium tenue* (minute trace traversing the bed obliquely to the new fossil trace). The same drill core as above, not far away from the specimen mentioned. Sample inv. No. Ge 25551.



Photo 3. *Godulaichnium tenue* Plička, 1986, immediately below the specimen shown on Plate I, Fig. 1. Sample inv. No. Ge 25552, positive hyporelief.

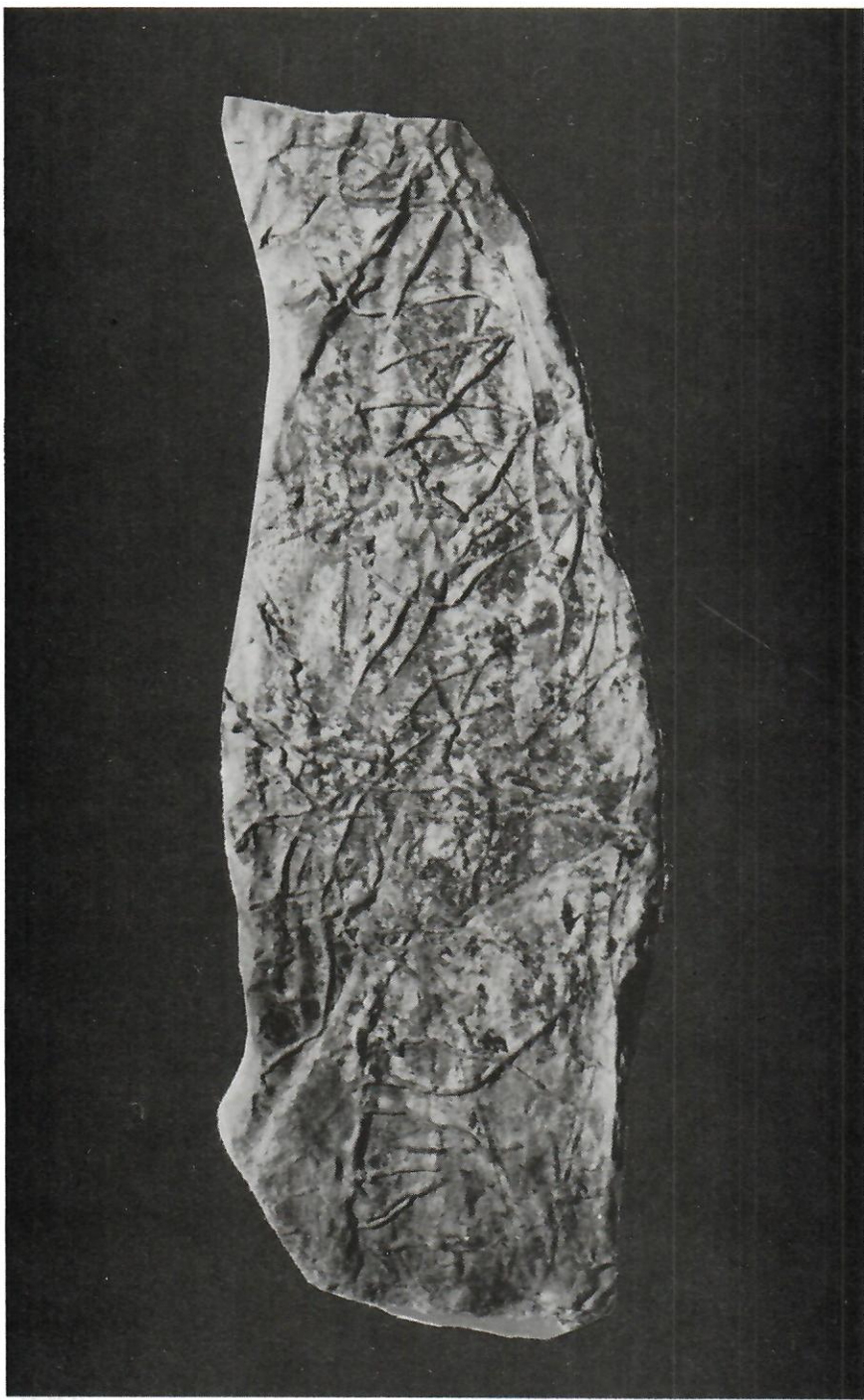


Photo 4. *Oravaichnium hrabei* n. ichnogen. n. ichnosp., Zlín Formation of the Bystrica Unit in the Magura flysch (Eocene), a quarry 2 km east of Oravská Lesná. Holotype, inv. No. Ge 26017.



Photo 5. Foregoing specimen, detail. Photos by M. HOFER.

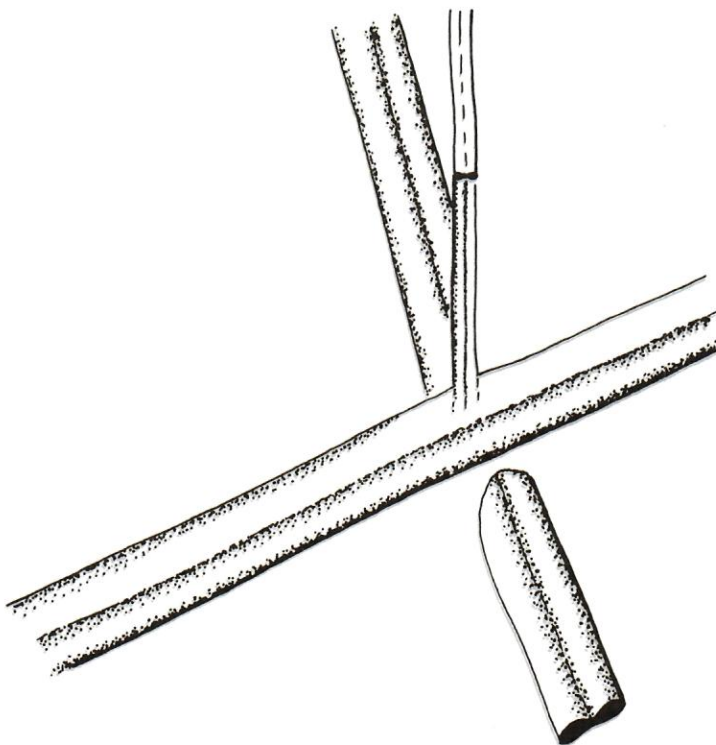


Fig. 4. *Godulaichnium jurkovae* n. ichnosp. in common with the smaller fossil trace of *Godulaichnium tenue* Plička, 1986. Sample No Ge 25551, the same drill core as on the foregoing Fig. 3.

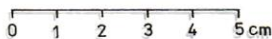
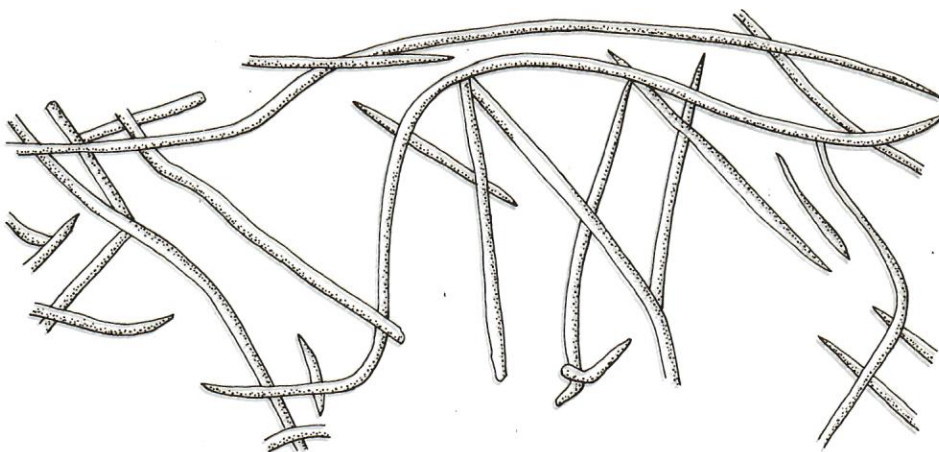


Fig. 5. *Oravaichnium hrabei* n. ichnogen. n. ichnosp., holotype, sample No Ge 26017. Quarry 2 km east of Oravská Lesná, Zlín Formation of the Bystrica Unit in the Magura flysch, Eocene.

Type locality: Oravská Lesná, a quarry near the road, about 2 km east of the village.

Type level: Greenish-grey, fine-grained sandstones of the Zlín Formation of the Bystrica Unit in the Magura flysch (Eocene), Outer Carpathian flysch.

Derivation of the name: In honour of the late professor Dr. Sergei Hrabě, the distinguished Czechoslovak zoologist.

Material: 7 specimens (sandstone fragments). The specimens are deposited among the collections of the Geological and Palaeontological Department of the Moravian Museum in Brno. Dimensions of the holotype: 20×58×4 cm, Inv. No Ge 26017.

Diagnosis: A cylindrical trace on the lower bedding plane of the sandstone (positive hyporelief) of constant width throughout the trace. The trace is 2–3 mm wide, non-branching, winding in its course, with frequent crossing (at different levels). No transverse segmentation was observed.

Description: Cylindrical traces 2–3 mm wide, with smooth surfaces and no transverse segmentation, frequently tapering to form pointed ends, traverse the lower bedding plane of the sandstone in various directions. The pointed ends are caused by the fact that

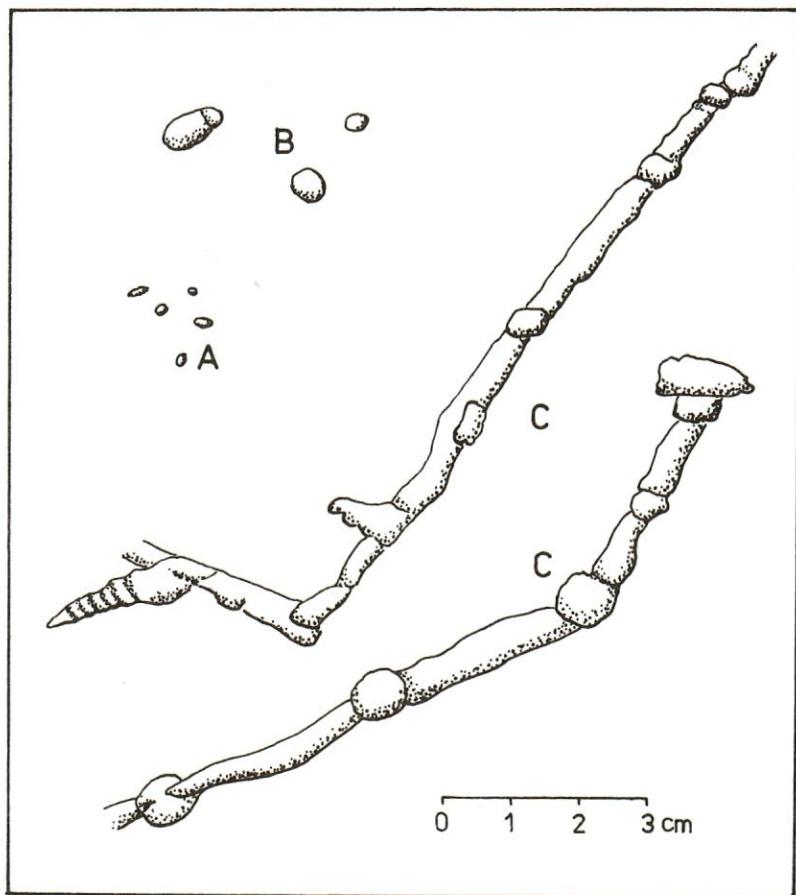


Fig. 6. Fossil traces on the lower bedding plane of a sandstone within the Zlín Formation of the Bystrica Unit within the Magura flysch forming an assemblage with the new fossil trace of *Oravaichnium hrabei* n. ichnogen. n. ichnosp. on holotype sample No Ge 26017.

A – *Punctumichnium parvum*; B – *Punctumichnium medium*; C – *Rhabdoglyphus* aff. *caliciformis*.

the marine animal creeping on the clayey surface of the sea bottom penetrates into or emerges from the bottom sediment in intervals of 2–4 cm of the track (see Fig. 5 for the holotype). The fossil traces do not intersect but cross at different levels.

Remarks: The new-found fossil trace resembles that of the genus *Planolites* Nicholson 1873, but it is much smaller in size. It also differs by the fact that the fossil traces of the genus *Popradichnium* Plička, 1983, i. e. *Popradichnium erraticum* (M. Plička, 1983) and *Popradichnium minutum* (Plička, in the press) exhibit straight courses and that the fossil trace of *Popradichnium erraticum* has various appendages on its surface and is varying in width. The somewhat similar fossil trace of the genus *Sabularia* Książkiewicz, 1977 also varies in width (see M. Książkiewicz, 1977).

Sediment: Greenish-grey, fine-grained, calcareous lamellar to tabular sandstone of the Zlín Formation of the Bystrica Unit.

Assemblage: In the sandstone fragments from the quarry about 2 km east of Oravská Lesná, the following fossil traces were recognized: *Gordia molassica*, *Planolites* sp., *Sabularia simplex*, *Paleodictyon carpathicum*, *Punctumichnium parvum*, *P. medium* and *Gyrichnites* sp. The fossil trace of *Rhabdoglyphus* aff. *caliciformis* Książkiewicz, 1977 (Fig. 6) was identified simultaneously with the new fossil trace on the holotype specimen.

Origin: The fossil trace of *Oravaichnium hrabei* n. ichnosp. appears to have been produced by the activity of marine worms.

Occurrence: Zlín Formation of the Bystrica Unit in the Magura flysch, Eocene.

Conclusion

The new-found fossil traces supplement the range of fossil traces present in the Carpathian flysch of Czechoslovakia. The find of the fossil trace of *Godulaichnium jurkova* n. ichnosp. recognized in a drill core from the Istebna Formation points to the necessity of studying drill cores in more detail also with respect to the possible occurrence of traces, as has been demonstrated by the discoveries of trace fossils in drill cores of pilot holes and deep holes (M. Plička, 1978, Z. Novák, 1986, A. Němcová–M. Plička, 1989).

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