Spirocircus cycloides, a new ichnofossil from the Upper Cretaceous in Northern Moravia (Czech Republic)

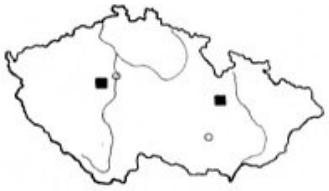
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A b s t r a c t . A new ichnofossil, *Spirocircus cycloides* ichnogen. et ichnosp. nov., is interpreted as a subsurface feeding trace. It is known from the Middle Turonian of the Bohemian Cretaceous Basin (locality Svojanov) and from several outcrops of the Letná Formation (Ordovician, Barrandian area, Central Bohemia). The so far known finds indicate a possible occurrence in the Cruziana ichnofacies, and a broad stratigraphic range of the new trace.

A b s t r a k t . Nová ichnofosilie *Spirocircus cycloides* ichnogen. et ichnosp. nov. je interpretována jako mělce podpovrchová potravní stopa. Dosud známé výskyty (střední turon České křídové pánve, Svojanov a několik lokalit letenského souvrství v barrandienském ordoviku) poukazují na výskyt v kruzianové ichnofacii a na velké stratigrafické rozpětí.

K e y w o r d s : Ichnofossils, fodinichnia, Cretaceous, Ordovician, Bohemian Massif



Introduction

The Bohemian Cretaceous Basin belongs to ichnologically little investigated parts of the Bohemian Massif, despite of the fact that ichnofossils are relatively numerous and diverse here. Some of these traces are described in Frič (1885), Tuppy (1914) Zahálka (1957), Vialov and Golev (1977), and newly by Pek (1981) and Mikuláš (1993).

The ichnofossil described in this paper comes from the old collection of Johann Tuppy (housed in Městské muzeum at Moravská Třebová). The paper is aimed at its morphological description, ethological interpretation and classification in the ichnological system.

Localization and outline of geology

The described ichnofossil comes from the Svojanov locality about 9 km ENE of the town of Moravská Třebová (see Fig. 1), from the calcareous fine-grained sandstone of the lower layers of the Middle Turonian. This locality belongs to the Orlice-Žďár lithofacies region of the Bohemian Cretaceous Basin.

Beside the studied ichnofossil, the species *Cucullaea subglabra, Inoceramus cuvieri, Lima multicostata, Lima* sp., *Lyropecten (?Aequipecten) ternatus,* and *Hemiaster* sp. were found.

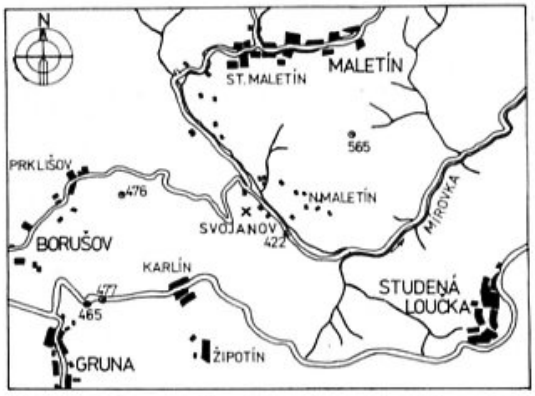


Fig. 1. Map of the surroundings of the Svojanov village. The trace fossil locality is indicated by a cross.

Systematic part

Spirocircus ichnogen. nov.

T y p e i c h n o s p e c i e s : *Spirocircus cycloides* ichnosp. nov.

D i a g n o s i s a n d r e l a t i o n s h i p s : See the description of the ichnospecies.

Spirocircus cycloides ichnosp. nov.
Figs. 2, 3

Holotype: Specimen figured here as Fig. 2; Coll. Městské muzeum at Moravská Třebová, No. G-972 (Coll. J. Tuppy).



Fig. 2. Spirocircus cycloides ichnogen. et ichnosp. nov., holotype (Coll. Městské muzeum Moravská Třebová, G-972), Middle Turonian, Svojanov, x 0.5.

Type horizon: Cretaceous, Middle Turonian.
Type locality: Svojanov near Moravská Třebová.
Material: The holotype from the type horizon and locality. Four other specimens from the Bohemian Middle Ordovician (Letná Formation, localities Městský vrch at Beroun, Ostrý, Trubská rokle, and Háj near Zahořany).

Description: The specimen from the type locality shows smooth, strongly horizontally flattened tunnels of oval cross-section, without wall linings, about 7-12 mm wide and ca. 2 mm high. The tunnels form a system of three subcircular curves. These circles or ovals are roughly concentric, however their centre-points are not equal. In this way, the trace fills or covers a substantial part of the bed or bedding surface (see fig. 3). The diameters of the circles (ovals) are 7.5, 11.5, and 13.5 cm.

Remarks: Very similar traces have been described by Mikuláš (in press, MS 1992) from the Bohemian Middle Ordovician (Barrandian area). Unfortunately, Mikuláš's work will be published later than the present paper. Therefore, the ichnospecies and ichnogenus are described here for the first time. The finds from the Middle Ordovician have either smooth or irregularly undulating flattened tunnels or ribbons forming many circles or ellipses

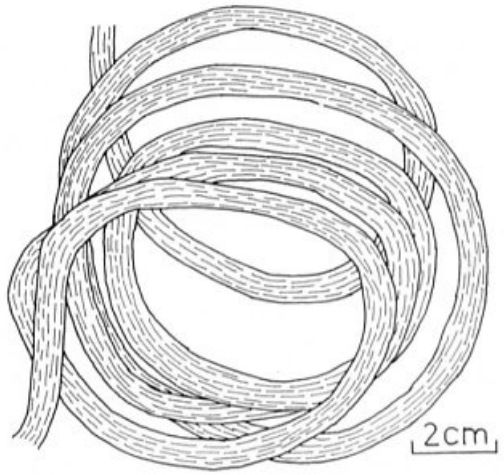


Fig. 3. Spirocircus cycloides ichnogen. et ichnosp. nov., schematic drawing made after three specimens from the Barrandian Ordovician (Letná Formation, localities Trubská rokle, Ostrý, and Městský vrch at Beroun).

running on the upper bedding planes of sandstones or greywacke sandstones. Some circles and ellipses of each specimen are displaced and either knotted or joint together. In the case of the finds from the Cretaceous and Ordovician, we belive to deal with shallowly subsurface feeding traces (fodinichnia), and in the case of one out of the four Ordovician specimens with an epistratal feeding trace (pascichnion). *Spirocircus* seems to be one of many logical variants of feeding on deposits from the sediment surface, or from the layer rich in organic material inside the sediment. The ethological similarity with the ichnogenera *Urohelminthoida, Spirophycus, Squamodictyon,* etc. should be considered.

Morphologically, *Spirocircus* is closely related to *Spirodesmos* Andrée, 1920 (but this creates simpler, almost purely concentric spiral structures), conceivably *Spirophycus* Häntzschel, 1962 (it creates a more complicated ornament, often composed of two spirals growing in opposite direction) - see Häntzschel (1975).

Ichnofacies relationships

In the Ordovician Letná Formation, *Spirocorcus cycloides* occurs in the typical Cruziana ichnofacies together with *Rusophycus, Cruziana, Phycodes, Palaeophycus, Planolites* and many other ichnogenera (Mikuláš, *in press*, MS 1992). The Cruziana ichnofacies represents a shallow sublittoral environment (cf. Frey and Pemberton 1984). As for the find from the Svojanov locality, the sedimentological characteristics and

accompanying fauna suggest a relative similarity with the low energy, shallow sublittoral environment (cf. Kříž - Čech 1974). Due to a limited number of the known specimens, the concept about the affinity of *Spirocircus cycloides* to the Cruziana ichnofacies should be regarded preliminary. For *Spirocircus,* a very broad stratigraphic range (characteristic of many other ichnogenera) can be presumed.

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