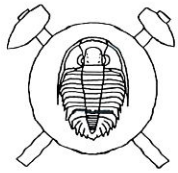
The first find of the dinosaurian footprint in the Czech Republic (the Krkonoše Piedmont Basin) and its stratigraphic significance



První nález stopy dinosaura v České republice (podkrkonošská pánev) a její stratigrafický význam (Czech summary)

(3 text-figs.)

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The dinosaur footprint is described from the locality U Devíti Křížů quarry (Krkonoše Piedmont Basin, Czech Republic). The animal which shaped the footprint is classified with Theropoda and probably with Coelurosauria. The Middle Triassic or younger age is assigned to the Bohdašín Formation on the basis of stratigraphic range of this type of dinosaurian footprints.

Key words: Triassic, Bohdašín Formation, vertebrate ichnofossil, Theropoda, stratigraphy

Introduction

The unique specimen described below was collected by employees of the U Devíti Křížů quarry (the new alternative name is the Krákorka quarry) few years ago. The importance of the material was recognized by Václav Hornych and Luděk Jirásek from the company exploiting this quarry. I obtainedet the sample for study thanks to Vladimír Prouza, geologist of the Czech Geological Survey. The imprint is deposited in the collection of the Czech Geological Survey, Prague under the number JZ 10.

The U Devíti Křížů quarry is situated about 3 km north-west from Červený Kostelec (northeastern Bohemia) in the southeastern part of the Krkonoše Piedmont Basin. The white medium-grained kaolinitic quartzose sandstone is currently exploited as plates for construction purposes. The thickness of the sandstones in the uppermost part of the Bohdašín Formation is 15 m in the quarry (Prouza et al. 1985).

Description and interpretation

Surface of the layer containing the footprint is covered by adhesion ripples. These structures indicate subaerial conditions – an emerged wet sand (a sand sheet). The footprint is not quite complete. The distal terminations of the digits II and III are missing. The three-digit imprint appears in negative relief. No standard method has yet been established for detailed measurements of the length and breadth of each impressions (Sarjeant 1975). I used Haubold's suggestion (1971) of the measurements or in this case rather estimations.

Measurements (see Fig. 1):
Footprint length: 14 cm
Footprint width: 18 cm
Digit II length: 12 cm
Digit III length: 14 cm
Digit IV length: 12 cm
Interdigital angle α (between digits II and III): 42°
Interdigital angle β (between digits III and IV): 50°
Angle between digits II and IV: 92°

The angle between the digits II and IV is approximately 90. The footprint width is larger then its length, if my interpretation of the termination of the digits II and III is correct. The heel is broadly rounded. Neither digit balls or claw (on the digit IV) are visible. The right three-digit footprint probably belongs to the pes of a bipedal dinosaur. No specific or generic determination of the footprint is still possible because only one incomplete imprint was found. However, the animal which shaped the footprint should be undoubtedly classified with the suborder Theropoda Marsh, 1881 and probably with the infraorder Coelurosauria Huene, 1914 (see Haubold 1971, 1984).

Conclusions

The above described unique footprint is the first unquestioned dinosaur evidence from the Czech Republic. The age of the Bohdašín Formation was determined by several authors in the range from Upper Permian to Lower Triassic (see Tásler et al. 1979). Majority of the later authors (e.g. Mader 1990 and Prouza et al. 1985) consider the age of these sediments as Lower Triassic. The age is assigned mainly on the basis of lithological and palaeogeographical analogies. Mader (1990) also described autochthonous *Nathorstiana*-like lycopod stems from the U Devíti Křížů quarry. These findings are, however, considered as problematic by Šimůnek (1998, oral communication).

The theropod footprint demonstrates that the Bohdašín Formation has to be younger than Lower Triassic (see e.g. Sarjeant 1975; Haubold 1971, 1984). The age of the Bohdašín Formation, or at least of its uppermost section, is for that reason Middle Triassic or younger.

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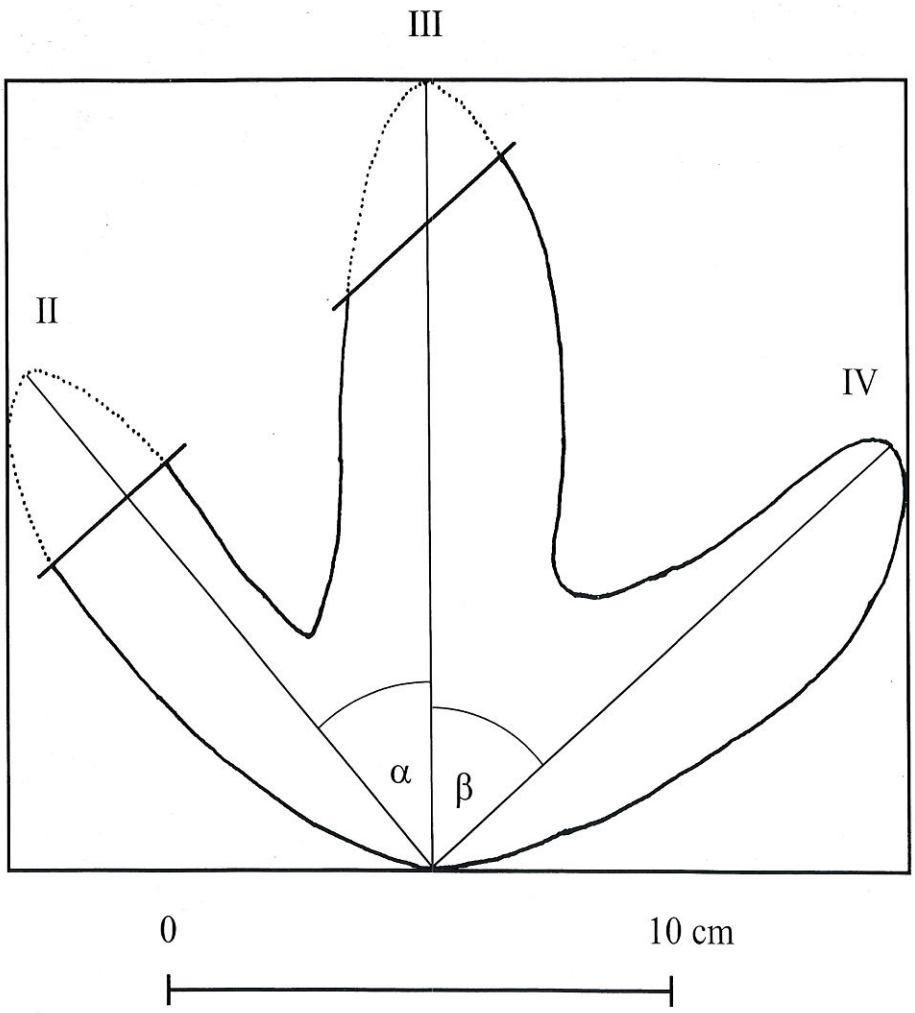

Fig. 1. The footprint outline with characterization of the way of the measurements The missing terminations of the digits II and III are marked by the dotted lines. Specimen no. JZ 10.

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První nález stopy dinosaura v České republice (podkrkonošská pánev) a její stratigrafický význam

Na lokalitě U Devíti Křížů (podkrkonošská pánev) byla ve svrchní části bohdašínského souvrství nalezena unikátní stopa dinosaura. Jde o první doklad života této skupiny plazů z našeho území. Nedokonalé zachování a ojedinělost nálezu nedovolují druhové, ani rodové určení. Původcem této tříprsté stopy je však nepochybně bipední zástupce podřádu Theropoda Marsh, 1881, pravděpodobně z infrařádu Coelurosauria Huene, 1914. Zástupci výše uvedených skupin dinosaurů (a jejich stopy) se začínají objevovat od středního triasu a proto je nutné přehodnotit stáří bohdašínského souvrství (nebo alespoň jeho nejvyšší části) na středně triasové, nebo mladší.

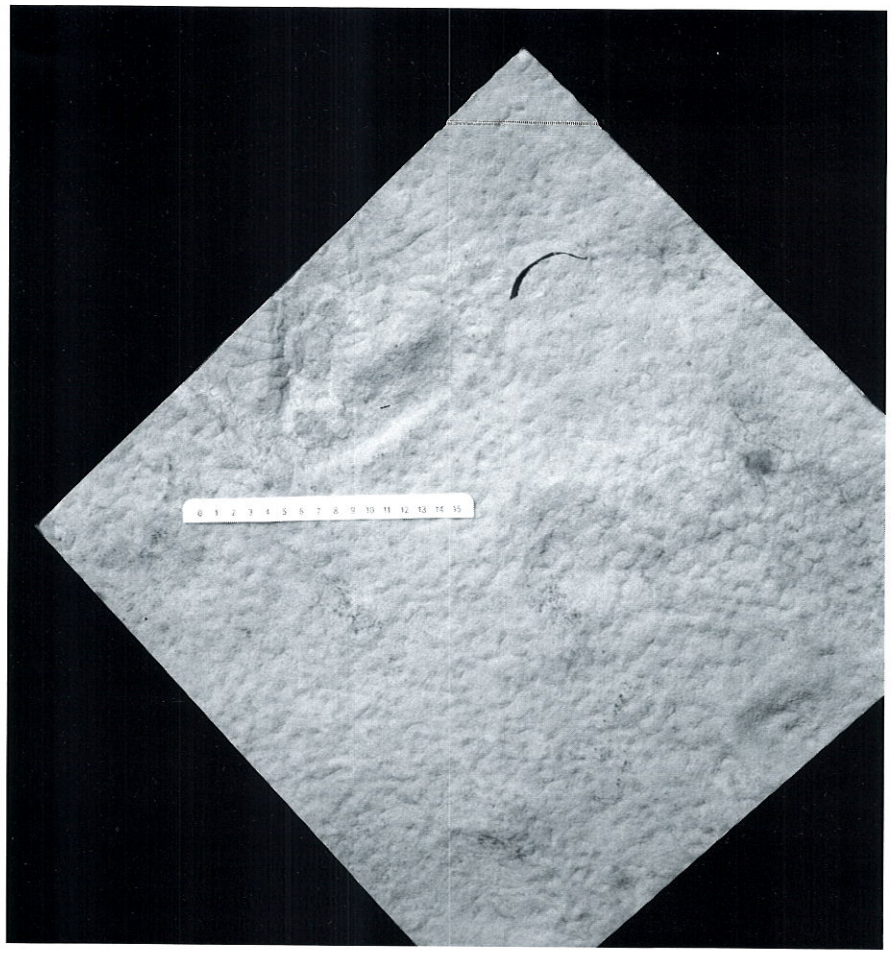

Fig. 2. The footprint of a theropod; U Devíti Křížů quarry; Bohdašín Formation; Middle (?) Triassic; JZ 10.

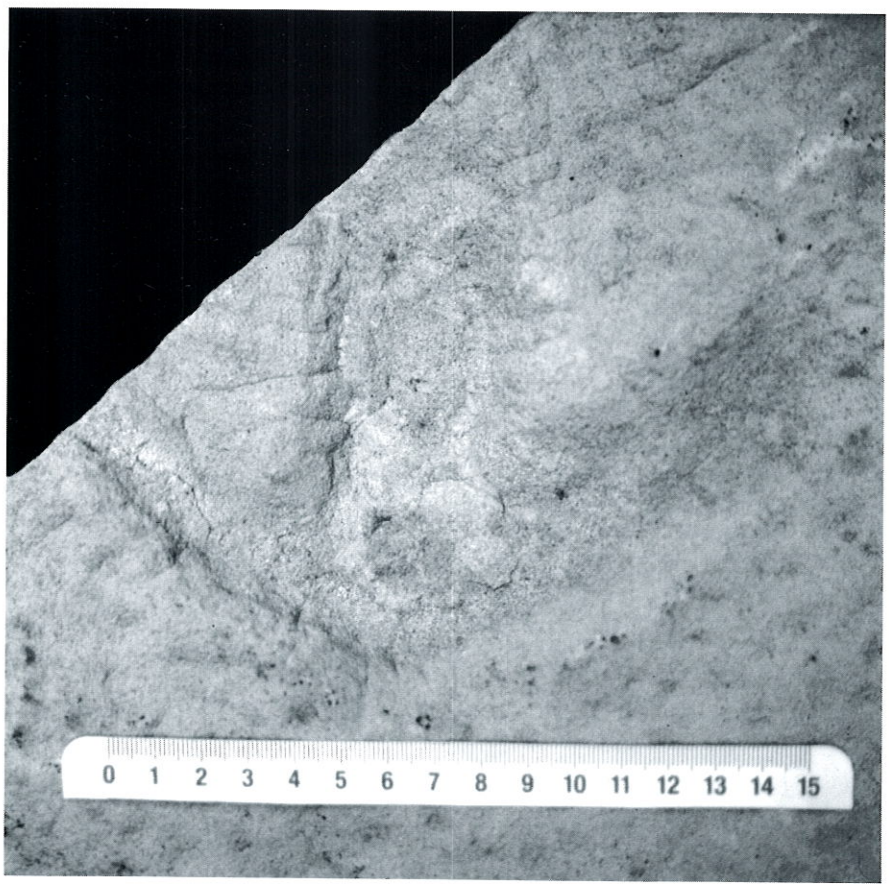

Fig. 3. The detail of the theropod footprint; U Devíti Křížů quarry; Bohdašín Formation; Middle (?) Triassic; JZ 10.
Photos by J. Marek