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Extraordinary trilobite collected by František POŠEPNÝ discovered after 140 years

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Abstract: This extraordinary specimen, a well-preserved articulated thorax of a large specimen of the middle Cambrian paradoxidid trilobite *Paradoxides* (*Hydrocephalus*) *minor* (BOECK, 1827), was collected by the notable geologist František POŠEPNÝ during an excursion to the Hřebeny mountain range, Czech Republic, in the 1890s, and was thought to have been lost for nearly 140 years. The trilobite originates from the Brdlavka locality, one of the easternmost outcrops of the Jince Formation. There is no fossil collected at this locality housed in institutional and private collections. The recent discovery of this fossil in the Geological Pavilion of the Technical University of Ostrava, Czech Republic, enabled its assignment to the common species *Paradoxides* (*Hydrocephalus*) *minor* (BOECK, 1827). This species confirms the occurrence of the middle levels of the middle Cambrian Jince Formation at the Brdlavka locality.

Keywords:

- František POŠEPNÝ;
- paleontology;
- Cambrian trilobite;
- Drumian;
- Barrandian area;
- Příbram-Jince Basin;
- Czech Republic

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Résumé : ***Un trilobite extraordinaire récolté par František POŠEPNÝ redécouvert 140 ans plus tard.-*** Cet exemplaire exceptionnel, un thorax articulé bien préservé d'un grand spécimen du trilobite paradoxididé du Cambrien moyen, *Paradoxides (Hydrocephalus) minor* (BOECK, 1827), avait été récolté par le célèbre géologue František POŠEPNÝ lors d'une excursion dans la chaîne de montagnes Hřebeny, en République tchèque, dans les années 1890. Puis, pendant près de 140 ans, il a été considéré comme perdu. Ce trilobite provient du site de Brdlavka, l'un des affleurements les plus orientaux de la Formation de Jince. Aucun autre fossile récolté dans cette localité n'est présent dans des collections institutionnelles ou privées. La découverte récente de ce fossile dans le Pavillon géologique de l'Université Technique d'Ostrava, en République tchèque, a permis de l'attribuer à *Paradoxides (Hydrocephalus) minor* (BOECK, 1827). Cette espèce commune confirme la présence des niveaux moyens de la Formation de Jince du Cambrien moyen sur le site de Brdlavka.

Mots-clefs :

- František POŠEPNÝ ;
- paléontologie ;
- Trilobite cambrien ;
- Drumien ;
- région barrandienne ;
- bassin de Příbram-Jince ;
- République tchèque

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1. Introduction

František Pošepný (see § Appendix 1) is mainly remembered as the author of *The Genesis of Ore Deposits*, a globally accepted innovative theory on the origin of ore deposits (Pošepný, 1894). It is assumed that this study was largely based on Pošepný's lectures delivered when he headed the School of Economic Geology at the Mining College at Příbram (see § Appendix 2) between 1879 and 1889 (Votrubec, 1986: p. 36). In 1889, Pošepný retired and moved to Vienna (Austro-Hungarian Empire, now Austria). In 1895, Pošepný published a comprehensive titled study Beitrag zur Kenntniss der montangeologischen Verhältnisse von Přibram, in which he summarized knowledge of the geology of the mining area of the Příbram ore field (see § Appendix 3). In this contribution, Pošepný (1895: p. 654) briefly mentioned the presence of the 'Jinecer Schiefer' (= Jince Formation) NE of the municipality of Čenkov and listed the forested areas of Komorsko lodge and Písek Hill as places where the formation occurs (Fig. 1B).

Pošepný (1895) reported a specimen of a paradoxidid trilobite between Malá Baba and Studený hills in the area of the Brdlavka spring that he collected during an excursion with professors Jan Krejčí (see § Appendix 4) and Karl Feistmantel (see § Appendix 5). The year of this excursion was not specified by Pošepný, but it can be approximately estimated, as Pošepný worked at the Mining College at Příbram between 1879 and 1889 and Feistmantel died in 1885. Consequently, the excursion must have occurred between 1879 and 1885. The destiny of this trilobite specimen was unknown, and it was thought to have been lost during several relocations of university collections during the 20th century. In 2023, this extraordinary trilobite was re-discovered in the Geological Pavilion of the Technical University of Ostrava, Czech Republic.

In German: "Barrande ist ihnen in dem Thale des Chumava-Baches zum letztenmale begegnet, und bei einer gemeinschaftlich mit J. Krejči und K. Feistmantel unternommenen Excursion fand ich einige Findlinge im Oberlaufe des nach Hostomic fliesenden Baches zwischen den Berg Malá Baba und Studeny in der Höhe der Brdlavka genannten Quelle. In dem einem Findling fanden wir einen schönen Paradoxiden, den ich der bergakademischen Sammlung von Přibram einverleibt habe" [Translation: "Barrande met them *(= strata of the Jince Formation*) for the last time in the valley of the Chumava stream, and during an excursion undertaken together with J. Krejčí and K. Feistmantel I found several erratic boulders in the upper course of the stream flowing to Hostomic between the Malá Baba and Studeny hills at the height of the spring called Brdlavka. In one of the boulders we found a nice (beautiful) *Paradoxides* which I have enclosed (added) to the mining academy collection of Příbram"].

The goal of this contribution is to describe, classify and illustrate the trilobite specimen and to discuss its importance for the stratigraphic position of the Brdlavka locality.

2. The Brdlavka locality

The specimen collected by Pošepný came from the Brdlavka locality in the Hřebeny mountain range (Fig. 1B). The forested Hřebeny mountain range is characterized by gentle slopes that are extensively covered by residual weathering products. Because of this cover, the Cambrian sediments are generally quite poorly exposed, and consequently their fossils are also poorly known. The geology of the area has been more or less exhaustively discussed in more than twenty contributions, but fossils have been briefly mentioned only in a few reports.

Barrande (1852: p. 64, 924) was the first to refer to the rocks of the 'schistes de Ginetz' (= Jince Formation) in the Hřebeny mountain range. Rocks of this unit were discovered after a long search near the 'moulin de Zator' (= Zátor mill; Fig. 1B); and the name 'Zator' is also the only locality name marked in the inserted map (Barrande, 1852: p. 56c). However, two names, 'moulin de Zator' and the 'Mt. Komorsko' (= Komorsko locality; Fig. 1B) were mentioned by Barrande (1852: p. 370-371) as outcrops that had yielded the trilobite *Paradoxides spinosus* [actually *Paradoxides* (*Hydrocephalus*) *minor* (Boeck, 1827)]. According to Chlupáč (1999: p. 11), Barrande knew that Cambrian fossils occurred in two natural outcrops in the Hřebeny mountain range; specifically, the Zátor locality near Velká Bába Hill and the Komorsko locality on the southern slope of Písek Hill. In addition, Krejčí (1860: p. 467) reported the presence of the 'vrstvy Jinecké' (= Jince Formation) at 'Zátory' (= Zátor mill). In the second edition of the book, Krejčí (1877, p. 391) mentioned 'Břidlice Jinecké' (= Jince shales) at the 'mlýn Zátor' (= Zátor mill) and at Komorsko. Krejčí and Feistmantel (1885: p. 20-21; 1890: p. 14) cited Barrande's report about the occurrence of trilobites near the 'Mühle Zátor' (= Zátor mill), but did not provide new information. Similarly, Katzer (1892: p. 811, 812) published the information that there was an outcrop of the 'Paradoxidenschiefer' (= Jince Formation) with Cambrian fossils near the 'Zátorer Mühle' (= Zátor mill). Liebus (1904: p. 325) collected a trilobite pleura and cylindrical ichnofossils near the locality called 'Brdlavkaquelle'. In a subsequent contribution, Liebus (1913: p. 759) repeated the earlier published information about several outcrops of the Jince Formation, particularly at Komorsko and Písek Hill, 'Brdlavkaquelle', Velká and Malá Baba hills, and Studený vrch. In the associated preliminary geological map, Liebus (1913) illustrated two strips of middle Cambrian rocks cropping out south of Písek Hill and southeast of Velká and Malá Bába hills.

Šnajdr (1958: p. 27) reported on test pit JC 36 near the Zátor solitary house on the southeastern slope of Malá Bába Hill; this place is the same as the Brdlavka spring and was assigned to the *Stromatocystites pentangularis* zone (= *Hypagnostus parvifrons* zone of Fatka & Szabad, 2014). In a comprehensive review of the Příbram-Jince Basin, Havlíček (1971, Pl. III) illustrated a belt of the

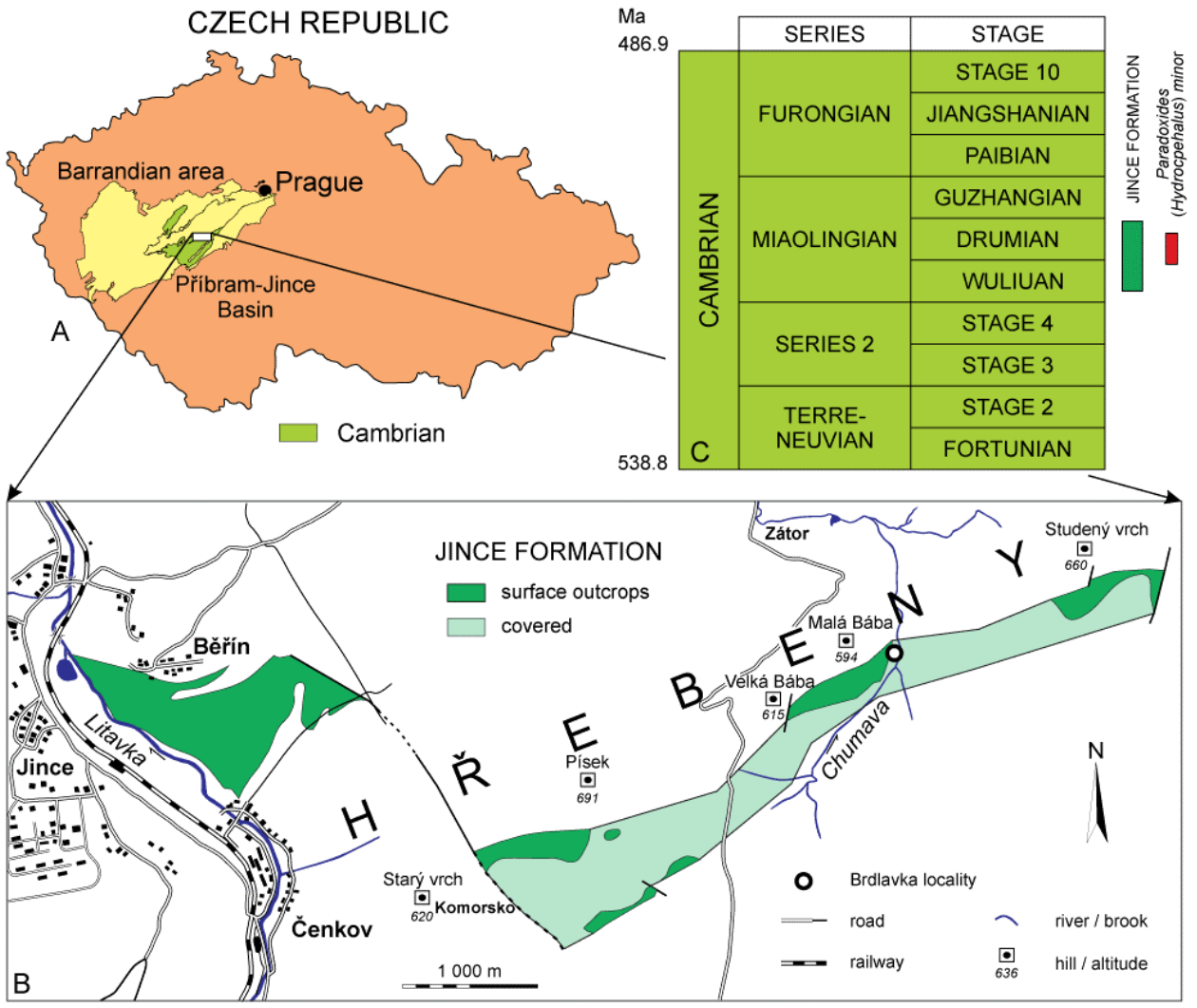

Figure 1: Map and stratigraphy; **A)** Czech Republic with the position of the Barrandian area and the Příbram-Jince Basin; **B)** schematic geological map of the Hřebeny mountain range with the location of the Brdlavka locality (adapted after HAVLÍČEK, 1971); **C)** stratigraphy of the Cambrian System with the ranges of the Jince Formation and the trilobite *Paradoxides* (*Hydrocephalus*) *minor* (BOECK, 1827) (map adapted after HAVLÍČEK, 1971, stratigraphy adapted from https://www.stratigraphy.org and FATKA *et al.*, 2004).

Jince Formation ca. 150-600 m wide south of the Písek, Velká Bába and Studený vrch hills; this belt ended on the western slope of Charvát Hill. However, the Brdlavka locality is not named.

3. The re-discovered trilobite specimen

A rare sample with remains of an articulated paradoxidid trilobite was collected by František POŠEPNÝ from the middle Cambrian Jince Formation in the Hřebeny mountain range. POŠEPNÝ (1895: p. 653) wrote that this rare specimen had been deposited in the collection of the Mining College at Příbram (see above). However, the specimen was never studied by palaeontologists, and so has never been described, figured or systematically treated.

The specimen is housed in the collection at the Geological Pavilion of the Technical University of Ostrava (see § Appendix 6) under the number TUO Z - 01712 (see § Appendix 7) (Fig. 2A-B). This pavilion contains and exhibits mineralogical, petrographic, paleontological, and regional geological collections as well as collections of mineral resource deposits. The collection currently comprises more than 78 thousand specimens.

The re-discovered specimen is an external mould of the exoskeleton of a large late holaspid specimen of *Paradoxides* (*Hydrocephalus*) *minor* (BOECK, 1827). The trilobite is preserved on the surface of a polygonal slab of a fine-grained greywacke (Fig. 2A). The counterpart (= internal mould) is not preserved.

The original paper label bearing the locality information
Dědička les = heiress forest
u Brdlavky = at Brdlavka
Hostomi cS = Hostomice
is glued on the slab surface near the trilobite (Fig. 2B).

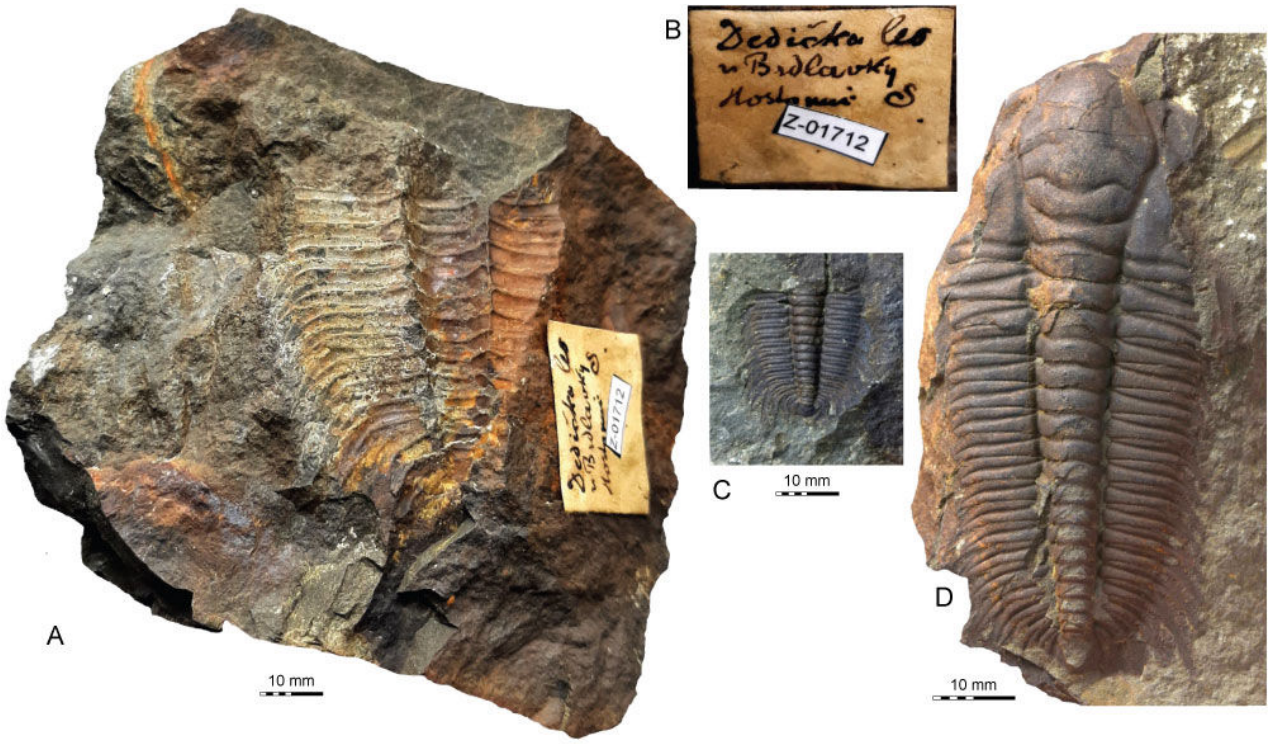

Figure 2: Photographs of the specimen of the trilobite *Paradoxides* (*Hydrocephalus*) *minor* (Boeck, 1827) collected and mentioned by Pošepný (1895: 654), Geological Pavilion of the Technical University of Ostrava, specimen TUO Z - 01712 and two other specimens. **A)** external mould of incomplete thorax; **B)** detail of the original label glued on the rock sample; **C)** internal mould of articulated thorax with pygidium, CGS MŠ 8586, Jince - Vystrkov locality; **D)** internal mould of a complete articulated specimen, CGS MŠ 501, Jince - Ovčín locality, original figured by Šnajdr (1958: Pl. 23, fig. 15).

The preserved specimen comprises twelve articulated middle and posterior thoracic segments; the cephalon and pygidium are missing (Fig. 2A). According to Šnajdr (1958: p. 139-140; 1987), the full thorax of *Paradoxides* (*Hydrocephalus*) *minor* comprises eighteen segments (Fig. 2D). In the studied specimen, the six anterior thoracic segments are not preserved Fig. 2A, C-D). The complete exoskeleton is estimated to have had a sagittal length of ca. 150 mm.

Paradoxides (*H.*) *minor* ranges through a large part of the Jince Formation (Fig. 1C), from the higher levels of the *Paradoxides* (*Eccaparadoxides*) *pusillus* biozone to the upper levels of the *Ellipsocephalus hoffi-Paradoxides* (*Rejkocephalus*) biozone (see Šnajdr, 1958: p. 140; Fatka *et al.*, 2004: p. 378).

4. Conclusions

The trilobite specimen collected by František Pošepný during an excursion together with professors Jan Krejčí and Karl Feistmantel in the Hřeben mountain range was thought to have been lost during several movements of university collections during the 20th century. This extraordinary specimen re-discovered in 2023 in the collection of the Geological Pavilion of the Technical University of Ostrava is identified as *Paradoxides* (*Hydrocephalus*) *minor* (Boeck, 1827). It is the first fossil collected at this locality, as no fossil remain is housed in institutional and private collection and confirms the occurrence of middle Cambrian Jince Formation at the Brdlavka locality.

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Appendices

Appendix 1: POŠEPNÝ (30th March 1836 Jilemnice, Austro-Hungarian Empire, now Czech Republic to 27th March 1895 Döbling, Austro-Hungarian Empire, now Austria) studied at the Mining College in Příbram (later the Mining College of Further Education, now the Technical University of Ostrava, Czech Republic), and later at the Prague Polytechnic and the Imperial Geological Institute in Vienna (Austria), where he worked as a mining trainee. He gained experience in mines at various places in the Austro-Hungarian Empire. In 1879 he returned to the Mining College in Příbram, where he headed the School of Economic Geology and earned the title of professor. He continued his research in the Příbram district. In 1889 he prematurely retired and moved with his wife to the suburbs of Vienna. There he worked on numerous scientific contributions and conducted a number of scientific tours across Europe and the Middle East.

POŠEPNÝ is considered to be the founder of deposit geology, whose findings enabled more efficient extraction of ore. In his magnum opus *The Genesis of Ore-Deposits* (1894) POŠEPNÝ described a new theory of the origin of ore deposits. The theory received great recognition worldwide. In addition to this work, he was the author of more than a hundred other specialized publications, including a study of Příbram and gold-bearing ores in central Bohemia. URL: https://www.hgf.vsb.cz/513/en/collections/profPosepny/

Appendix 2: Mining College at Příbram, later the Mining College of Further Education at Příbram, now the Technical University of Ostrava.

Appendix 3: URL: https://www.poznejpribram.cz/en/hornicke-muzeum-pribram

Appendix 4: Jan KREJČÍ (28 February 1825 Klatovy to 1 August 1887 Prague) Czech geologist, journalist and politician. He wrote the first Czech textbooks on geology in 1860 and 1877. University professor of mineralogy and geology at the Prague Polytechnic Institute. He published numerous works in Czech and is rightly considered to be the "Father of Czech geology" and the foremost Czech natural scientist of the 19th century.
(for more information see: URL: https://en.wikipedia.org/wiki/Jan_Krej%C4%8D%C3%AD)

Appendix 5: Karel FEISTMANTEL (14 February 1819 Praha to 29 September 1885 Praha-Smíchov). Worked at several steelworks in central Bohemia and studied Paleozoic volcanites and coal seams and collected fossils. He was member of several scientific societies, including k.k. Geologischen Raichsanstalt Wien. Published about sixty geological, paleontological and mineralogical articles. In 1878 he retired, moved to Prague, and in the following years carried out numerous excursions together with Jan KREJČÍ.
(for more information see: URL: http://www.geology.cz/demo/dvd_hm/pgs_eng/autori_id_1977.html)

Appendix 6: URL: https://www.hgf.vsb.cz/513/en/aboutpavilion/

Appendix 7: Abbreviations:

Technical University of Ostrava - TUO

Czech Geological Survey Prague - ČGS