

BIOSTRATIGRAPHICALLY IMPORTANT FINDINGS OF TWO INDEX TRILOBITES FROM THE JINCE FORMATION (CAMBRIAN, DRUMIAN) OF THE PŘÍBRAM-JINCE BASIN (BARRANDIAN AREA, CZECH REPUBLIC)

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Abstract: *Litavkaspis rejkovicensis* Fatka, Kordule et Šnajdr from the Příbram-Jince Basin has been known to occur in a roughly 30 m thick eponymous Taxon-range Zone situated in the lower parts of the Jince Formation (Cambrian, Drumian), within the *Eccaparadoxides pusillus* Interval Zone. A unique finding of a cranidium of *Litavkaspis* sp. at the locality Jince-Vystrkov, described in this report, comes from the middle parts of the *Paradoxides gracilis* Taxon-range Zone, lying roughly 250 m higher than the hitherto known biostratigraphically youngest occurrence of the index taxon. Specimens of *Dawsonia bohémica* (Šnajdr) from the Jince Formation have been collected exclusively in about 1 m thick deposits of the eponymous Taxon-range Zone situated stratigraphically at the base of the *Onymagnostus hybridus* Interval Zone. The findings of *Dawsonia* cf. *bohémica* presented herein come from the localities Rejkovice – Potůček in the *Litavkaspis rejkovicensis* Taxon-range Zone, and Rejkovice – Ve žlutých in the *Acadolenus snajdri* Interval Zone. Their stratigraphic positions are therefore 30–50 m lower than the typical occurrence of *Dawsonia bohémica* (Šnajdr) in the eponymous Taxon-range Zone.

Keywords: Trilobita, biostratigraphy, Cambrian, Drumian, Jince Formation, Příbram-Jince Basin, Czech Republic

INTRODUCTION

Biostratigraphically important specimens of trilobites *Litavkaspis* sp. and *Dawsonia* cf. *bohémica* (Šnajdr) have been discovered in the Jince – Rejkovice area (Příbram-Jince Basin; Jince Formation, Cambrian, Drumian) outside the hitherto known stratigraphic range of the index species *Litavkaspis rejkovicensis* Fatka, Kordule et Šnajdr, 1987 and *Dawsonia bohémica* (Šnajdr, 1950). The figured material is housed in the paleontological collections of the Czech Geological Survey, Prague.

DESCRIPTIVE PART

Agraulidae Howell, 1937

Litavkaspis Fatka, Kordule et Šnajdr, 1987

Type species: *Litavkaspis rejkovicensis* Fatka, Kordule et Šnajdr, 1987; Cambrian, Drumian, Jince Formation; Rejkovice, Příbram-Jince Basin, Barrandian area, Czech Republic.

***Litavkaspis* sp.**

(Pl. I, figs 1, 2)

For this study, we had at disposal a single, markedly dorsoventrally flattened, incomplete cranidium of a holaspid specimen (FK1268). Its morphology, especially the conspicuously vaulted frontal border, places it to the agraulid genus *Litavkaspis* Fatka, Kordule et Šnajdr, 1987. Due to the unfavorable preservation we leave it in the open nomenclature. This unique finding comes from the upper portion of the Jince Formation, the *Paradoxides gracilis* Taxon-range Zone (*sensu* Fatka and Szabad 2014), exposed at the locality Jince – Vystrkov, called as “Za kasárnami” (behind barracks; 49.7795619N, 13.9678108E), on the north-eastern hillside of the Vystrkov Hill (541 m). The specimen was found in about 0.4 m thick layer situated in the middle levels of the greywacke-shale succession belonging

to the *Paradoxides gracilis* Zone. The cranidium is preserved as an internal mould in grayish-green silty shale with a grayish-blue coating of manganese hydroxides and is partly overlain by an external mould of an incomplete exoskeleton of *Ptychoparia milena* (Kordule). The layer has also provided other fauna characteristic for the *Paradoxides gracilis* Zone: trilobites *Paradoxides gracilis* (Boeck) – abundant, *Hydrocephalus* (*H.*) *minor* (Boeck) – abundant, *Hydrocephalus* (*Rejkocephalus*) *rotundatus* (Barrande) – rare, *Conocoryphe* (*C.*) *sulzeri sulzeri* (Schlotheim) – abundant, *Ptychoparia milena* (Kordule) – abundant, and *Peronopsis integra* (Beyrich) – abundant; echinoderms *Lichenoides priscus* (Barrande) – uncommon, and *Stromatocystites* sp. – uncommon; brachiopods *Lindinella* sp. – rare; bivalved arthropods *Forficaris* sp. – very rare.

Discussion to *Litavkaspis* Fatka, Kordule et Šnajdr, 1987

The index taxon *Litavkaspis rejkovicensis* Fatka, Kordule et Šnajdr, 1987 was originally described from the lower part of the Jince Formation, *Eccaparadoxides pusillus* Zone, the type locality Rejkovice near Jince. Later on, Fatka and Kordule (1992) defined the new *Litavkaspis rejkovicensis* Subzone within the *Eccaparadoxides pusillus* Zone. Its thickness was estimated to 8 m. Subsequently, Fatka and Szabad (2014) extended the stratigraphic range of the taxon to 30 m at the locality Jince – Vinice and defined the *Litavkaspis rejkovicensis* Taxon-range Zone within the newly established *Eccaparadoxides pusillus* Interval Zone. The unexpected finding of *Litavkaspis* sp. in the middle part of the *Paradoxides gracilis* Zone, 250 m above the upper limit of the *Litavkaspis rejkovicensis* Zone, is thus remarkable. The precise assignment of *Litavkaspis* sp. at the species level and its thorough assessment require a new, well-preserved comparative material.

Eodiscidae Raymond, 1913

Dawsonia Hartt in Dawson, 1868

Type species: *Microdiscus dawsoni* (Hartt in Dawson, 1868, p. 655); Cambrian, Fossil Brook Formation; New Brunswick, Canada.

Dawsonia cf. *bohemica* (Šnajdr, 1950)

(Pl. I, figs 3–7)

Dawsonia cf. *bohemica* (Šnajdr, 1950) is represented by a single pygidium and two cranidia coming from the localities Rejkovice – Potůček (brooklet; the locality No. 12 in Fatka and Kordule, 1992, and No. 12/2 in Kordule 1996; 49.8078147N, 13.9568314E), and Rejkovice – Ve žlutých (the locality No. 11 in Fatka and Kordule 1992; 49.8080106N, 13.9647336E). Rejkovice – Potůček is stratigraphically situated in the *Eccaparadoxides pusillus* Interval Zone, whereof in the middle part of the *Litavkaspis rejkovicensis* Taxon-range Zone *sensu* Fatka and Szabad (2014). The pygidium FK1361 (Pl. I, fig. 7) found at this locality is preserved as an internal mould in grey-purple calcareous greywacke containing also fragmentary trilobite exoskeletons of *Conocoryphe* sp. and *Germanopyge* sp. Another specimen of *Dawsonia* cf. *bohemica* from Rejkovice – Potůček is represented by an external mould of an incomplete pygidium FK1362 (Pl. I, figs 3, 4) in a yellow-brown greywacke. The locality Rejkovice – Ve žlutých, corresponding biostratigraphically to the *Acadolemus snajdri* Taxon-range Zone, yielded an external mould of an incomplete cranidium FK1363 (Pl. I, figs 5, 6).

The accompanying fossil associations at both localities are rich and highly diversified. The original lists of taxa in Fatka and Kordule (1992; tab. 2) are complemented here by our further findings: Rejkovice – Potůček (grey-purple greywacke with sandy lamination and subordinate grey-brown silty shale layers): trilobites *Eccaparadoxides pusillus* (Barrande) – abundant, *Conocoryphe cirina* Šnajdr – abundant, *Conocoryphe sulzeri atlanta* Šnajdr – common, *Litavkaspis rejkovicensis* Fatka, Kordule et Šnajdr – abundant, *Germanopyge* sp. – common, *Acadoparadoxides* (*A.*) *sirokyi* Šnajdr – rare, *Hydrocephalus* (*H.*) *mandiki* Kordule – rare, *Hydrocephalus* (*Rejkocephalus*) *knizeki* Kordule – rare, *Skreiaspis spinosa* (Pompeckj) – rare, *Novocatharia havliceki* (Šnajdr) – very rare, *Solenopleurina tyrovicensis* Růžička – very rare, *Ptychoparia* sp. – very rare, *Ptychoparioides chlupaci* Kordule – very rare, *Phalacroma bibullatum* (Barrande) – very rare, *Peronopsis* cf. *fallax* (Linnarson) – very rare, *Condylomyge* cf. *rex* (Barrande) –

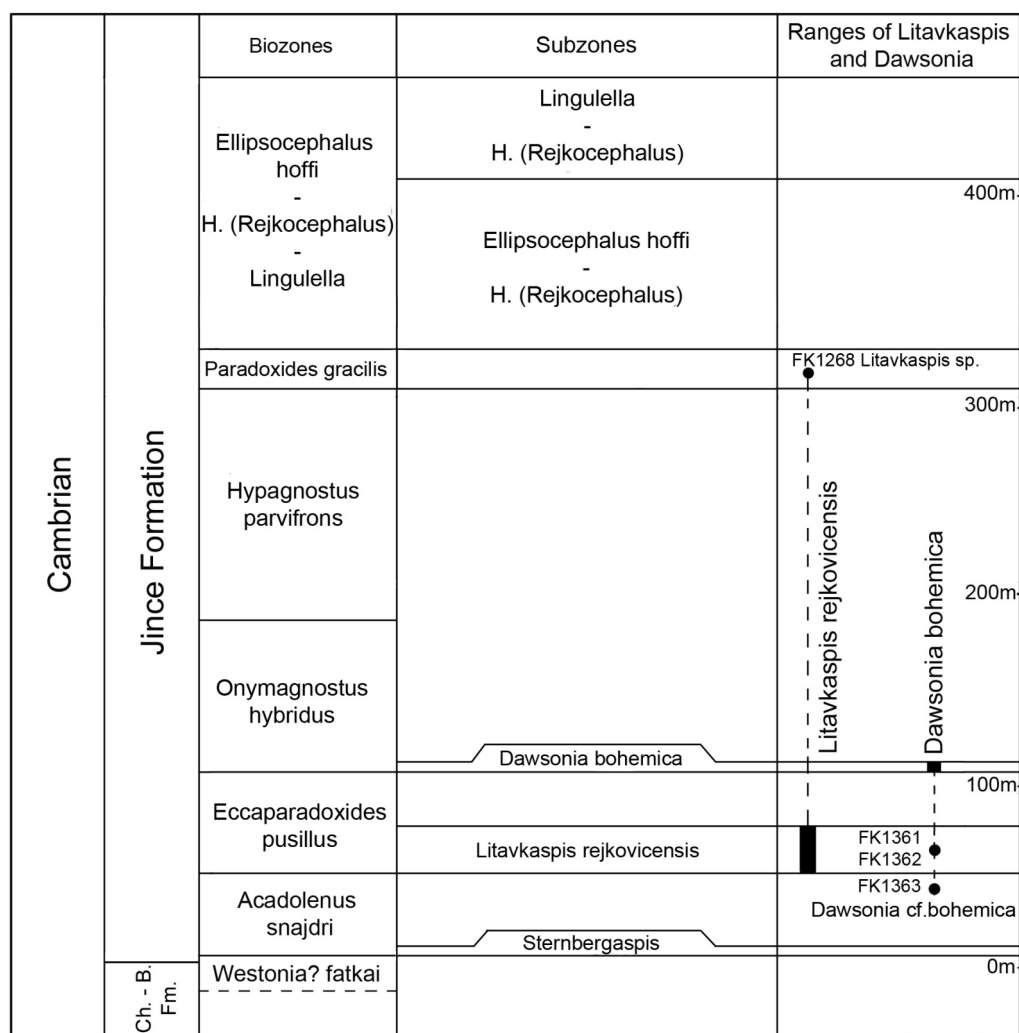


Figure 1. Range-chart of the index trilobite taxa *Litavkaspis rejkovicensis* Fatka, Kordule et Šnajdr and *Dawsonia bohemia* (Šnajdr) accross the Jince Formation (Cambrian, Drumian) in the Příbram-Jince Basin, with the designated unusual biostratigraphic positions of the open-nomenclature specimens of *Litavkaspis* sp. and *Dawsonia* cf. *bohemia* (Šnajdr) discussed in this report. The biostratigraphic division of the uppermost Chumava-Báština Formation (Ch.-B. Fm.) and the Jince Formation has been modified after Fatka and Szabad (2014). The thickness scale corresponds to the stratotype section of the Jince Formation in the Litavka River Valley (Fatka and Szabad, 2014, fig. 9).

very rare, and *Dawsonia* cf. *bohemia* (Šnajdr) – very rare; echinoderms *Decacystis* sp. – rare, *Etoctenocystis* sp. – rare, *Ceratocystis* sp. – rare, *Stromatocystites* sp. – rare, *Asturicystis havliceki* Fatka et Kordule – very rare, and *Cigara* sp. – very rare; brachiopods *Brahimorthis pompeckiana* Havlíček – very rare, *Westonia bohemia* (Koliha) – rare, and *Glyptacrothele bohemia* (Barrande) – rare; Hyolitha div. gen. et sp. – rare; Algae indet. (remnants) – rare.

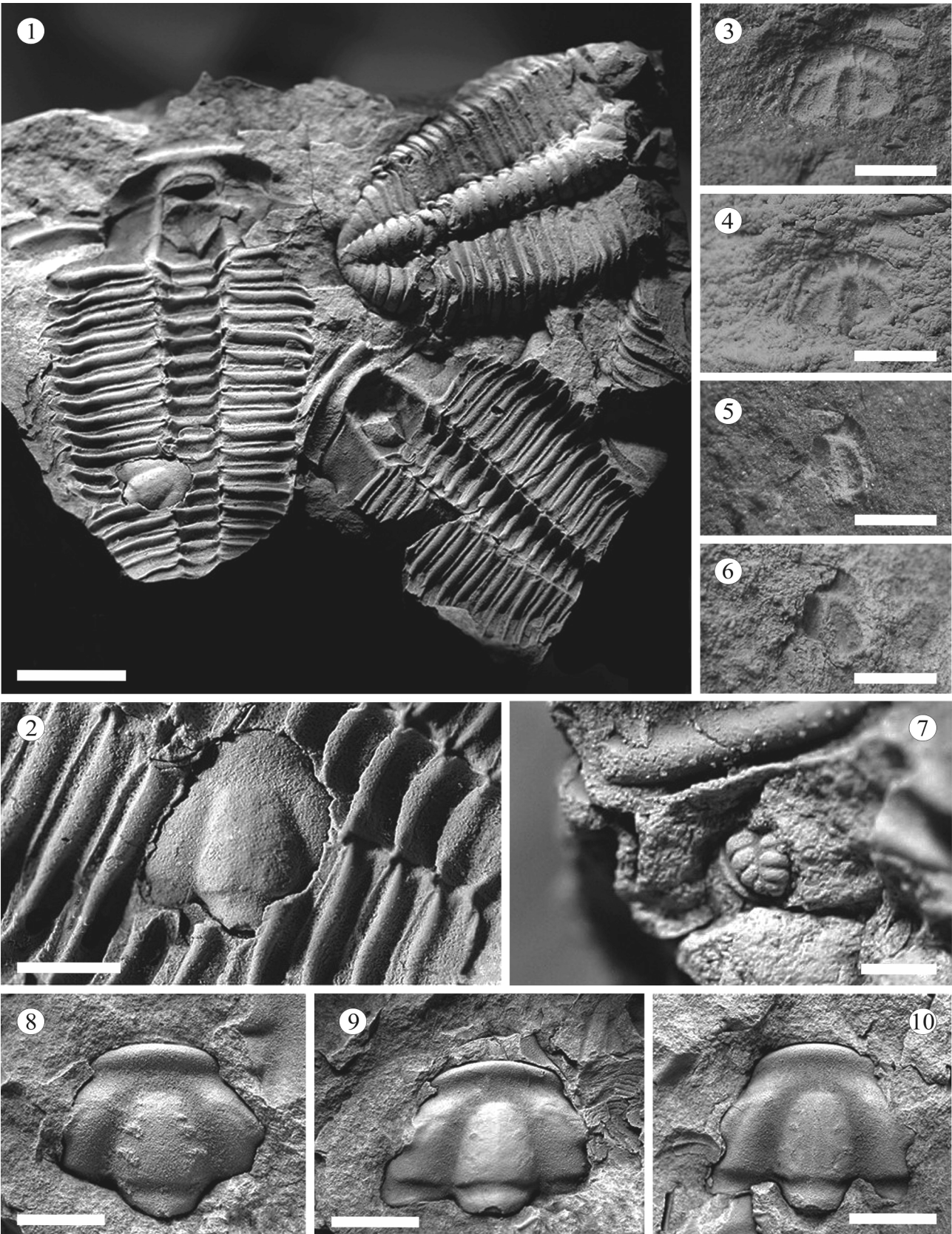
Rejkovice – Ve žlutých (variegated greywacke to silty shale): trilobites *Eccaparadoxides pusillus* (Barrande) – abundant, *Conocoryphe cirina* Šnajdr – abundant, *Novocatharia havliceki* (Šnajdr) – uncommon, *Acadolenus snajdri* Fatka et Kordule – uncommon, *Skreiaspis spinosa* (Pompeckj) – common, *Jincella prantli* (Růžička) – very rare, *Lobo-*

cephalina emmrichi (Barrande) – rare, *Ctenocephalus coronatus* (Barrande) – very rare, *Ellipsocephalus vetustus* (Pompeckj, 1895) – common, *Ptychoparia* sp. – rare, *Ptychoparioides* sp. – rare, and *Dawsonia* cf. *bohemia* (Šnajdr) – very rare; echinoderms *Decacystis* sp. – rare, and *Acanthocystites* sp. – rare.

Discussion to *Dawsonia* cf. *bohemia* (Šnajdr, 1950)

The stratigraphic range of the eodiscid taxon *Dawsonia bohemia* (Šnajdr, 1950) was refined by Šnajdr (1958). He extended it into the uppermost layers of the *Eccaparadoxides pusillus* Zone. At that time, this level was only known from a locality next to the hillside Vinice near Jince, exposed in the riverbed of the Litavka River. Later on, Fatka

Plate I



and Kordule (1992) noticed a rich occurrence of the taxon at their locality No. 19, situated at the base of the *Onymagnostus hybridus* Taxon-range Zone. The stratigraphically narrow (about 1 m) succession with an abundant eodiscid material was denoted at the same time as the horizon with *Dawsonia bohemica*. Fatka and Kordule (1992, fig. 2, designated with a question mark) reported a questionable occurrence of this eodiscid taxon from the locality Rejkovice – Ve žlutých (No. 11) belonging to the *Acadolenus snajdri* Subzone, within the *Eccaparadoxides pusillus* Zone. Fatka *et al.* (2004) placed the taxon *Dawsonia* cf. *bohemica* (Šnajdr) to the *Acadolenus snajdri* and *Litavkaspis rejkovicensis* subzones. Recently, Fatka and Szabad (2014) defined the *Dawsonia bohemica* Taxon-range Zone coinciding with the range of the original horizon with *Dawsonia bohemica*, i.e., the 1 m thick succession in the stratotype section of the hill slope Vinice, near Jince (No. 19 of Fatka and Kordule 1992). The new material, which was found ca. 30–50 m below the base of the *Dawsonia bohemica* Taxon-range Zone, confirms the occurrence of *Dawsonia* cf. *bohemica* (Šnajdr) in the *Litavkaspis rejkovicensis* and *Acadolenus snajdri* Taxon-range Zones, as was already proposed by Fatka and Kordule (1992), and Fatka *et al.* (2004).

CONCLUSION

The new findings of trilobite specimens from the Jince Formation, figured and described herein as *Litavkaspis* sp. and *Dawsonia* cf. *bohemica* (Šnajdr), are stratigraphically important. They come from the strata behind the currently known stratigraphic ranges of the index taxa *Litavkaspis rejkovicensis* and *Dawsonia bohemica* in the Příbram-Jince Basin. However, their precise stratigraphic significance needs an exact taxonomical assignment. This task will require gathering of additional, much better preserved study material.

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REFERENCES

- Dawson, J. W. 1868. *Acadian Geology: The geological structure, organic remains, and mineral resources of Nova Scotia, New Brunswick, and Prince Edward Island*. 694 pp. MacMillan and Co., London.
- Fatka, O., Kordule, V. 1992. New fossil sites in the Jince Formation (Middle Cambrian, Bohemia). *Věstník Českého geologického ústavu* 67(1), 47–60.
- Fatka, O., Kordule, V., Szabad, M. 2004. Stratigraphic distribution of Cambrian fossil in the Příbram-Jince Basin (Barrandian area, Czech Republic). *Senckenbergiana lethaea* 84(1/2), 369–384.
- Fatka, O., Kordule, V., Šnajdr, M. 1987. *Litavkaspis*, a new Middle Cambrian trilobite genus. *Věstník Ústředního ústavu geologického* 62(3), 179–181.

Plate I. Biostratigraphically significant specimens from the Jince Formation. 1, 2 – *Litavkaspis* sp.: *Paradoxides gracilis* Taxon-range Zone, Jince – Vystrkov, "Za kasárnami" (behind barracks); 1) incomplete cranidium, internal mould in association with incomplete specimens of *Ptychoparia milena* (Kordule), FK1268, scale bar 10 mm; 2) dtto, detail, FK1268, scale bar 5 mm. 3, 4, 7 – *Dawsonia* cf. *bohemica* (Šnajdr, 1950): *Litavkaspis rejkovicensis* Taxon-range Zone, Rejkovice – Potůček (brooklet); 3) incomplete cranidium, external mould, FK1362, scale bar 2 mm; 4) incomplete cranidium, external mould, FK1362, scale bar 2 mm; 7) incomplete pygidium, internal mould, FK1361, scale bar 1.5 mm. 5, 6 – *Dawsonia* cf. *bohemica* (Šnajdr, 1950): *Acadolenus snajdri* Taxon-range Zone, Rejkovice – Ve žlutých; 5) incomplete cranidium, imprint of external exoskeleton surface (negative counterpart), FK1363, scale bar 2 mm; 6) incomplete cranidium, imprint of external exoskeleton surface (negative counterpart), FK1363, scale bar 2 mm. 8–10 – *Litavkaspis rejkovicensis* Fatka, Kordule et Šnajdr, 1987: incomplete cranidia, internal moulds, *Litavkaspis rejkovicensis* Taxon-range Zone, Rejkovice – Potůček (brooklet); 8) VV3276/512, scale bar 3 mm; 9) VV3269/512, scale bar 3 mm; 10) VV3270/512, scale bar 3 mm. All specimens were coated with ammonium chloride (except figs 3, 5); photographs taken by M. Pavlovič.

- Fatka, O., Szabad, M. 2014. Cambrian biostratigraphy in the Příbram-Jince Basin (Barrandian area, Czech Republic). *Bulletin of Geosciences* 89(2), 413–429.
- Howell, B. F. 1937. Cambrian *Centropleura vermontensis* fauna of northwestern Vermont. *Geological Society of America Bulletin* 48, 1147–1210.
- Kordule, V. 1996. Význam některých méně známých fosiliferních lokalit pro stratigrafii jineckého souvrství v českém středním kambriu. *Věstník Českého geologického ústavu* 71(1), 37–47.
- Raymond, P. E. 1913. On the genera of the Eodiscidae. *Ottawa Naturalist* 27, 101–106.
- Šnajdr, M. 1950. *Aculeodiscus* nov. gen. ze středočeského středního kambria (Trilobitae). *Sborník Ústředního ústavu geologického, oddíl paleontologický* 17, 201–206.
- Šnajdr, M. 1958. Trilobiti českého středního kambria. *Rozpravy Ústředního ústavu geologického* 24, 1–280.