

CAMBRIAN AND ORDOVICIAN FOSSIL-LAGERSTÄTTEN IN THE BARRANDIAN AREA

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Abstract

Exceptionally preserved fossils showing typical characters of the so called Konservat-Lagerstätten are shortly mentioned from Cambrian and Ordovician sediments of the Barrandian area. Fossils with well preserved soft parts were ascertained in several different levels of two Cambrian units of the Příbram-Jince Basin as well as in diverse levels of the Skryje-Týřovice Basin. Other exceptionally preserved fossils are shortly discussed from numerous Lower to Upper Ordovician levels of the Prague Basin.

Introduction

The existing evidence of exceptional preservation of fossils in the so called Fossil-Lagerstätten (see Seilacher 1970, Seilacher et al. 1985, Allison, 1988), provide a unique window in fossil communities, including Cambrian and Ordovician. However, lagerstätte are generally rare. Despite their rarity, they play a fundamental role in understanding evolution of the life, but also in reconstructing of trophic web in the past (e. g. Butterfield 2002, Briggs – Crowther 2007).

Cambrian and Ordovician successions of the Barrandian area are well known by skeletal fauna studied for more than 150 years. Despite such a long tradition of palaeontological research and the high level of recent knowledge, soft-bodied remains preserved in Lagerstätten are obviously underestimated. During the two recent projects (GAČR 205/06/0395 "Palaeoecology and trophic structure of selected Cambrian and Ordovician fossil assemblages in the Barrandian area" and GAČR 205/09/1521 – "Palaeoecological interactions in Cambrian and Ordovician communities in the Barrandian area") diverse exceptionally preserved soft-bodied fossils (= Konservat-Lagerstätten) were discovered in numerous levels in the Barrandian area. Four selected levels with exceptionally preserved fossils are shortly discussed here (fig. 1).

1. Paseky Shale Member (early Cambrian),
2. Buchava and Jince formations (middle Cambrian),
3. Klabava and Šárka formations (Lower-Middle Ordovician),
4. Letná Formation (Upper Ordovician).

Material and methods

In this chapter, the papers summarizing palaeontological and stratigraphical data are referred and the most

recent discoveries of exceptionally preserved fossils are shortly discussed.

1. Paseky Shale Member (early Cambrian)

Preservation of legs and some other soft-parts was established in two quite spectacular arthropods, *Kodymirus* and *Vladicaris* (see Chlupáč 1996 and also Mikuláš 1996). Earlier data on stratigraphic distribution of other taxa described from the Paseky Member were recently compiled by Fatka et al. (2004).

Recent discoveries:

- so called elephant skin surfaces were established at several levels of the Paseky Shale Member,
- the enigmatic genus *Eldonia* was found at the Kočka locality,
- earlier not established fossil groups were ascertained (e. g. hyolithids).

2. Jince and Buchava formations (middle Cambrian)

Published data on all fossil taxa, including their stratigraphic and geographic distribution within the Buchava and Jince formations were compiled (Fatka 1990, Fatka et al. 2004, Geyer et al. 2008).

Recent discoveries:

Soft parts and other kinds of exceptionally preserved fossils were established in numerous samples. Some of these discoveries were studied in detail; several papers describing these finds were submitted during GAČR 205/09/1521:

- one of the oldest graptoloids was described by Maletz et al. (2005),
- the first occurrence of the enigmatic genus *Wiwaxia* was published (Fatka et al. 2011a),

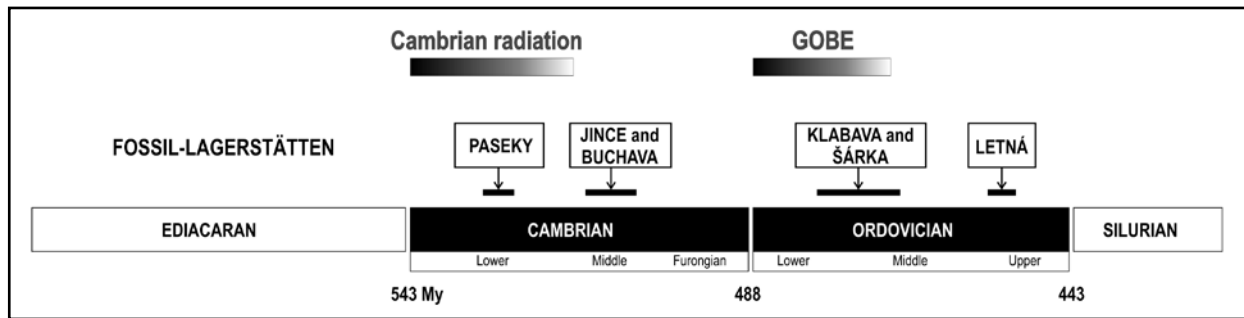


Fig. 1: Time frame of the studied Fossil-Lagerstätten (GOBE = Great Ordovician Biodiversification Event).

- feeding on carcasses of diverse skeletal fauna and the associated trace fossils were documented (Fatka et al. 2009b, 2011c, Fatka – Szabad 2011a, b),
- bitten and malformed agnostids were studied (Fatka et al. 2009a),
- feeding on carcasses of diverse soft-bodied fauna and the associated trace fossils were analyzed (Mikuláš 2001, Mikuláš et al. 2011),
- fodinichnial association – new type of trilobite mor-tichnia is defined by Fatka – Szabad (2011b),
- exceptionally preserved hyolithids as well as numerous articulated hyolithids feeding in situ are documented (Fatka et al. 2008, Valent et al. 2009, 2011a, b).

3. Klabava and Šárka formations (Lower – Middle Ordovician; Floian – Darriwilian)

Published data on Lower Ordovician fossil taxa have been compiled by Kraft – Kraft (2000) and references therein. Data on Lower and Middle Ordovician primary producers were summarized by Fatka (1993), knowledge on the skeletal fossils was recently compiled for brachiopods and trilobites – Mergl (2002, 2004) and Budil et al. (2007), Mergl et al. (2007, 2008); graptolites – Kraft – Kraft (1999), Kraft – Mergl (1979) and ichnofossils – Mikuláš (1993, 1995, 1998). The brachiopod and trilobite assemblages were established and/or discussed (Mergl 2002, Mergl et al. 2007, 2008, Servais et al. 2008, Fatka – Mergl 2009).

Soft parts and other kinds of exceptionally preserved fossils are known in numerous samples of worms – Kraft – Mergl (1989), Harvey et al. 2010, agnostids – Slavičková – Kraft (2001), and trace-fossils – Bruthansová – Kraft (2003). Some other discoveries were studied in detail within the grant GAČR 205/09/1521:

- bitten trilobites (Budil et al. 2010),
- exceptional sponge-radiolarian assemblage (Mergl – Duršpek 2006),

- echinoderm Lagerstätten (Lefebvre 2007, Lefebvre – Fatka 2003),
- soft parts of hyolithids (Valent – Kraft 2009).

4. Letná Formation (Upper Ordovician)

Revision and description of new findings of the enigmatic arthropods were published (Rak 2009, Rak et al. 2009, Ortega-Hernández et al. 2010); the brachiopod and trilobite assemblages were recently re-evaluated (Servais et al. 2008, Fatka – Mergl 2009). Some of exceptionally preserved trilobites were also studied (Fatka et al. 2011).

Summary

All the five lithostratigraphic units, the Paseky Member, Jince, Buchava, Klabava, Šárka and Letná formations contain exceptionally preserved fossils and represent taphonomic windows of the Konservat-Lagerstätten type in several levels. Such levels offer an extraordinary possibility to study early Cambrian to Upper Ordovician ecosystems in the classical Barrandian area using earlier inaccessible data.

Study and evaluation of fossils collected from such Lagerstätten could provide very important information for reconstruction of the complex benthonic and in some cases planktonic parts of food web following the Precambrian/Cambrian agronomic revolution and the subsequent development associated with the GOBE (Global Ordovician Biodiversification Event).

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