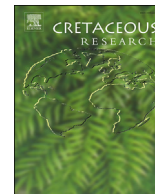




Contents lists available at ScienceDirect

Cretaceous Research

journal homepage: [www.elsevier.com/locate/CretRes](http://www.elsevier.com/locate/CretRes)

## Ammonites, inoceramids and stable carbon isotopes of the Cenomanian–Turonian OAE2 interval in central Europe: Pecínov quarry, Bohemian Cretaceous Basin (Czech Republic)

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### ARTICLE INFO

#### Article history:

Received 5 February 2017

Received in revised form

4 April 2017

Accepted in revised form 8 April 2017

Available online xxx

#### Keywords:

Mid-European Cretaceous

OAE2 interval

Palaeontology

Geochemistry

Stratigraphic correlation

### ABSTRACT

In a well-exposed succession of Cenomanian through lower Turonian strata at Pecínov (Bohemian Cretaceous Basin, Czech Republic), a detailed study of ammonite and inoceramid assemblages was undertaken for the first time and combined with a revision of physical and carbon-isotope stratigraphy. The upper Cenomanian part of the OAE2 interval yielded a relatively rich ammonite assemblage containing *Metoicoceras geslinianum* (d'Orbigny, 1850), *Calycoceras* (*Calycoceras*) *naviculare* (Mantell, 1822), *Pseudocalyoceras angolaense* (Spath, 1931), *Lotzeitites aberrans* (Kossmat, 1895), *Euomphaloceras septemseriatum* (Cragin, 1893), *Sciponoceras gracile* (Shumard, 1860), *Allocrioceras annulatum* (Shumard, 1860) and ? *Puzosia* sp. Inoceramid bivalves include *Inoceramus pictus* J. de C. Sowerby, 1829, *Inoceramus* sp. aff. *Mytiloides praeturonicus* Tröger, 2015 and *Inoceramus* cf. *bohemicus* Leonhard, 1897 in the Cenomanian part of the succession. The subspecies concept of the *Inoceramus pictus* group is modified here. The occurrence of *Mytiloides puebloensis* Walaszczyk and Cobban, 2000 indicates the lowermost Turonian *Watinoceras devonense* Zone. Earlier interpretation of the positive carbon-isotope excursion is refined here and a combined bio- and chemostratigraphic correlation is presented to successions from the Western Interior Seaway and the British Chalk.

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### 1. Introduction

The Bohemian Cretaceous Basin (BCB), which acted as a seaway between the Boreal European basins and the northwestern margin of the Tethys (Fig. 1), represents an important area for interregional stratigraphical correlation. However, records of macrofauna are scarce from upper Cenomanian–lowermost Turonian strata. Late Cenomanian ammonites from the BCB were studied only sporadically by previous authors (Frič, 1869; Fritsch *in*; Fritsch and Schlönbach, 1872; Vašček, 1985, 1989; Cápová, 2012). In most cases, ammonite finds were not specifically related, neither to a particular section nor

to particular beds within sections. In an interdisciplinary study of the OAE2 interval at Pecínov quarry, Uličný *et al.* (1997a) recorded finds of macrofaunal index species, but did not provide detailed discussion or illustrations of specimens.

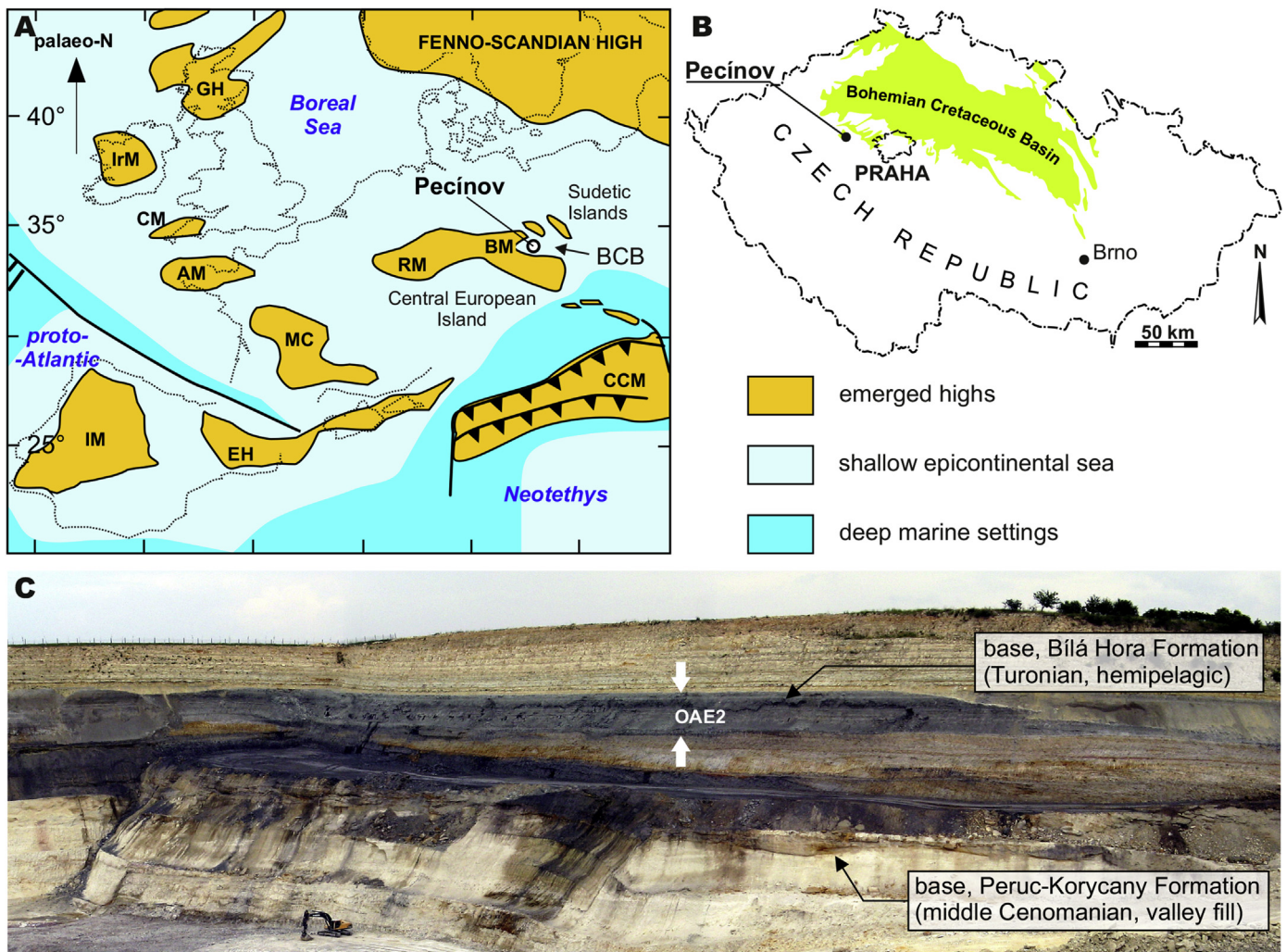
This paper presents, for the first time, a comprehensive report of ammonite and inoceramid faunal assemblages from Pecínov quarry, currently the best exposure of Cenomanian through lower Turonian strata in the BCB. Significant new collections were made possible by rapid progress in quarrying activity between 2012 and 2016. This ammonite fauna includes several near-cosmopolitan taxa commonly used for interbasinal and intercontinental correlations (e.g., Gale *et al.*, 2005; Monnet and Bucher, 2007). In the present paper, the stratigraphic distribution of macrofauna is combined with a carbon-isotope record in total organic carbon ( $\delta^{13}\text{C}_{\text{Org}}$ ), making it possible to construct a

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refined stratigraphic scheme for the upper Cenomanian in the BCB and central Europe. Simultaneously, the section is compared to the Pueblo GSSP/Portland succession (Colorado, USA) and Eastbourne (southeast England), indicating a high stratigraphic potential and importance. The present study focuses on the upper Cenomanian part of the succession and on the Cenomanian–Turonian boundary proper, where most of the new material comes from; a discussion of the higher parts of the lower Turonian is beyond the scope of the present paper and is deferred to another occasion.

extending along reactivated fault zones in the basement of the Bohemian Massif (Fig. 1). The greatest extent of marine flooding was reached in the early Turonian, but existing outcrops of the Cenomanian–Turonian boundary succession commonly show stratigraphic condensation and hiatuses of varying extent. One notable exception is the still active Pecínov quarry near Nové Strašecí, approximately 40 km west of Prague (Fig. 1), which represents a high-quality, well-accessible exposure of the Cenomanian–Turonian boundary interval in the basin (WGS 84, coordinates: 84: N 50°7.76', E 13°55.03').



**Fig. 1.** A. Palaeobiogeographic map of northwest and central Europe showing position of the Bohemian Cretaceous Basin. Abbreviations of emerged landmasses: AM – Armorican Massif, BM – Bohemian Massif, CM – Cornubian Massif, CCM – Central Carpathian Massif, EH – Ebro High, GH – Grampian High, IM – Iberian Massif, IrM – Irish Massif, MC – Massif Central, RM – Rhenish Massif. B. Position of the BCB within the Czech Republic with Pecínov quarry marked (modified after Uličný et al., 2014). C. Photograph of the Pecínov working quarry in 2012.

## 2. Geological and palaeogeographical setting

During the mid-Cretaceous, the palaeohighs of the Rhenish and Bohemian massifs were the last regions to be affected by the flooding of the central European continental interior (compare Voigt et al., 2008; Wilmsen et al., 2014; and references therein). Between the late Cenomanian and Santonian, the Bohemian Cretaceous Basin functioned as a relatively shallow seaway

Pecínov quarry is located within an erosional outlier of Cretaceous strata along the western edge of the preserved infill of the BCB (Fig. 2). During the course of the stepwise Cenomanian transgression, this region was initially a palaeovalley that was gradually infilled by fluvial and estuarine strata (Uličný et al., 1997a,b, 2009). At the onset of *Metoicoceras geslinianum* Zone time, further flooding transformed the area into an embayment in the western part of the basin (Fig. 2), partly sheltered from the main

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