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A discussion about Valanginian Neocomitinae from Central Poland, their ontogeny and possible origin

Izabela Ploch

Polish Geological Institute, National Research Institute, Rakowiecka 4, PL-00-975 Warszawa, Poland

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ABSTRACT

In the Valanginian Wąwał section, Central Poland, ammonites are numerous and very well preserved, often with early whorls. This material provides new information and unique details for the study of the ontogeny and relationships within the Neocomitinae. The early ontogenetic stages of the genera *Neohoploceras* Spath, *Karakaschiceras* Thieuloy and *Neocomites* Uhlig from the Wąwał section have been studied in detail and, based on the similarity of the early stages, the close relationship between *Neohoploceras* Spath and *Karakaschiceras* Thieuloy is suggested. More distant from them is the genus *Neocomites* Uhlig, whose early ontogenetic stages are different. The earliest appearance of the genera *Karakaschiceras* Thieuloy and *Neohoploceras* Spath in the Wąwał section may suggest that the Polish Basin, with its intermediate character between the Tethyan and Boreal realms, could have been the best place for their early development and the beginning of their later evolutionary path.

1. Introduction

The taxonomic determination of rare or fragmentarily preserved species is difficult, with difficulties in the recognition of their individual development and affiliation. The revision and new findings of extremely numerous and uniquely preserved ammonites from the Valanginian Wąwał section, Central Poland (Fig. 1), has allowed for an extensive study improving our knowledge and providing new data for future studies. The Wąwał section is richly fossiliferous especially in mollusks such as ammonites, bivalves and gastropods. Three cosmopolitan ammonite genera: *Neohoploceras* Spath, *Karakaschiceras* Thieuloy and *Neocomites* Uhlig represent the Neocomitinae in the Wąwał section. Even though the group has a widespread geographic distribution, the knowledge about some species is still ambiguous. Details about these cosmopolitan genera have been presented by Company (1987), Kutek et al. (1989), Reboulet (1996), Aguirre-Urreta (1998), Wippich (2004), and Klein (2005), therefore they are not repeated here. The conclusions and details about these genera from the Wąwał section and their relationships are described in parts dedicated to each genus.

Related species generally begin with common early stages and then diverge into distinct adult forms. This way the same ancestral characters and relationships can be preserved in the individual development of related specimens. In the case of *Karakaschiceras* Thieuloy, Kemper et al. (1981) suggested that the material known at that time was highly variable, sparse and fragmentary. Therefore, finds of a larger number of specimens could reduce the number of species currently recognized. Accordingly, the results presented here of the study on the unique material from the Wąwał section, in relation to abundance and preservation, is important for the study of this group.

The material from the Wąwał section allows for the study from the early ontogenetic to adult stages and, based on it, for the determination of their possible relationships.

Representatives of the genus *Neohoploceras* Spath are the most numerous Neocomitinae in the section. The genus is represented by *Neohoploceras brandesi* (109 specimens), *Neohoploceras arnoldi* (13 specimens), *Neohoploceras submartini* (3 specimens), and *Neohoploceras subgibbosum* (1 specimen) (Figs. 3 to 6; 7-2; 8A–D; 9; 10; 11-3; 13-2. The genus *Karakaschiceras* Thieuloy is represented by *Karakaschiceras quadristrangulatum* (9 specimens), *Karakaschiceras heteroptychum* (3 specimens), *Karakaschiceras gibbosum* (3 specimens), *Karakaschiceras biassalense* (2 specimens), *Karakaschiceras pronecostatum* (4 specimens), and *Karakaschiceras pruszkowskii* (5 specimens) (Figs. 7-1; 8E; 11-1, 2; 12; 14-5, 6). The genus *Neocomites* Uhlig is represented by *Neocomites neocomiensis* (12 specimens) and *Neocomites teschenensis* (4 specimens) (Figs. 13; 14-1, 2, 3, 4; 15). Two specimens of *Neohoploceras* sp. and

E-mail address: izabela.ploch@pgi.gov.pl.

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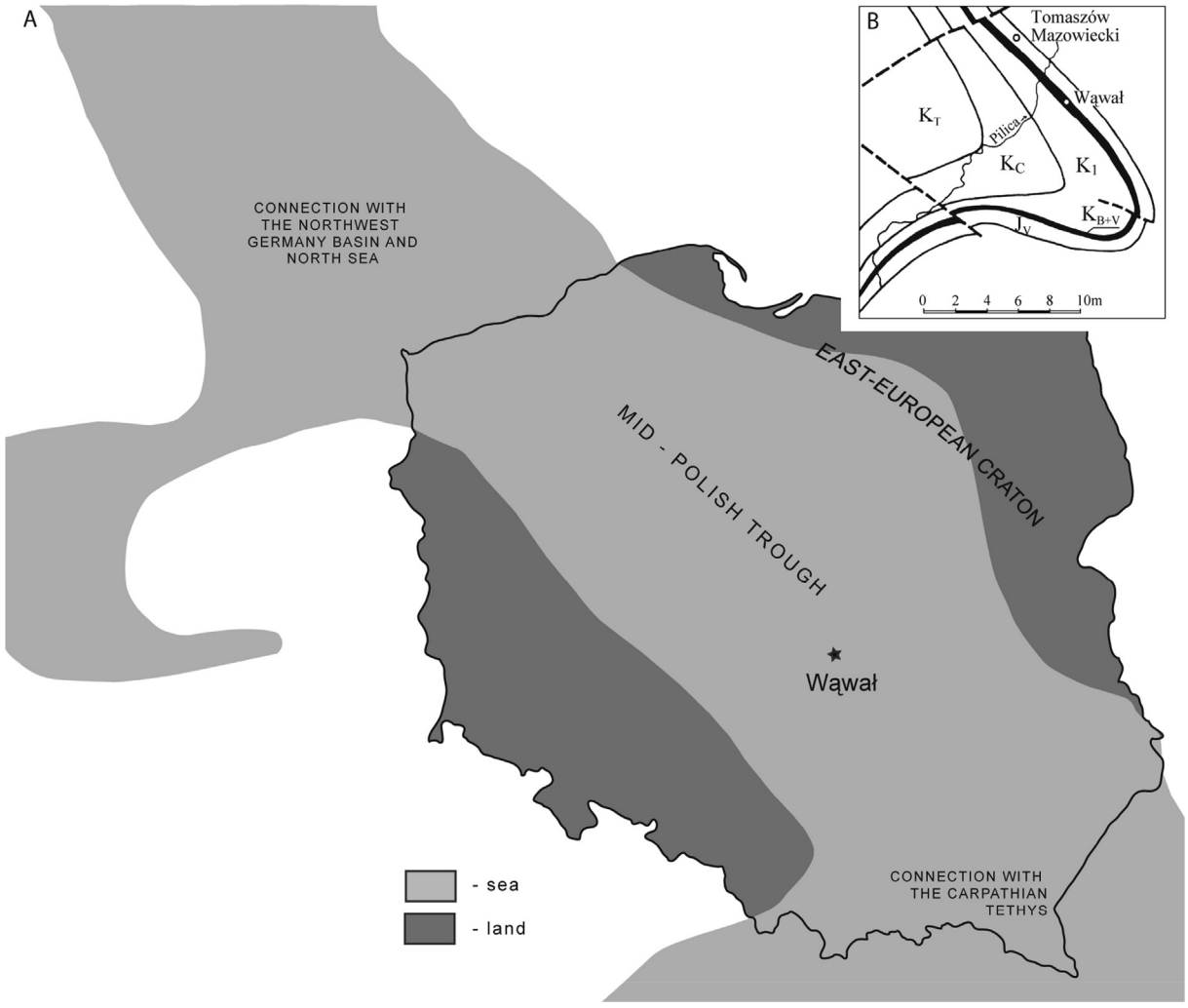

Fig. 1. A Upper Valanginian paleogeography, wider spread of Polish Basin during Valanginian (see Gaździcka and Leszczyński, 2001). 1B. Geological map of the Tomaszów syncline; KT – Turonian, KC – Cenomanian, K1 – higher Lower Cretaceous, KB + V – Berriasian and Valanginian, JV – Volgian (after Kutek and Marcinowski, 1996).

Neocomites sp. from the Łowicz IG 1 well located in the more central part of the Polish Basin than the Wąwał section (Fig. 1) were also used is this study.

The results of reinterpretation of the material may encourage and be useful for further analysis and revision of collections from other areas of their occurrence.

2. Wąwał section

Nearly all of the rich and well-preserved material of *Neohoploceras* Spath, *Karakaschiceras* Thieuloy and *Neocomites* Uhlig used in the study derives from the Valanginian strata of the recently abandoned Wąwał clay-pit (previously it was part of Wąwał village and nowadays it is part of Tomaszów Mazowiecki town), located in the northeastern limb of the Tomaszów Syncline within the Mid-Polish Anticlinorium (Fig. 1). Abundant and excellently preserved fossils has allowed for many studies of the paleoenvironment, biogeographic provincialism and fluctuations (Kokoszyńska, 1956; Witkowski, 1969; Kubiatowicz, 1983; Łącka et al., 1989; Kutek et al., 1989; Kutek and Marcinowski, 1996; Dziadzio et al., 2004; Morales et al., 2015). The stratigraphy and taxonomy of the ammonites were studied by Kokoszyńska (1956), Witkowski (1969), Kutek et al. (1989), Dzik (1990), Ploch (2003), Dziadzio et al. (2004), and Ploch (2007). The species of *Karakaschiceras* Thieuloy from the Wąwał section were recognized and the earliest occurrence and origin of this genus in the Polish Basin was suggested by Kutek et al. (1989).

During the Early Cretaceous, the Polish Basin, developed along the margin of the Eastern European Platform, represented part of the Central-European Basin, connected with the Tethys in the south and with the North Sea Basin across northern Germany (Fig. 1). This peculiar position resulted in variable influences of both major paleogeographic provinces: Tethyan and Boreal.

The formerly exposed succession comprises a 23 m series of monotonous, partly calcareous clays with sporadic ferruginous ooids, lenses of sand, glauconite, sideritic and phosphatic nodules, and a distinctive horizon of calcareous nodules. The succession corresponds to five Tethyan ammonite zones: the "*Thurmaniceras*" *petransiens*, *Neocomites neocomiensiformis*, *Karakaschiceras inostranzewi*, *Saynoceras verrucosum* and *Neocomites peregrinus* zones (zones according to the latest ammonite biostratigraphy - Reboulet et al., 2014; Company and Tavera, 2015); and to five time-equivalent German ammonite zones: the *Platylenticeras robustum*, *Platylenticeras heteropleurum*, *Prodichotomites hollwedensis*, *Dichotomites crassus*, *Dichotomites polytomus*, and *Dichotomites triptychoides* zones. The lithologies of the exposed sediments resemble in part the traditional German Polyptychiten-Schichten (Fig. 2) (cf. Kutek et al., 1989; Ploch, 2002; Dziadzio et al., 2004).