

**A NOTE ON LATE CRETACEOUS FORAMINIFERAL BIOSTRATIGRAPHY OF THREE
SECTIONS IN THE MIECHÓW TROUGH, SOUTHERN POLAND**

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ABSTRACT: Four sections were studied in the Miechów Trough at Rzeżuśnia, Gajówka and Podlesice. Based on planktonic foraminiferal assemblages, the zone with *Globotruncana ventricosa* has been determined in these sections, which is correlatable with the *Belemnitella mucronata* Zone of the upper Campanian, which had previously been established in the study area on the basis of macrofauna.

KEY WORDS: Upper Cretaceous, Miechów Trough, biostratigraphy, palaeoecology, foraminifera

Introduction

The Upper Cretaceous sediments in the Miechów Trough have been studied by palaeontologists and stratigraphers from the first half of the nineteenth century. However, the basic biostratigraphical subdivision of strata in this area relied mainly on macrofaunal assemblages linked to apparent changes in lithology, but microfaunas have not been analysed in detail (Rutkowski 1965). The Miechów Trough, strictly speaking part of the Polish Basin, was situated in the southern part of the Polish central graben the axis of which, since the Coniacian, underwent slow inversion transforming it to the Mid-Polish Trough. The study area is located in the southwesterly part of the Miechów Trough (Fig. 1), which represents the southeasterly segment of the Szczecin-Łódź-Miechow-Syncline, one of the major Alpine tectonic elements of extra-Carpathian Poland. The Cretaceous of the trough, represented by strata of late Albion to early Maastrichtian age, unconformably overlies Jurassic (Kimmeridgian) rocks and in its central and southern parts is covered by the Miocene deposits of the Carpathian Foreland Basin (Pożaryski 1977).

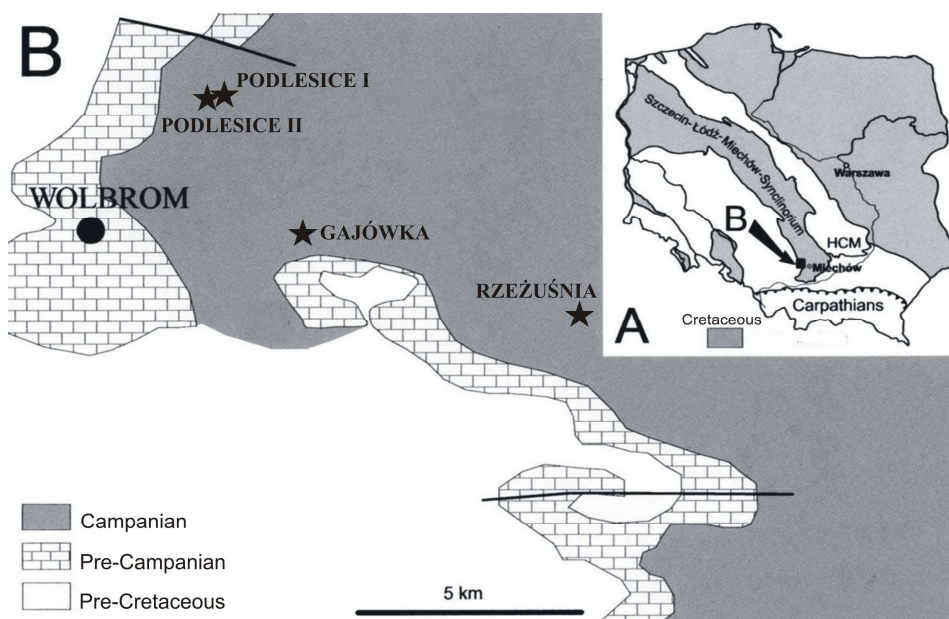


Fig. 1. Map of Poland (inset A), showing the extent of Cretaceous strata; arrow denotes the Miechów area; B shows the outcrops at Gajówka, Podlesice and Rzeżuśnia (modified after Jagt et al., 2004)

Material and methods

During field work attempts were made to improve on knowledge of the sections exposed at Rzeżuśnia, Gajówka and Podlesice. Samples for foraminiferal analysis were collected from these sections; it appeared that well-preserved planktonic foraminifera are very abundant and comprise important species assemblages. The commonest are representatives of the genus *Globotruncana* (Fig. 2), with *G. arca*, *G. bulloides* and *G. ventricosa*. These three species occur in all four sections. Less common are *G. linneiana*, *G. pozaryskae* and *G. orientalis*, while species of the genus *Contusotruncana*, i.e., *C. fornicata* and *C. plummerae*, are rare. Also documented in all samples are *Archaeoglobigerina blowi* and *A. cretacea*. In addition, *Heterohelix globulosa* and *H. striata* occur commonly, while markedly fewer examples of *H. robusta*, *H. semicostata* and *H. pulchra* are documented. The *Hedbergella* type is also frequent, and *He. holmdelensis* is known from all sections. Amongst species of the genus *Globigerinelloides*, *Gl. prairiehillensis* and *Gl. multispinus* have the longest ranges.

Benthic foraminifera are less well preserved than planktonic species. Most numerous are representatives of the genera *Stensioenia*, in particular *S. gracilis* and *S. pommerana*, *Bolivinoidea*, mostly *B. decoratus*, *B. laevigatus* and *Gavelinella*.

Within the standard foraminiferal zonation of the Campanian Stage, the following zones have been distinguished, from bottom to top: *Globotruncanella elevata*, *Globotruncana ventricosa*, *Globotruncanella calcarata*, *Globotruncanella havanensis*, *Globotruncana aegyptiaca* and the lowermost portion of *Gansserina gansseri* (Robaszynski and Caron 1995, Gradstein et al. 2004).

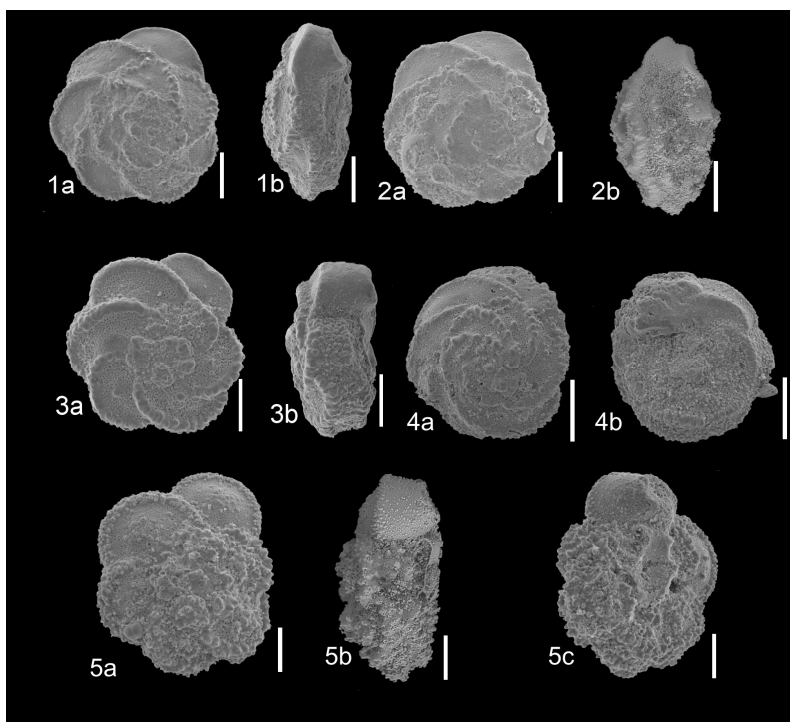


Fig. 2. The commonest foraminiferal species (scale 100 μm). 1-2 – *Globotruncana arca* (Cushman); Podlesice, upper Campanian; 3 – *Globotruncana ventricosa* White; Podlesice, upper Campanian; 4 – *Contusotruncana fornicata* (Plummer, 1931); Gajówka, upper Campanian; 5 – *Globotruncana bulloides* Vogler; Gajówka, upper Campanian

This division is based in part on species whose geographical distribution is controlled by temperature, being frequent at either lower or higher latitudes and occasionally absent elsewhere. These include *Globotruncanita elevata*, *Globotruncanita calcarata* and *Gansserina gansseri*. Therefore, at higher latitudes often other zones are used, based on more cosmopolitan species, which are then correlated with the standard zonation. For example, the level of *Globotruncana elevata* (Peryt 1980, Caron 1985) corresponds to the zone of *Globotruncana arca*, which is defined from the first occurrence of that species to the first occurrence of *Globotruncana ventricosa*, and marks the lower upper Campanian.

Main preliminary results

Based on planktonic foraminiferal assemblages, the zone of *Globotruncana ventricosa* has been documented in the sections studied. In addition to an analysis of the planktonic assemblages, in terms of biostratigraphy also the presence of benthic foraminifera has been taken into account. After examining the ratio between these two groups, the P/B ratio, the following picture emerges (compare Murray 1976):

< 20%: inner shelf, 0-50 m

10-60%: middle shelf, 50-100m

40-70%: outer shelf, >100 m

> 70%: upper part of continental slope, > 150 m.

On the basis of P/B ratios which range between 51 and 65%, it can be said that deposition of the strata studied took place in the middle to outer shelf.

These three sections in the Miechów area have also been studied for macrofaunal assemblages. Commonest are belemnites, in particular *Belemnitella mucronata* and closely related forms, while co-occurring ammonites include *Lewyites elegans*, *Scaphites gibbus*, *Trachyscapites spiniger*, *Pachydiscus* cf. *subrobustus*, *Pachydiscus haldensis* and *Baculites* sp. Also found are irregular echinoids (mostly *Echinocorys* gr. *subglobosa*, *Micraster stolleyi* and *Micraster glyphus*), inoceramid and non-inoceramid bivalves, gastropods and sponges.

Based on echinoid and belemnite evidence, Jagt et al (2004) documented for the Rzeżuśnia section the *stobaei/basiplana* Zone [sensu germanico]. The present study shows the strata to be assignable to the *Belemnitella mucronata* Zone (Fig. 3), on the basis of assemblages typical of the *Globotruncana ventricosa* Zone of the upper Campanian.

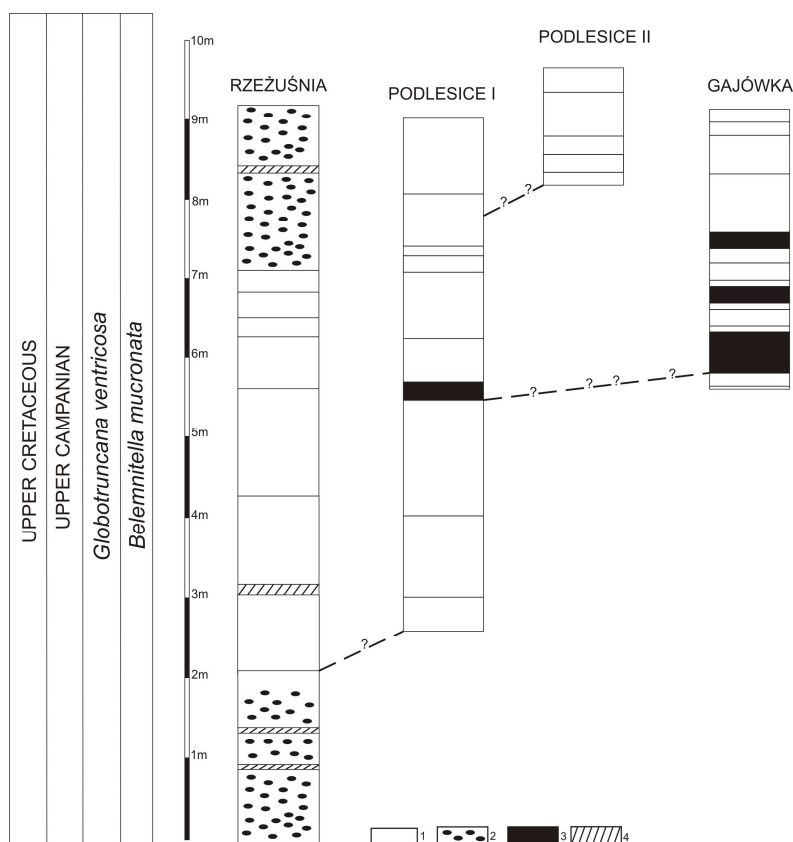


Fig. 3. Probable biostratigraphical correlation. 1- grey chalk, 2- flints, 3- interval covered, 4 – marls

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