



Integrated stratigraphy of the Campanian/Maastrichtian boundary succession of the Middle Vistula River section, central Poland: part II

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PREFACE

The Upper Campanian and Lower Maastrichtian of the Middle Vistula River valley section (central Poland) is a continuous lithologically monotonous succession that yields all biostratigraphically critical macro- and microfossil groups (ammonites, belemnites, inoceramid bivalves, foraminifera, nannofossils and dinoflagellates). The sequence also retains a good stable isotope and palaeomagnetic signal. The section is located in what was the transitional zone between the Boreal and Tethyan biogeographic provinces, and was in the middle of the North European Biogeographic Province, with both western and eastern faunal elements of the Province. Furthermore, the Campanian/Maastrichtian boundary interval is well exposed and easily accessible. All these features make the Middle Vistula River section a critical reference sequence that provides information that supplements the record from the Global Stratotype Section at Tercis in southeastern France (Odin, 2001; Odin and Lamaurelle, 2001), and the section at Kronsmoor in northern Germany (Niebuhr et al., 2011).

The set of papers presented in this issue of *Geological Quarterly* is the continuation of a series of stratigraphic studies of the Campanian/Maastrichtian boundary succession of the Middle Vistula River section, initiated over a decade ago. The starting point of the whole project was the geological reinterpretation of the Campanian/Maastrichtian boundary interval by Walaszczyk, Machalski, and Marciniowski, joined by Remin in 2007. This project demonstrated the presence of a complete fossiliferous succession across the boundary. The initial reinterpretation was based on inoceramid bivalves (Walaszczyk, 2004), and these results were subsequently confirmed on the basis of new studies on ammonites (Machalski, 2012) and belemnites (Remin, 2007, 2012). Together, these demonstrated the importance of the Middle Vistula section as a potential reference section for the boundary interval.

The first part of a multi-authored report was published in 2012 (*Acta Geologica Polonica*, vol. 54 part 4), and concentrated on belemnites (Keutgen et al., 2012; Remin, 2012), the group long regarded as critical for biostratigraphy of the Campanian–Maastrichtian interval, and still of great value in stratigraphical and biogeographical interpretations. The paper on sponge assemblages (Świerczewska-Gładysz, 2012) was not intended as a discussion on biostratigraphy; rather it documents one of a few groups in the record with a high potential for environmental interpretation.

This present report contains four papers, presenting various stratigraphical aspects of the boundary succession. The first paper, by Remin, is the continuation of his belemnite studies. In this survey, based on newly collected material, the author presents a new stratigraphic-taxonomic interpretation of the genus *Belemnitella* from the Middle Vistula succession. The base of the *Belemnella obtusa/Belemnella vistulensis* Zone, the *Belemnella*-marker of the lower boundary of the Maastrichtian Stage, is shown to be equivalent to the top of the *Belemnitella najdini*–*B. posterior* Zone, as proposed in the paper. The top of the *posterior* Zone coincides with the almost total disappearance of the Campanian *Belemnitella* clade, and is a datum that is a good proxy for the Campanian/Maastrichtian boundary. It may also mark a more significant biological event than previously realized.

Peryt and Dubicka present a re-study of the benthic and planktonic foraminiferal record. Their analysis is focused on the boundary interval, but also provides information extending down into the Middle Campanian *Bostrychoceras polyplacum* ammonite Zone. The account of the planktonic foraminifera supplements the earlier survey of the senior author (Peryt, 1980); the benthic forams were treated recently by both authors in the context of their regional studies (Dubicka and Peryt, 2012), which places the present report in a wider regional context. The planktonic species *Rugoglobigerina milamensis*, *R. hexacamerata* and *R. pennyi*, the FOs of which were recognised in the upper part of the “*Inoceramus*” *redbirdensis* Zone, appear to be very good proxies for the Campanian–Maastrichtian boundary, as currently defined. Only a single benthic form, *Neoflabellina reticulata*, has a FO close to the base of the Maastrichtian, in the latest Campanian.

Plasota, Nawrocki and Walaszczyk document the magnetostratigraphy of the sequence in one of the few palaeomagnetic studies undertaken in the Middle Vistula section. The biostratigraphically well-constrained interval studied by these authors is referred to magnetostratigraphic chron C32n, and the Campanian/Maastrichtian boundary is located near the top of the C32n2n subchron. There are a number of narrow reversed polarity intervals in the C32n2n chron, which may, however, be the result of partial remagnetisation.

The last paper of this report, by Remin, Machalski and Jagt, is not based on the material from the Vistula section. The authors describe the recent discovery of the heteromorph ammonite, *Diplomoceras cylindraceum*, one of the three ammonite proxies used for the present definition of the base of the Maastrichtian (see Odin and Lamaurelle, 2001), from beds far below the boundary as currently defined by the GSSP. The specimen, found in the Campanian of the Roztocze Hill, in eastern Poland, is from the Middle

Campanian *Bostrychoceras polyplacum* Zone. This record demonstrates beyond doubt that the first occurrence of this species has no value as a secondary marker for the base of the Maastrichtian stage.

Further reports on the Vistula section will deal with nannoplankton, dinoflagellate cysts, stable isotope and chemostratigraphy.

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