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Conchostracans in continental deposits of the Zechstein–Buntsandstein transition in central Germany: Taxonomy and biostratigraphic implications for the position of the Permian–Triassic boundary within the Zechstein Group

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ABSTRACT

The end-Permian mass extinction marks the largest biotic crisis in the geologic record. The stratigraphic position of this boundary in continental deposits is still under discussion. In the present study, conchostracans from the Zechstein–Buntsandstein (Late Permian to Early Triassic) transition in central Germany have been taxonomically reinvestigated in order to better understand their utility for fine-scale biostratigraphy in continental Permian–Triassic boundary sections. The studied material was obtained from both collections and recent sampling activities in classical key sections and new outcrops of the Zechstein and Buntsandstein Groups. The sedimentary environments of the conchostracan occurrences are interpreted as lacustrine to fluvial facies depending on the paleogeographic position within the basin of the respective sections. The conchostracan fauna in the Zechstein–Buntsandstein transition consists of *Euestheria gutta*, *Palaeolimnadiopsis vilujensis*, *Cornia germari*, *Estheriella marginostriata*, *Estheriella costata*, *Estheriella nodosocostata*, *Magniestheria mangaliensis*, and *Euestheria nordvikensis*. Based on comparison with the Early Triassic conchostracan record in the Moscow syncline, the *Palaeolimnadiopsis vilujensis–Euestheria gutta* association in the upper part of the Fulda Formation indicates both its Early Triassic age and a position of the continental Permian–Triassic boundary within the Zechstein Group.

1. Introduction

Continental Permian–Triassic transitional deposits are rare in Central Europe and restricted to the Central European Basin. Surface outcrops of this transition exist mainly in Thuringia, Saxony–Anhalt and Hesse. The poor fossil content of the Late Permian deposits is mainly caused by siliciclastic evaporitic mud flat (sabkha) conditions. The paucity of fossils in the playa lake deposits of the earliest Triassic might be a consequence of the greatest mass extinction in Earth's history. At the end of the Permian more than 90% of species known from the fossil record in marine deposits died out (e.g., Erwin, 1994). Precise isotopic age determination has demonstrated that the extinction occurred during an interval of 61,000 ± 48,000 years (Burgess et al., 2014; Shen et al., 2011). The ultimate reason of the extinction is unclear and debates about the cause involve evidence for oceanic anoxia (e.g., Wignall and Twichett, 1996; Song et al., 2014), oceanic acidification (e.g., Clarkson et al., 2015), volcanism (e.g., Reichow et al., 2002), asteroidal or cometary impact (e.g., Becker et al., 2001), global cooling (e.g., Roscher et al., 2011), global warming (e.g., Sun et al., 2012), or various combinations of these processes (e.g., Benton and Twichett, 2003). The biota in continental ecosystems also suffered from this severe extinction (e.g., Erwin, 2006; Benton and Newell, 2014), but the determination of the critical stratigraphic interval is difficult and a precise marine–nonmarine correlation is a current task of the International Stratigraphic Subcommissions (e.g., Schneider et al., 2014b). The Zechstein–Buntsandstein transition in Germany has been, and remains, a challenging goal for multiple studies on the scale of regional to global stratigraphic correlations including magnetostratigraphy (e.g., Szurlies, 2013), cyclostratigraphy (e.g., Bachmann and Kozur, 2004), chemostratigraphy (e.g., Korte and Kozur, 2005) and biostratigraphy (e.g., Kozur and Seidel, 1983a, 1983b; Kozur and Weems, 2010).

The conchostracans of the Lower Buntsandstein Subgroup are of the high value for biostratigraphy (Kozur and Seidel, 1983b) because they are the most common faunal elements among rare records of other

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