



A highly diverse early Middle Triassic bivalve fauna from North Dobrogea (Romania) and its implication for bivalve recovery after the end-Permian mass extinction

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The end-Permian mass extinction that extinguished between 81% and 96% of all marine species about 252 Ma ago caused a shift from the Upper Paleozoic T-type carbonate factory to a non-skeletal M-type carbonate factory. The Bithynian (early Middle Triassic) *Tubiphytes*-microbial buildup from the Caerace Formation in North Dobrogea (Romania) is not only one of the last “pure” M-type carbonate factory before the transition towards T-type factories but also one of the few bioconstructions from the Tethyan realm that flourished during this time. It provided a suitable environment for various groups of abundant and diverse benthic macroinvertebrates such as bivalves, gastropods and brachiopods. With 50 reported species that belong to 39 genera, containing eight species and two genera newly described, bivalves are the most diverse macroinvertebrate taxon reported from this unit. However, rarefaction analysis suggests that the bivalve diversity might be undersampled.

Because the *Tubiphytes*-microbial buildup is one of the oldest Triassic carbonate reefs it provides the opportunity to study how bivalves adapted to this new habitat type and how this affected their recovery after the end-Permian mass extinction. A comparison between diversities of Early and Middle Triassic bivalve faunas revealed that the investigated fauna is much more diverse than all Early Triassic bivalve faunas; however, it is not as rich as some Late Anisian and Ladinian (both Middle Triassic) faunas, possibly representing an early stage of the main rediversification of bivalves after the end-Permian mass extinction.

The presence of a highly diverse invertebrate fauna associated with the low-diverse M-type *Tubiphytes*-microbial buildup suggests that benthic faunas recovered faster from the end-Permian mass extinction than metazoan reefs. Furthermore, it is proposed that the high diversity of the benthic invertebrate fauna was facilitated by the newly arising carbonate factories in the Middle Triassic, which contributed at least partly to the accelerated pace of recovery during the Middle Triassic.