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Ecophenotypic plasticity versus evolutionary trends—morphological variability in Upper Jurassic bivalve shells from Portugal

Simon Schneider, Franz T. Fürsich, Tanja Schulz-Mirbach, and Winfried Werner
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Upper Jurassic marginal marine strata of the Lusitanian Basin (central Portugal) yield a rich benthic macrofauna from which three bivalve target taxa, i.e., *Arcomytilus, Isognomon*, and *Eomiodon* , were chosen for morphometric studies, because of their abundance both in space and time and their variability in shell shape. The shells have been analysed with regard to outline shape (Fourier shape analysis), dimensions, ornamentation (*Arcomytilus*) and ligament arrangement (*Isognomon*). Additionally, data on co−occurring fauna and palaeotemperatures calculated from $\delta^{18}O$ values have been recorded. The results of the morphometric analyses have been interpreted with regard to phylogeny and palaeoecology. In all target taxa, a distinct, rapid size increase at around the Early/Late Kimmeridgian boundary is evident. Potential causes for this process are discussed, and an increase in food availability is regarded the most likely scenario. In Isognomon rugosus, a distinct change in resilifer arrangement co−occurs with size increase, resulting in the evolution of an endemic species in the Lusitanian Basin, for which the name *Isognomon lusitanicus* is re−established. Like in several extant Mytilidae, morphological species characterisation in *Arcomytilus* turns out unsatisfactory, due to high intra−specific variability. However, *Arcomytilus morrisii* is still regarded as a valid species that evolved in the Lusitanian Basin. Despite high shape variability, *Eomiodon securiformis* is also considered to be a clearly distinguished species. For all target taxa morphologic variability is discussed with regard to environment, and variation between populations is delineated. The data suggest a weak correlation of facies and shell shape in *Arcomytilus*, while *Isognomon lusitanicus* seems to develop local varieties in different subbasins. Finally, the great morphologic plasticity of bivalves from rather distinct systematic entities is shown to result from different causes, thus demonstrating that careful studies of the involved species are a prerequisite to draw correct palaeoecological conclusions.

Key words: Bivalvia, morphometry, Fourier shape analysis, size increase, ecophenotypy, Late Jurassic, Portugal.

Simon Schneider [s.schneider@lrz.uni-muenchen.de], Winfried Werner [w.werner@lrz.uni-muenchen.de], Bayerische Staatssammlung für Paläontologie und Geologie and GeoBioCenterLMU,

Richard-Wagner-Str. 10, D-80333 Munich, Germany; Franz T. Fürsich [franz.fuersich@gzn.uni-erlangen.de], GeoZentrum Nordbayern, Fachgruppe PaläoUmwelt, Friedrich-Alexander Universität Erlangen-Nürnberg, Loewenichstr. 28, D-91054 Erlangen, Germany; Tanja Schulz-Mirbach [t.schulz-mirbach@lrz.uni-muenchen.de], Department für Geo- und Umweltwissenschaften, Sektion Paläontologie, Ludwig-Maximilians-Universität München, Richard-Wagner-Str. 10, D-80333 Munich, Germany.