

Body-size scaling relationships in bivalve species: a comparison of field data with predictions by the Dynamic Energy Budget (DEB) theory

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Abstract

In this paper, we apply the Dynamic Energy Budget (DEB) theory to bivalve species (1) to provide basic body-size scaling relationships that can be used to predict species characteristics when basic information is lacking, and (2) to analyse the discrepancy between DEB predictions based on energetic constraints and field observations to identify potentially important factors in life history strategy of bivalves. Body-size scaling relationships were identified for size at first reproduction, Von Bertalanffy growth rate, and egg and larval development time in relation to egg and larval volume and temperature conditions. Due to their small egg volume, bivalve species are characterised by a relatively short pelagic larval stage. The main discrepancy between field observations and DEB predictions was in the relationship between egg and larval volume and adult body volume. In bivalves, the characteristics of the early life stages are not related to body size of the species. Since the minimum size of settling larvae is always larger than 125 μm , it is suggested that successful settlement might be the key factor. Settlement size or volume of the fragile larvae must be in balance with the sediment composition, i.e. similar to or larger than that of the sediment grain size.