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Bivalve microstructural evolution: evidence from the fossil record

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Modern bivalves secrete shells which show a wide range of mineralogical and microstructural arrangements. A recent phylogenetic analysis of modern bivalve relationships used both molecular evidence of up to 9 genes and 210 morphological characters (Bieler et al., 2014) An analysis of the informative value of various morphological characters in phylogenetic reconstruction confirmed the importance of shell microstructure is such surveys.

Different microstructural types are, in general arranged in discrete within the shell and most are made up of 2 or 3 layers of different microstructure and/or mineralogical composition. There has long been an interest in charting the occurrence of these different arrangements which are believed to be of phylogenetic and adaptive biomechanical significance. But what information can we usefully extract from the fossil record? Does the diagenetic instability of aragonite destroy a useful phylogenetic signal? In this poster, I examine the distribution of major microstructure types across the Bivalvia, to document the first appearance of each and to identify particular key microstructures and parts of the tree where major structural changes happen or where critical information is yet to be discovered and where new data can be most beneficial to our understanding both of phylogenetic relationships within the class and key adaptive innovations.

References

Bieler, R. and 19 others (2014) Invertebrate Systematics, 2014, 28, 32–115