BIOIMMURATION: EXCEPTIONAL FOSSIL PRESERVATION MADE ROUTINE

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Bioimmuration, broadly defined as fossilization by virtue of organic overgrowth, allows preservation of soft-bodied organisms and soft parts of organisms with mineralized skeletons. Sessile organisms attached to hard or firm substrates are routinely overgrown by other organisms competing for living space. If the overgrowing organism has a mineralized skeleton which is likely to be fossilized, then it may carry a high fidelity (sub-micron scale) impression of the overgrown organism on its underside. This is a mould bioimmuration, the simplest mode of preservation. A diagenetic infilling of the mould, commonly by calcite, produces a cast bioimmuration. In addition, the protected microenvironment between the overgrowing organism and the substratum favours early diagenetic permineralization of the soft tissues of the bioimmured organism and the development of more complex preservational styles.

In spite of its potential for soft part fossilization, very little research has been undertaken on bioimmuration, with the notable exception of the work of Ehrhard Voigt principally on Maastrichtian sea-grass communities. Research in progress is revealing a great abundance of bioimmured fossils in Mesozoic shallow marine deposits of NW Europe where oysters and serpulids overgrew a variety of other organisms.

Bioimmured soft-bodied bryozoans belonging to the Order Ctenostomata are very common and display a range of preservational styles. Minute spines and pores ornamenting the cuticular zooidal walls are sometimes present, as are permineralized pore chambers. The high diversity of stoloniferan and carnosan ctenostomes encrusting hard substrates in the Oxfordian and Kimmeridgian is striking and contrasts with the depauperate fauna of calcified cyclostome bryozoans.

Oyster shells in the Kimmeridge Clay are often encrusted by myriads of tiny individuals of the inarticulate brachiopod Discinisca, previously known from comparatively few specimens of this age. Emerging from the fragile commissures are setae several times the length of the delicate phosphatic shells. Setae of neighbouring individuals may be aligned in parallel facing away from the direction of approach of the overgrowing organism.

The hemichordate Rhabdopleura is common as a bioimmured fossil in the Oxford Clay. Overgrowth protects the periderm and the black stolons, and colonies are much more intact than previously described examples of this genus from the Jurassic.

The Phylum Entoprocta had no unequivocal fossil record before the recent discovery of bioimmured entoprocts in the Kimmeridge Clay. Colonies comprise stolons linking erect zooids which have been pushed flat against the substratum during overgrowth. The existence of thickened sockets at the base of the zooids permits assignment of the fossils to the extant genus Barentsia. Permineralization of the entoproct cuticle has occurred, leaving minute pores apparently once occupied by epithelial microvilli.

Pedunculate barnacles are commonly found bioimmured by oysters in the mid-Cretaceous Cambridge Greensand. Normally the cirri are retracted but in one exceptional example their outlines are clearly visible as moulds on the attachment area of an oyster.

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