Fossils explained III—Mesozoic invertebrates

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Overview

The Mesozoic Era is associated with a diverse range of marine organisms, as well as a diverse terrestrial fauna. With Mesozoic rocks common across the globe, deposited in the warm, 'greenhouse' conditions across the globe, there is much interest in the fossils of this interval. Perhaps the most highly prized are the ammonites; widely collected by enthusiasts, ammonites were abundant and diverse cephalopods (Fig. 1) that were extinguished at the end of the Cretaceous. Accompanying them were another group, the belemnites, which also died out. Nautiloids were to carry on, the lone survivor today being *Nautilus* itself (Fig. 2). Replacing the dominant brachiopods of the Palaeozoic were more molluscs—bivalves in particular, with a diversity that extended into the Cenozoic. Some of which were capable of reef-building—rudists—in the rich carbonate-seas of the time while the diversity of the assemblage includes echinoderms.

Belemnites are mostly bullet-shaped fossils that lived alongside their ammonite cousins. The belemnite shell has a chambered part, and an object known as the 'guard' (Fig. 3), which formed an internal shell that helped to keep its squid-like owner horizontal in the water column, more ready to hunt using its arms, and using an ink sac like that of its squid cousins, to evade attack. Belemnites are common fossils in Jurassic and Cretaceous rocks, but like the ammonites, did not survive the end-Cretaceous extinction event. That was left to the small numbers of **nautiloids**.

Bivalves are the familiar seashells we have all collected from beaches sometime in our lives. Consisting of two shells (known as valves) that hinge together, there is a great diversity of types. Burrowing clams are usually symmetrical, the two valves mirror images of each other. Others, such as oysters and scallops, often have valves of differing shapes and sizes (the exception being mussel shells), living on the surface. **Rudist bivalves** are particularly diverse in form. For most bivalves, the two valves fall apart when the animal dies, as they are held together with muscles acting against a spring-like ligament, so that the two valves are usually scattered. Bivalves have been around for a long time, first appearing in the Ordovician, but they really hit the big time after the widespread decimation of the brachiopods at the end of the Permian, and are commonest from the Triassic onwards, part of one of the major groups of the Mollusca—baring the insects, one of the most diverse groups of invertebrate organisms. Clams are particularly common, staring alongside their cousins, the sea snails, from the Palaeogene onwards.

Echinoids (sea urchins) are commonest from the Mesozoic onwards, and consist of a test that is made up of numerous plates, each one a crystal of the mineral calcite (calcium carbonate, Fig. 4). In life, sea urchins are covered with a thin skin covered with spines of varying sizes (which gives them their group name, echinoderm) as anyone who has been on holiday to the Mediterranean will attest—grave warnings are given out to small children to avoid stepping on green spiky objects lurking in the rocks. In the main, sea urchins that live on rocky surfaces have regular domed shells with large spines. Burrowing versions are typically heart-shaped (allowing them to burrow more effectively), and have more subdued spines.

Fig. 1. The ammonite *Anahoplites* from the Cretaceous of England. (Image: P. Doyle).

Fig. 2. *Nautilus pompilus*, the last surviving nauliloid (Image: P. Doyle).

Fig. 3. Belemnites belonging to the genus *Acrocoelites* from the Lower Jurassic of northern England (Image: P. Doyle).

Fig. 4. The echinoid *Micraster coranguinum* from the Cretaceous of southern England (Image P. Doyle).