Fossils explained IV—Cenozoic invertebrates

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Overview

In the aftermath of the end-Cretaceous mass extinction, the marine life of the globe had changed. Still dominating the shallow seas were the molluscs, with bivalves and gastropods typical of the Palaeogene clays and sand environments indicative of the shallow seas found on several continents. These clays typically preserve exquisite detail, and in some cases, the original colour patterns locked into the preserved aragonite (Fig. 1). But there were other organisms too, many preserved in great detail. This release will examine some examples.

Gastropods are amongst the most attractive of all modern seashells, with a diversity of shapes (though all based on the simple coiled cone) and surface colours. Fossil sea snails—technically known as gastropods (literally meaning 'mobile stomach'), have a similar diversity of shapes, but have largely lost their colour during the process of fossilization. Gastropods are common from the Mesozoic onwards, and are significant fossils in rocks from the Palaeogene and Neogene (Fig. 2), sitting alongside their contemporaries, the bivalves.

Bryozoans are unassuming colonial fossils that, in some cases, are confused with corals, and in other cases, appear as mat or net-like fossils attached to the surface of others. Often overlooked by fossil collectors, bryozoans are actually complex organisms that have been around since the Ordovician, and that prior to the great Permian extinction event, helped form some of the largest reefs during the Palaeozoic. They are important fossils through the Mesozoic and into the Cenozoic too.

Barnacles are cirripeds, or a group of crustaceans, that primarily fall into two types: the familiar acorn barnacles that cement to intertidal settings, and the less familiar goose barnacles that attach by a stalk. Though having a reasonably long geological history, for Charles Darwin, the latter part of the Cenozoic would be the age of the barnacle. Darwin was one of the few scientists to study these complex organisms, and given that many barnacles are found in shallow, high-energy environments, it is not surprising that they are relatively poorly studied by palaeontologists.

Foraminifera are single-celled organisms that have a long geological history, and as such are not specifically associated with the Cenozoic alone. Forams are generally small, microscopic in fact (Fig. 3), and occur as both planktonic and benthic organisms. Large bottom-dwelling genera evolved in the Palaeozoic (the fusulinids), and in the Palaeogene (the nummulites). Foraminifera are important fossils, as they have been used by scientists to provide information on water temperatures of the seas in which they were living, to assist with the dating of rock successions, and in the study of evolutionary processes.

Amber is a unique material, derived from tree sap, which provides a means of preserving instantaneously those organisms that become entrapped in the sticky substance. Amber is incredibly important in preserving details of fragile insects, for example, and is commonly associated with the Cenozoic sequences of the Baltic Coast. The terrestrial fauna preserved in amber (Fig. 4) provides an interesting counterpoint to the rich marine life preserved in the clays of this Era.

Fig. 1. Shells of the Eocene bivalve genus *Polypecora* from southern England, preserved with colour banding intact. (Image: P. Doyle).

Fig. 2. The gastropod *Athleta athleta* from the Eocene clays of southern England (Image: P. Doyle).

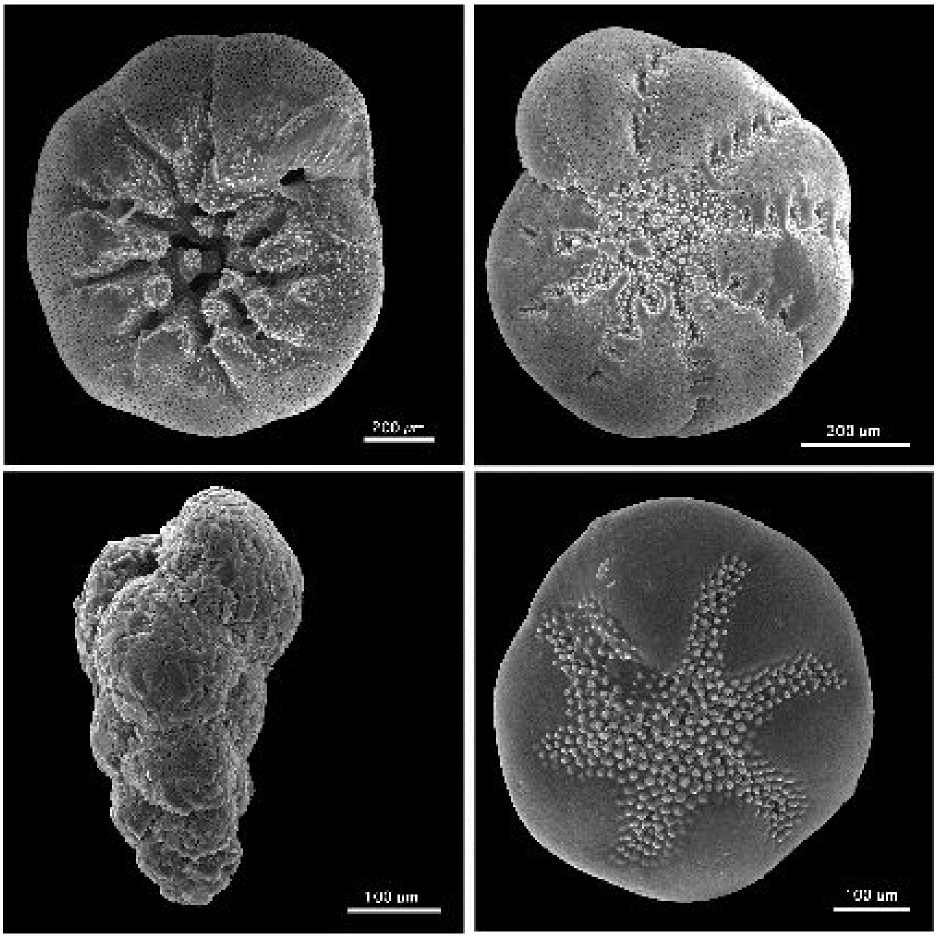

Fig. 3. Scanning electron microscope (SEM) images of four benthic foraminiferans (ventral view) from the US Geological Survey. Clockwise from top left: *Ammonia beccarii*, *Elphidium excavatum clavatum*, *Buccella frigida* and *Eggerella advena*. (Image: USGS).

Fig. 4. Insects preserved in Baltic amber (Image: M.L. Nguyen),