ECHINOIDS

Echinoids, commonly known as sea-urchins, are marine animals. They have a calcareous 'shell', known as a test, made of numerous small pieces known as plates. In the five radial and converging ambulacral areas the plates are perforated by small pores for 'tube feet' (used for locomotion and respiration). In the interambulacral areas the plates are usually larger, with abundant spines (which are usually detached in fossils). Other, smaller, areas contain the mouth (peristome area) and the anus (periproct area).

'Regular' sea-urchins are roughly spherical, and have a basic five-fold symmetry. They live on the sea- floor, and have their mouth underneath (on their lower surface) and anus on top (upper surface). Protruding spines provide protection. Carboniferous-age echinoids (e.g. the 'cidaroid' from Oklahoma) and older specimens had flexible tests, but Jurassic (e.g. *Hemicidaris*) and living animals have rigid tests.

By Jurassic times some echinoids have changed towards bilateral symmetry, with the mouth at the front and the anus at the back, enabling them to burrow beneath the surface of the sea-floor. This also protected them and they have smaller less-protruding spines. Their ambulacra areas are often petal-shaped and are only on the upper (dorsal) surface. Heart-shaped tests of *Micraster* occur in the Chalk of England.

By Miocene times, almost flat tests of 'sand-dollars' (e.g. *Scutella*) have become common. Most live flat on the sea-bed, or burrow just below. Internally they have buttresses (between the lower and upper surfaces) to strengthen the test.

A SELECTION OF FOSSIL SEA-URCHINS IN IPSWICH MUSEUM: 17.09.11

'Cidarid' plates from Oklahoma, USA. Of Carboniferous age, about 320 million years old. The earliest echinoids, with flexible shells, are not easily preserved as complete tests. Isolated plates are much more common.

Echinoid fossil with some of its long spines. About 168 million years old (Jurassic age). Locality of this specimen unknown, possibly from near Cheltenham.

Tylocidaris (broken) from Northfleet, Kent. About 84 million years old (Cretaceous). It shows the large bosses (tubercles) on the surfaces of the plates, to which the large club-shaped spines were attached.

Hemicideris, a cidarid-like sea-urchin with large bosses. About 158 million years old (Jurassic). Locality unknown, possibly from Wiltshire.

Schizechinus shows no major ornamentation. About 18 million years old (Miocene), probably from Malta.

Temnechinus has deep areas in its interambulacral plates. About 4 million years old (Pliocene), probably from Orford, Suffolk.

Echinus is nearly spherical and has living relatives in British seas. About 4 million years old (Pliocene); from Orford, Suffolk.

Nucleolites from near Abingdon. About 158 million years old (Jurassic). The periproct lies in a deep groove in the upper (dorsal) surface of the shell.

Clypeus is large and disc-shaped. The periproct lies in a deep groove and the ambulacra are petal-shaped and on the upper surface. About 168 million years old (Jurassic); probably from near Cheltenham.

Micraster from Bramford, Suffolk. About 83 million years old (Cretaceous). A relatively large 'heart-urchin'. The anterior (front) ambulacrum is in a deep groove, whilst the other four are in shallow grooves.

Hemipneustes from Valkenburg, Netherlands. About 68 million years old. Amongst the largest Cretaceous sea-urchins, its anterior ambulacrum is in a deep groove.

Echinocorys from Bramford, Suffolk. About 83 million years old (Cretaceous). Roughly oval and with a somewhat loaf-like shape, this is a Suffolk 'fairy loaf'. Placed by the oven, they were said to ensure bread in plenty. A Saxon-age grave in Westgarth, Bury-St-Edmunds contained the skeleton of a woman holding an *Echinocorys* in her right hand.

Echinocorys from Faxe, Denmark. About 63 million years old (Danian age), showing that *Echinocorys* survived the geological events that caused the extinction of the ammonites and the dinosaurs.

Conulus from Stowlangtoft, Suffolk. About 84 million years old (Cretaceous). It has a high-domed conical test. *Conulus* belongs to a group of echinoids of similar shape, differing in the details of their plates.

Echinolampus from Grignon, France. About 45 million years old (Eocene). A disc-shaped broadly oval test.

Schizaster. Its anterior ambulacrum lies in a broad deep grove. The other 'petals' are also deeply depressed. About 18 million years old (Miocene); probably from Malta.

Scutella from Anjou, France. An 18 million-year-old (Miocene) sand-dollar. It is flat and disc-shaped, with pores arranged in rosettes.

Clypeaster from Malta. About 18 million years old (Miocene). The largest known sea-urchin; it has petaloid ambulacra.

Clypeaster. This specimen is highly domed on its dorsal (upper) side. Probably from Malta; of Miocene age.

Echinocyamus from Alderton, Suffolk. About 2½ million years old (Pliocene-Pleistocene age). One of the smallest sea-urchins. They have a rather flattened test.

Spatangus from Orford, Suffolk. About 4 million year sold (Pliocene). A large heart-shaped test.

Brissus from Thorpeness, Suffolk. About 4 million years old (Pliocene). The anterior ambulacrum is barely sunk, the 'petals' are sunk.