Objects from Doncaster Museum and Art Gallery's Palaeontology collection

Palaeontology

Palaeontology is the study of fossils. As with the geology collection, the museum's first fossils were donated by members of the Doncaster Microscopical and Scientific Society.

Amongst the earliest donors were Henry H. Corbett, the first Curator, Thomas H. Culpin and William Sawney Bisat. Several of their donations are probably type specimens of national and perhaps international importance. A type specimen is the one that was first used to define a new species. These early collections include sea creatures like Goniotites and molluscs from the Coal Measures and Magnesian Limestone.

When Brighouse Museum near Halifax closed in 1957, an important early fossil collection was passed to Doncaster, mainly from the east coast of Yorkshire and the Lower Coal Measures.

In 1964 to mark the opening of the new museum on Chequer Road, a collection of fossils was donated from the National Geological Survey Collection. It represents some of the most important fossil collecting sites in the country.

Then in 1972 the museum acquired a large and important collection of Pleistocene animal bones. Found in Tattershall Quarry, North Lincolnshire, they date back to between 12,000 and 25,000 years ago.

Today the collection contains some incredibly important and interesting fossil specimens. Four Eurypterids (Sea Scorpions), a crinoid death bed assemblage and a complete Ichthyosaur are amongst the most stunning and unique of these.

Fish

381-354 million years old. Devonian Period
From Old Red Sandstone, Dura Den, Fife

Holoptychius flemingi
HOL-OP-TIE-KEY-US FLEM-ING-I

Holoptychius was a feared hunter of the Devonian seas. With fang-like teeth and a streamlined body, it was a fast and deadly predator. These fish grew to between 50-60cm long. They probably hunted in packs**,** rounding up shoals of other fish and attacking them from all sides. *Holoptychius* remains have been found around the world. They were related to modern lungfishes**,** which are fish with lungs! They had lobe-like fins that resembled legs, and with lungs, they could breathe air.

Holoptychius is thought to be the evolutionary link between fish and the dinosaurs and mammals. They were amongst the first vertebrates (creatures with backbones) to venture from water to land. There are very few lobe-finned fish still living today. The most famous is the coelacanth, which can still be found in tropical seas off south-east Africa and the Indian Ocean.

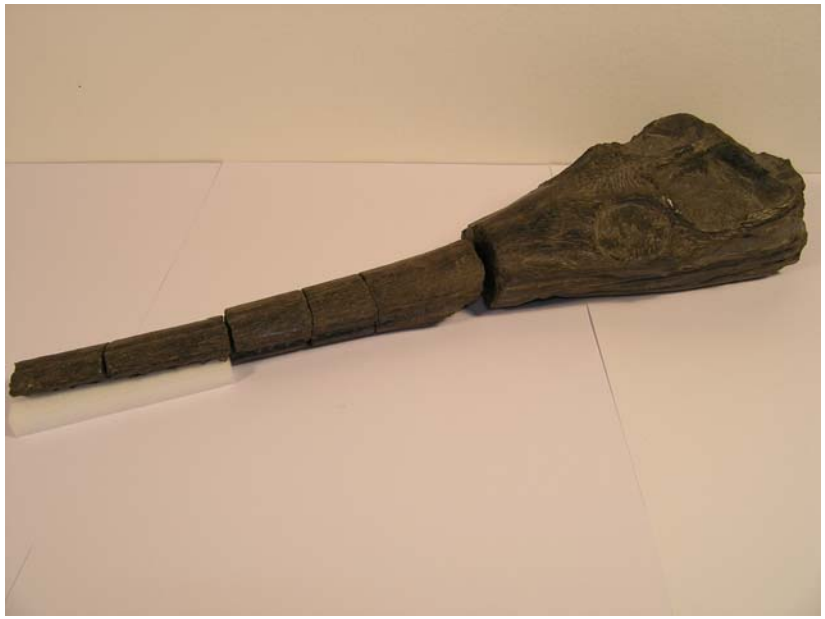
If you look carefully at the fossil, you can count four individual fish. All lie upside down and in a tightly packed group. It is difficult to understand how they died, but it is possible they were buried by a sudden underwater landslide.

Fossils like this are rare, but *Holoptychius flemingi* has been discovered before in much larger numbers. Indeed, one fossil, in the collection of London's Natural History Museum, has over 25 individuals all preserved together.

DONMG ZG33

Crocodile skull and jaw

189-180 million years old. Jurassic Period
From Whitby, Yorkshire



***Steneosaurus bollensis* (*Teleosaurus chapmani*)**
STEN-E-OH-SAW-RUS BOL-LEN-SISS

Steneosaurus (meaning 'narrow lizard') is an extinct type of crocodile. It had a long body, small forelimbs to help with swimming, and a long snout with thin, sharp teeth for eating fish. It probably lived in estuaries rather than the open ocean. It was similar in appearance to the long-snouted Gharial crocodile that still lives in India today. We know what *Steneosaurus* ate, because the remains of their meals have been found in fossilised coprolites (poo!).

We cannot be sure what happened to the rest of the creature's skeleton. However, the head, though broken into several pieces, is beautifully preserved. The breakage must have happened when the fossil was discovered and retrieved from the rock. If you look closely at the fossil, you can see all the individual teeth in the jaws. On top of the head, between the two big eye sockets, you can see a strange patterned plate known as an osteoderm. These are a type of bony armour plating, which covered a large area of the crocodile's body. These osteoderms are sometimes known as scutes, and are often found as individual fossils.

Fossil crocodiles are relatively common finds on the Yorkshire coast around Whitby and Scarborough. Here, in the Jurassic Period, there must have been a river delta running into the sea.

DONMG ZG425

Eurypterid

439-427 million years old. Silurian Period
From Lesmahagow, Strathclyde

Slimonia acuminata
SLI-MOAN-EAR A-CUME-IN-ARTA

Slimonia was closely related to *Pterygotus*. One of the main differences between the two was that *Slimonia* lived in freshwater, whereas *Pterygotus* lived in brackish estuaries. *Slimonia* preyed on smaller freshwater fish. Eurypterids were among the dominant predators of their time.

This example of *Slimonia* is quite large, but is not the largest. *Slimonia* could grow to lengths of around six feet. It would carry its body on spindly legs, and probably hunted through sudden rushes from a hidden location. It may possibly have buried itself, detecting prey by vibrations through the sand.

Eurypterids are often called sea scorpions, but they were not true scorpions. They were more closely related to horseshoe crabs, which unlike eurypterids, still have living relatives today.

Eurypterid fossils are found in several places around the world, including Russia and North America. They are found in great quantity in the state of New York, so much so that the eurypterid is the state fossil.

The site where this specimen was found is now protected and excavation is rarely allowed. So this fossil is rare, and an important example. Few museums are lucky enough to own one eurypterid, let alone four!

DONMG ZG365

Dinosaur footprint

160 million years old. Jurassic Period
From Scarborough Bay, Yorkshire

Dinosaur footprints are a type of trace fossil. These are the footprints, trails, burrows and excrement of long-dead organisms. They can tell palaeontologists a lot about the behaviour, feeding habits and habitats of these creatures. Dinosaur footprints have been recognised for over one hundred years. They have been discovered throughout the world, from beaches on the east coast of Britain, to Peruvian mountains 4,600 metres above present sea level. These footprints were discovered in 1954 by Robin Lidster, one of Doncaster Museum's curators.

If you look carefully, you can see three footprints on this slab, representing at least two different ornithopods travelling in different directions. These were herbivore (plant-eating) dinosaurs that walked on two legs. One is moving from the bottom of the slab towards the top. The second, the clearest print (the one traced with a white border), is moving obliquely across the slab's left-hand corner. You can see that the two dinosaurs are of different sizes. Based on the size of the prints, we can estimate that these dinosaurs were no taller than a small child of about three to five years old.

You can learn a lot from footprints, including the animal's speed and stride, if it walked on two or four legs, even its hunting behaviour. Looking at these footprints, it seems that perhaps the herbivores had been startled by a predator, and scattered in different directions.

This footprint was found in the world famous Burniston footprint bed, near Scarborough.

DONMG ZG602
Donated by J.R. Lidster

Dinosaur caudal (tail) vertebra

130-120 million years old. Cretaceous Period

Possibly from the Isle of Wight, Hampshire

***Iguanodon* (?)**
IG-WAHN-OH-DON

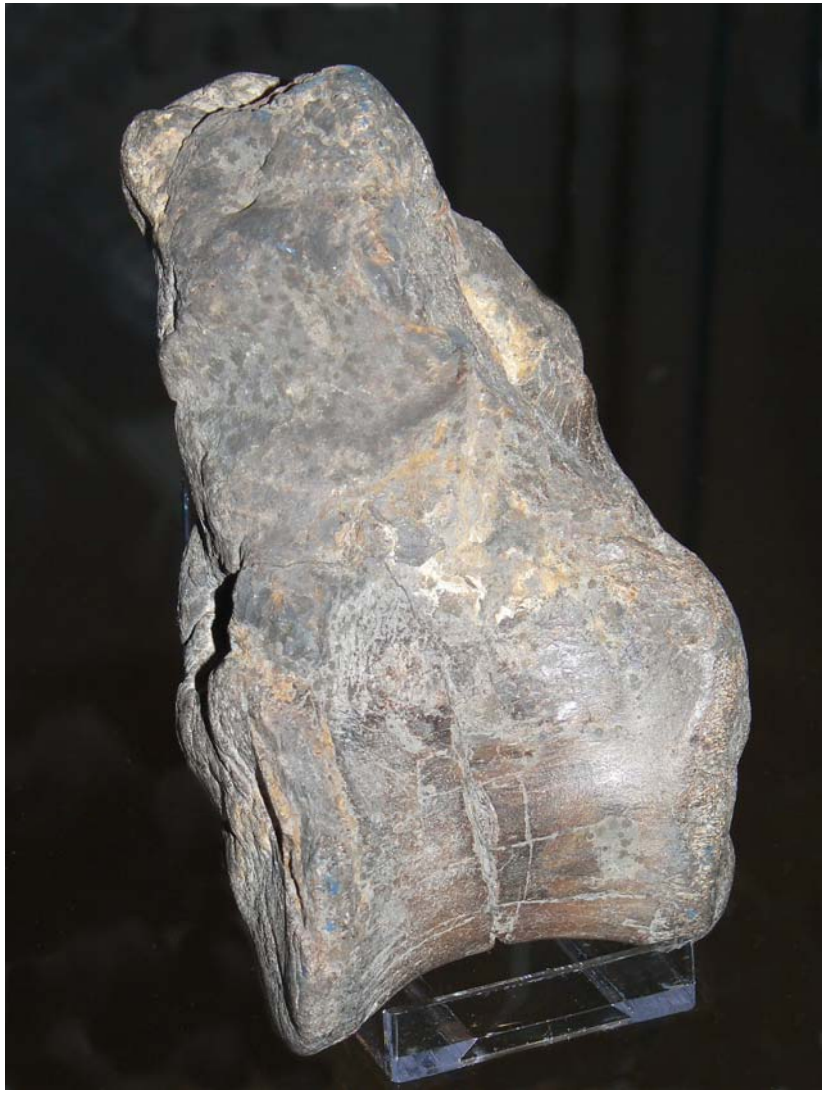
This fossil vertebra has been identified as belonging to the dinosaur *Iguanodon*. However current research by Dean Lomax, a local palaeontologist, may change this!

Iguanodon (meaning 'iguana tooth') was a large herbivorous dinosaur. It was a very bulky animal, but could switch from walking on two legs to walking on all four. It had a spike on each thumb, which may have been used for defence. When palaeontologists originally reconstructed how *Iguanodon* might have looked, they placed the thumb spike as a nose spike, imagining that it was actually a defensive horn. There is a very early model of *Iguanodon* in the gardens of the Crystal Palace, London. It dates from the mid-nineteenth century, and shows *Iguanodon* on all fours, with the thumb spike as a horn on the end of its nose.

Iguanodon was first found in 1822 in Sussex, and was only the second dinosaur to be named. A British geologist, Dr Gideon Mantell, was the first to describe it, in 1825. Being one of the earliest types of dinosaur to be discovered and shown to the public, a lot of museums have parts of *Iguanodon* skeletons. Also, because it was the first dinosaur to be identified, many of these museums hold remains that are early misidentifications. Perhaps our vertebra is one of them?

The largest find of *Iguanodon* fossils was in 1878, in a coalmine at Bernissart in Belgium. At a depth of 1056 feet (322 metres), at least 38 individual skeletons were found, most of which were adults. This suggests that they moved in herds, a bit like modern grazers such as zebras or bison.

DONMG ZG66



Coelacanth operculum
340 million years old. Carboniferous Period
From Bentley Colliery, Doncaster

Coelacanthus elegans
SEE-LA-KAN-FUSS ELY-GANS

This is just one part of a coelacanth, called the operculum, a section of the fish's armoured head around the area of the gills.

In 1938 the coelacanth was rediscovered as a living fossil. On 23 December, the curator of a small South African museum, Marjorie Courtney-Latimer, received a phone call from Hendrik Goosen, skipper of the trawler *Nerine*. He asked her to come to the East London docks (to the north-east of Cape Town), and look over his catch for interesting specimens.

Amongst an ordinary catch, she caught sight of an unusually coloured fish that she later described as 'Pale mauve blue with iridescent silver markings'. She sent drawings to a local marine biology specialist, J.L.B. Smith, who later confirmed it as a living coelacanth, to which he gave the nickname 'Old Four Legs'. Others have been found since.

Studies of this 'living' fossil have shown these coelacanths to be closely related to the fossil coelacanths. It has also presented an incredibly rare opportunity to study their biology and behaviour. Modern day coelacanths spend the day hovering (resting) in caves, deep underwater (300-700 feet), and come out to hunt at night.

Coelacanths are well-recorded fossils in Coal Measures, and this is a very early find. The earliest recorded was in 1844 by Louis Agassiz, an opponent of Darwin and his theory of evolution.

This specimen was found at Bentley Colliery, and at a time when miners worked the coalfaces with hand tools, must have been one of many fossil finds.

DONMG 76x

Section of tree trunk with bark preserved

354-295 million years old. Carboniferous Period
Found in a local coal mine

Sigillaria
SIG-IH-LAR-EAR

This large and incredibly heavy section of trunk is from a tree-like Carboniferous plant called *Sigillaria*. It was discovered in a coal seam deep underground by a local miner, and kindly donated to Doncaster Museum Service.

Sigillaria is an extinct type of arborescent (tree-like) plant, related to living clubmosses. Modern day clubmosses are low growing, and often live in mountainous regions. They can be found in the British Isles, but have a worldwide distribution. In Carboniferous swamp forests, the *Sigillaria* reached a height of 100 feet.

Sigillaria had a long straight trunk, with a characteristic bark made up of vertically arranged tube-like segments. The canopy of the plant sprouted into grass-like leaves. The whole structure was stabilised by thick sturdy roots called stigmaria, which held the tall, heavy plant in place. *Sigillaria* grew rapidly, and only had a relatively short life-cycle.

The coal that lies deep beneath us was the fuel of the Industrial Revolution. We still rely heavily on it today. Coal is formed from the remains of dead and decaying plants like *Sigillaria*. These formed huge swamp forests that covered the earth's land surface in the Carboniferous Period.

DONMG ZA2206

Dinosaur egg

71-65 million years old. Cretaceous Period
From Aix-en-Provence, France

Hypselosaurus priscum
HIP-SELL-OH-SAW-US PRISS-KUM

Hypselosaurus (meaning 'highest lizard') was a sauropod, generally dinosaurs with a long neck and long tail. It was estimated to be around 39 feet in length. It lived in European countries such as France, Spain and Romania.

Hypselosaurus belonged to a group of sauropod dinosaurs called titanosaurs. They were given this name because of their 'Titanic' size. They had huge bodies and limbs, with long necks and tails and a proportionately small head. They could grow up to 100 tonnes in weight.

They were made famous by the film *Jurassic Park*, in which they are seen roaming large plains like herds of cattle.

Hypselosaurus laid unusually large eggs, such as the one on display here. They have been measured at around 1ft in length, and are apparently the biggest dinosaur eggs found to date.

The location where this egg was found is now a World Heritage Site. It is protected against fossil hunting because of its scientific importance. There are thousands of eggs found in clusters, which must represent a *Hypselosaurus* nursery site. Here, these gigantic dinosaurs came to lay their eggs, and watch over them until they hatched. Because the site is now protected, it means that the eggs - like ours - that are in museums outside France, are very rare and important.

DONMG ZG405

Marine reptile
189-187 million years old. Jurassic Period
From Lyme Regis, Dorset

Ichthyosaurus (unknown species)
ICK-THEE-O-SAW-RUS

Ichthyosaurs (meaning ‘fish lizard’) were marine reptiles that resembled dolphins and sharks. They thrived from the Triassic into the mid-Cretaceous Periods, and became extinct about 25 million years before the dinosaurs. An ichthyosaur’s average size was from two to four metres long. Ichthyosaurs would probably have had a wide range of prey, including belemnites, extinct animals related to squids. You may have noticed a dark area on this ichthyosaur. This is actually the gut contents! You are looking at the fossilised remains of the ichthyosaur’s last meal before it died. There are very small hook shapes, called hooklets, preserved in the stomach region. This shows that the ichthyosaur’s last meal was belemnites. The hooklets were attached to the belemnites’ tentacles, and hooklets are very rarely fossilised.

This ichthyosaur was discovered in the early 1970s along the coast of Lyme Regis. Doncaster Museum Service purchased it with the assistance of a Science Museum grant. The ichthyosaur was displayed briefly in the 1980s, but once the museum no longer had a Keeper of Geology, the fossil became temporarily detached from its information. It was not until 2009 that Dean Lomax, a local palaeontologist (and co-creator of the ‘Fabulous Fossils’ display), rediscovered it and realised its significance. Research undertaken by Dean on the gut contents and on the belemnites fossilised with the ichthyosaur, suggests that it may be a one-of-a-kind specimen. It is perhaps a completely new species, and the only known example in the world. Dean is currently preparing a scientific paper for publication.

DONMG 1983.98

Crinoid

190-175 million years old. Jurassic Period
From Robin Hoods Bay, Whitby, Yorkshire

Pentacrinites
PEN-TA-CRIN-EYE-TEES

Crinoids, more commonly known as ‘sea lilies’ or ‘feather-stars’, resemble plants but are actually animals. Crinoids are made up of a long segmented stalk rooted into the ground. They have a calyx or head, from which feather-like arms protrude. The stalk is made of muscular tissue, and raises the calyx off the seabed to aid feeding. The calyx itself consists of both digestive and reproductive organs. Unfortunately for the crinoid, the mouth and anus are located side by side at the centre of the calyx. Crinoids feed by trapping small particles of food from seawater with their feather-like arms, and directing it into the mouth, to be digested in the calyx.

This fossil is an excellent example of a crinoid deathbed. At least three crinoids are present, and all the parts are visible.

Crinoids first appeared during the Ordovician Period, around 450 million years ago. They became so abundant that the sea floor would have resembled a forest. Some fossil sediments are made up almost entirely of crinoids. One of these, crinoidal limestone, even takes its name from the fossil creature. Interestingly, the fireplaces at Cusworth Hall are made from crinoidal limestone, prized for the beautiful patterns the fossils make in the stone.

Crinoids are extinct, but they do have descendants living today, especially in coral reefs and in the deeper ocean between 100-200 metres. Crinoids were closely related to starfish and sea urchins, and only lived in saltwater.

DONMG 1957.841