Learning resource pack

Gravel Hunters™

Sedgwick Museum *of Earth Sciences*

Discover incredible ancient creatures on your doorstep

Dodo and Dinosaur®

Sedgwick Museum *of Earth Sciences*

Introduction

Gravel Hunters™

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Gravel Hunters is a fun, educational resource created by the Sedgwick Museum of Earth Sciences at the University of Cambridge. It aims to encourage budding explorers of all ages to discover fossils for themselves on their doorstep. From gardens to car parks and driveways, fossils can be unearthed in gravel in all sorts of envrironments - all you need to do is collect them!

Did you know you can find fossils in your driveway?

The Sedgwick Museum of Earth Sciences houses millions of rocks and fossils from the UK and around the world.

At the museum, we often get asked, "Where is a good place to go fossil hunting?" Although there are places that are famous for fossil collecting, such as the Jurassic coasts of Dorset and Yorkshire, the Isle of Wight, and the beaches of East Anglia, you can also find them right here in Cambridge. You might be surprised by how easy they are to find.

What are gravel fossils?

Some fossils found in gravel are made of a sedimentary rock called flint, which is made of the mineral silica and is often found as nodules in Chalk.

The flint formed around 90 to 66 million years ago, when much of England was covered in a warm sea. The white sediment on this sea floor formed the Chalk rocks we find in the South-East of England. Both the Chalk and flint are made from the remains of microscopic single-celled algae. The Chalk is made from the calcium carbonate shells of a type of algae called coccolithophores. Flint forms from the silica found in the cell walls of a type of algae called diatoms.

Flint could fill animal burrows and sometimes, it would enclose the remains of creatures on the bottom of the sea. The original shells of the creatures would dissolve away, forming a mould. The flint would fill this mould and harden, forming a cast of the creature. These casts are the fossils we find in the gravel.

There are also fossils in the gravel that are older. They come from the clays north of Cambridge and are around 155 million years old. At this time, a warm and shallow sea teaming with life covered South-East England.

How did fossils end up in the gravel?

During the last Ice Age, around 50,000 years ago, ice sheets covered much of the UK and extended as far south as Cambridgeshire. The ice scraped the rocks underneath as it moved, collecting and transporting fragments. When the the ice sheets began to melt around 27,000 years ago, rocks and fossils were deposited as gravel until the ice disappeared 12,000 years ago.

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Discover

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Whilst not all gravel contains fossils, some is full of them, such as shells, sponges and sea urchins. Although many fossils we find will be chipped or incomplete, we can usually still identify them, meaning they give us a fascinating window onto what life was like millions of years ago.

The team at the Sedgwick Museum of Earth Sciences are keen to encourage visitors of all ages to learn more about fossils and record their own finds.

What can you find?

This resource gives examples of some of the most common fossils found in flint gravel. All are invertebrates (animals without a backbone) that had shells or other 'hard parts' became fossilised over millions of years.

Gravel Hunters will help you to identify belemnites, bivalves, *Gryphaea*, sponges, crinoids and echinoids (sea urchins), which can be found as whole or partial casts.

How can you record your finds?

A great way to document your finds is by creating a simple fossil journal. Sketch and take notes to describe what you have found and where. It is also important to label the fossils themselves, so you can match the notes in your journal to your specimens.

"We tend to think of our landscape as unchanging, but here in the gravel is rich evidence of animals living in the UK under a subtropical shallow sea during the Cretaceous Period, 143 to 66 million years ago."

Professor Liz Harper, Curator of Invertebrate Palaeontology, Sedgwick Museum of Earth Sciences

Belemnites

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What are belemnites?

Belemnites are a group of extinct marine animals. They are a type of mollusc, a huge group of animals that includes clams and snails. Belemnites are closely related to today's squid and cuttlefish, which belong to a group of molluscs called cephalopods.

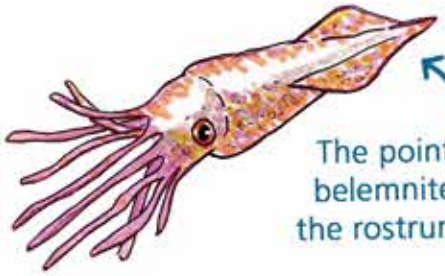
They lived around the same time as the dinosaurs and died out in the mass extinction 66 million years ago.

Belemnites had a squid-like body but, unlike modern squid, they had a hard internal skeleton. This structure, called the rostrum, was made up of crystals of the mineral calcite and became fossilised.

What should you look for?

Look our for tapered cones, cylinders or semi-cylinder shapes. You might also be able to see a cone-shaped hole in the centre of these shapes.

The calcite crystals in belemnite rostrums have become fossilised over millions of years, whereas their soft body parts are rarely preserved.



The pointed tip of a belemnite contained the rostrum (or guard).

What can you find?

A selection of belemnite fossils to scale.

3cm

Echinoids

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What are echinoids?

Echinoids, or sea urchins, are marine animals that are usually round and covered in spines. They evolved around 465 million years ago and over 1000 species live in today's seas and oceans. They are echinoderms, which means they are related to starfish and brittle stars.

Sea urchins have unique shells, called tests, which are made up of many small, fused plates. You might find a whole sea urchin, but more often you will find the impression of a small section of the test. Some will have bumps and holes on them, which are where the spines attached.

What should you look for?

Regular rows of holes or bumps, often in pairs. The pairs of holes will form a star-shape. Whole shell fossils are rounded pieces of flint with a flattened side. Echinoid fossils often look cracked.

What can you find?

Micraster echinoids are heart-shaped.

Echinoid fossils to scale.

In flint gravel, the fossils of ancient echinoid tests date back to the Cretaceous Period.

3cm

Gryphaea

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What are *Gryphaea*?

Bivalves are a group of molluscs that include clams, oysters and mussels. They have an external, two-part hinged shell that protects their soft body. *Gryphaea* is an extinct species of oyster.

In English folklore, fossil Gryphaea are often referred to as 'Devil's toenails' because they resemble the Devil's 'cloven hoof'.

Gryphaea shells have a large, thick left valve and a small, thin right valve. The larger, thicker left valve of the shell are more common as fossils, as the right valves are delicate and break easily. These are more likely to survive than the thin, flat right valves.

What should you look for?

Look out for rocks with a flaked, layered texture. Thick grey, curved 'toenail' shapes often preserve the appearence of the shell, but smaller fragments are often worn smooth by water over time.

What can you find?

Gryphaea evolved at the beginning of the Jurassic Period.

The ridges on *Gryphaea* shells are growth lines - a bit like how trees have more rings as they age.

Gryphaea fossils to scale.

3cm

Sponges

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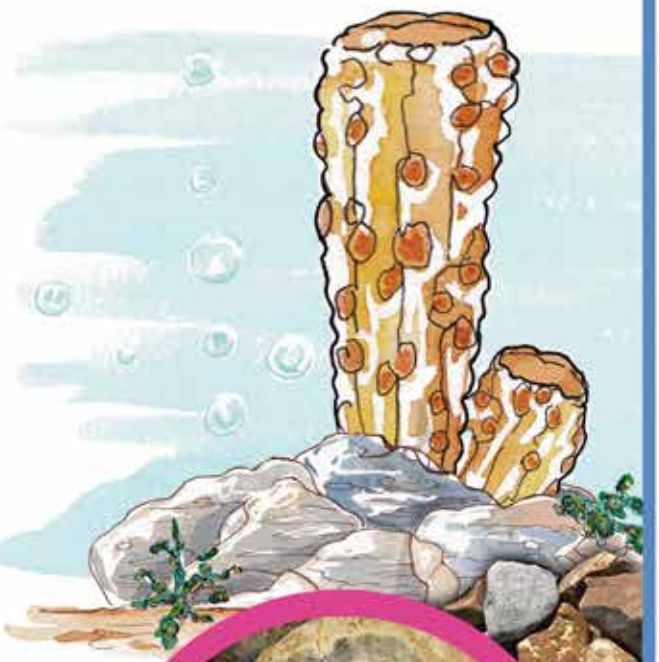
What are sponges?

Sponges are primitive marine animals which may have evolved over 800 million years ago. They are quite different from most other animal groups. Most do not move; they pump water through their porous skeletons to filter out particles of food.

The sponges you can find in gravel are from a group called the glass sponges. These sponges have a skeleton made up of tiny structures called spicules, which are made of silica.

Silica is the same mineral that glass and flint are made of and is very hard. Silica's toughness is one reason why it is common to find the fossils of glass sponges.



What should you look for?

See if you can spot tiny holes in flint rocks, round or branching shapes and spongy-looking textures.

Sponges helped to create flint! Flint is mostly made of the mineral silica and was formed from the silica remains of ancient sponges and microorganisms called diatoms.

Sponges are some of the oldest animals on Earth!

Bivalves

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What are bivalves?

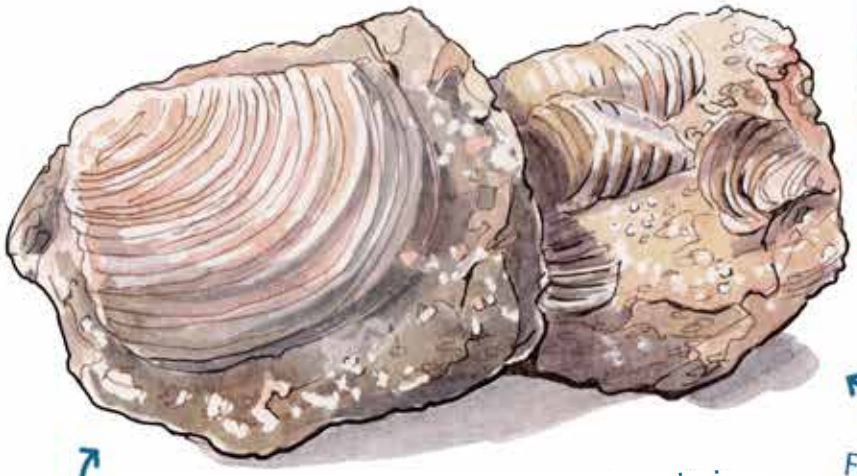
Bivalves are a group of molluscs that include clams, oysters and mussels. They live in both marine and freshwater environments. The first bivalves evolved over 500 million years ago. They have an external, two-part hinged shell that protects their soft body.

Thick, ribbed shells leave imprints in the flint and are easy to spot. These are usually bivalves like the scallop *Pecten* and the extinct *Inoceramus*.

Often imprints look exactly like shells you might find on the beach today.

What should you look for?

Keep an eye out for ribs, ridges and partial shell shapes.



What can you find?

Many bivalves are so well adapted to their environments that they have not changed much over hundreds of millions of years

Fossils of some *Inoceramus* species have been found to measure up to 2 metres wide!

Most bivalves have a 'foot' that can be used for burrowing and crawling!

Bivalve fossils to scale.

3cm

Crinoids

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What are crinoids?

Crinoids, also known as sea lilies, first evolved around 480 million years ago and are still alive today. Although they might look like a plant, they belong to a group of animals called echinoderms, which include sea urchins and starfish.

A crinoid's mouth is surrounded by feeding arms and they start life with a stalk that is attached to the dea floor. However, some adult crinoids move by crawling and others eventually loose their stalks to swim freely. Unstalked species are known as feather stars.

What should you look for?

Crinoid stalks can be found as stacks of star or disc shapes imprinted in flint. They can also be found as individual fragments. It is rare to find fossils of the 'heads' of crinoids, but you might find pieces of the feeding arms.

In gravel, the fossils of crinoids can often be found as broken fragments.

Crinoid fossils to scale.

Round crinoid stalk fragments

Star-shaped crinoid stalk fragments are sometimes called 'star stones' and in folklore have been described as 'fairy coins'.

3cm

Checklist

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Use the Gravel Hunters checklist to record and sketch your own finds!

Belemnite fossil

Date:

Location:

Size:

Echinoid fossil

Date:

Location:

Size:

Gryphaea fossil

Date:

Location:

Size:

Sponge fossil

Date:

Location:

Size:

Bivalve fossil

Date:

Location:

Size:

Crinoid fossil

Date:

Location:

Size: