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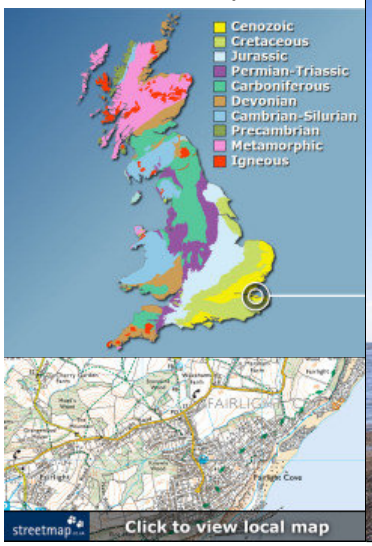
Written and designed by Roy Shepherd ©2011. Special thanks to my wife Lucinda Shepherd, friend Robert Randell and various experts for their support.

Contact details

Fairlight (East Sussex)

Location maps



Location summary

Geological period

Early Cretaceous epoch

Approximate age

143-139 million years

Fossil diversity

Dinosaur footprints, plant remains...

Supply of fresh material

Limited

Dangers to consider

Risk of falling rocks... read more

Equipment needed

Hammer, chisel, eye protection...

Protection status

This location is designated a SSSI

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How might the Fairlight area have looked 140 million years ago?

Introduction

Fairlight is a small village located a short distance from the coast between Pett Level (half a mile to the north-east) and Hastings (4 miles to the south-west). Over the years coastal erosion has consumed much of the village outskirts and several homes have already toppled over the cliff. A recent study revealed the cliffs had retreated over 100 metres in the last century alone. Until recently Fairlight was unprotected from the sea, but in the early 1990s a project to construct a wave barrier was completed (see below-right). Today, erosion remains a big problem for the local inhabitants, but is now confined to the stretches either side of the barrier and the foreshore immediately in front of it.

Left: An abandoned house stands precariously close to the cliff edge. **Right:** The cliffs at Fairlight Cove are now shielded by a large wave barrier.

The cliffs and foreshore are comprised of layers of sandstone and clay, deposited during the Early Cretaceous epoch, approximately 140 million years ago (mya).

Fossils can be found along the entire coastal stretch between Pett Level and Hastings. Among the finds made over the years include: dinosaur bones and footprints, horsetail stems and other plants, fresh-water bivalves, and fish remains. Although dinosaur remains are less common, when they are discovered their importance is usually very high - please notify Discovering Fossils or the Natural History Museum in London if you discover something of importance.

Access to the beach is made alongside The Smuggler pub at Pett Level.

Access to the beach is made a short distance east of Fairlight at Pett Level (click on the map at the top of the page for more detail). From the coast road a small access road (running alongside The Smuggler pub) leads to the beach. Parking is available along the main road opposite the pub (as seen above).

The cliffs at Pett Level and Fairlight are extremely unstable, falling rocks and large collapses occur without warning throughout the year. Please take care during your visit and avoid standing directly beneath the cliff. It's recommended to keep at least 8 metres from the cliff base; if your visit requires that you operate within this we strongly advise the use of a hard hat (available online).

The geology of Fairlight

Fairlight provides an opportunity to explore part of the Early Cretaceous epoch, a time in the earth's history dating approximately 143-139 mya. There are two geologic stages present within the cliff and foreshore: the Berriasian (approximately 145-140 mya) and the Valanginian (approximately 140-136 mya), although the precise transition between the two is not clearly defined (figure 1).

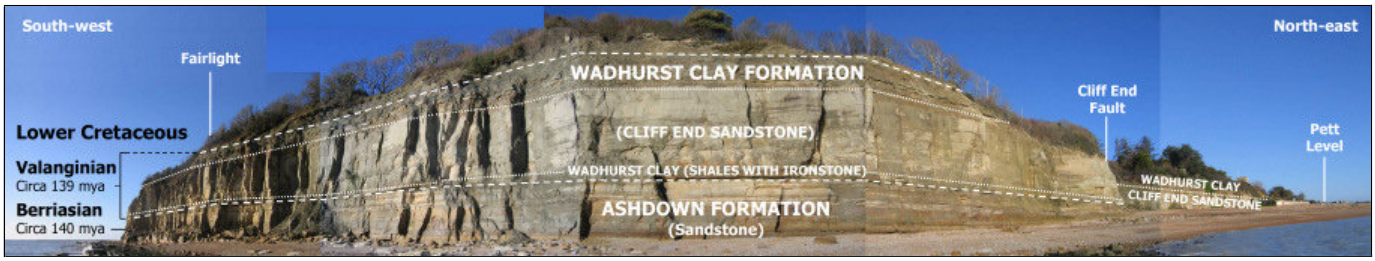


Figure 1: Panoramic view and detailed stratigraphy of the cliffs between Fairlight and Pett Level (2008).

The sediments exposed in the cliffs and on the foreshore between Pett Level and Hastings were originally transported to the area as sands and silts by rivers and streams, before settling at the base of a large lake or lagoon (predominantly above sea level). At this time Fairlight and the rest of Britain were part of the European landmass, located around 40° north of the equator, on the same latitude as the Mediterranean Sea is today.

For much of the Berriasian and Valanginian stages the climate was sub-tropical with seasonal changes in temperature and rainfall. The mostly low-lying terrain was home to a rich plant flora, revealed by the abundance of fossilised plant material found throughout the succession. Conifers and related plants were the dominant tree and cycad-like plants were also present. Grasses did not exist during the Cretaceous, instead the ground was covered by the horsetail *Equisetites*.

Perhaps the most exciting aspect of the sandstone is the presence of dinosaur bones and footprints, including carnivorous (meat-eating) and herbivorous (plant-eating) species. These dinosaurs would have grazed and hunted respectively along the river and lake sides, leaving their footprints in the sediment.

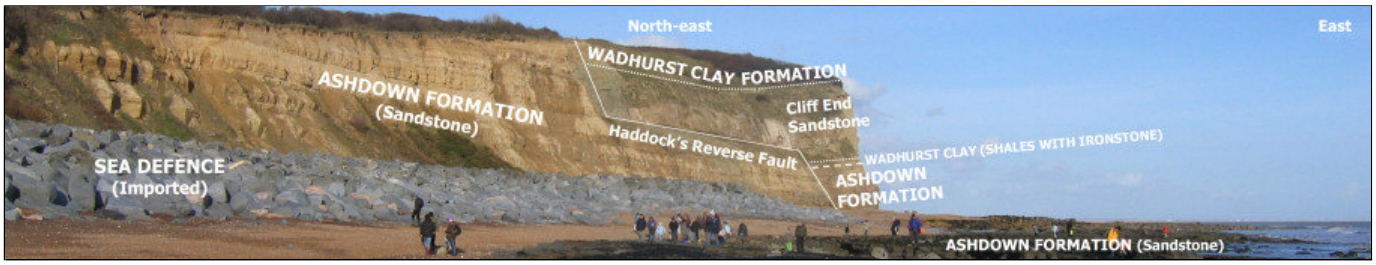


Figure 2: View north-east at Fairlight Cove. The distinctive scrape marks across the Cliff End Sandstone are visible along the Haddock's Fault.

Moving along the coast from Pett Level towards Fairlight Cove the geology becomes increasingly older, assisted by the presence of two reverse faults: Haddock's fault (Fig. 2 and 3) and Fairlight fault (Fig. 4). These faults formed suddenly as energy was released from the pressure built up by Africa colliding with Europe - a process that created the Alpine mountain chain and uplifted south-east England into a large dome-shaped structure, known as the Wealden Anticline (see Hastings for more detail). As the uplifting took place the rock at Fairlight was compressed laterally forcing one side to slip upwards over the other.

At Haddock's fault the cliffs on the south-west side have been thrust upwards, the lower section of the Ashdown Formation (Sandstone) is visible at beach level (Fig. 3). Over time erosion has removed the upper section of the Ashdown Formation. On the north-east side of the fault the majority of the Ashdown Formation is below beach level; the overlying Wadhurst Clay Formation is visible in the middle to upper sections of the cliff face.

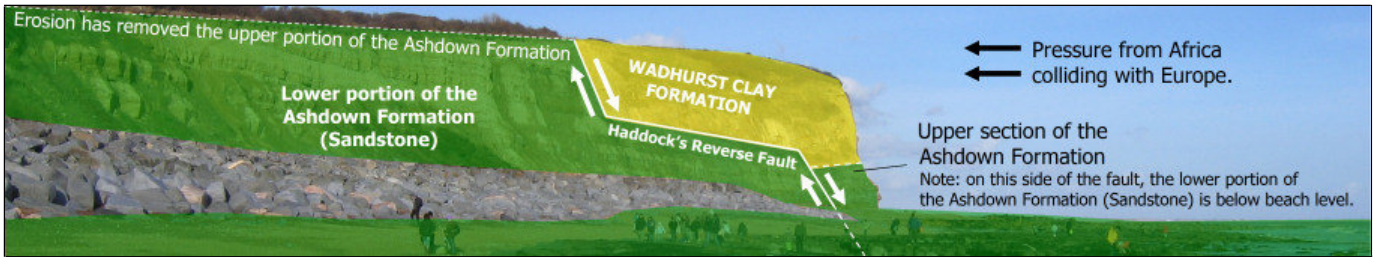


Figure 3: View north-east at Fairlight Cove. The distinctive scrape marks across the Cliff End Sandstone are visible along the Haddock's Fault.

Since the original Alpine uplifting the land on the immediate south-west side of Haddock's fault has slipped backwards (in the direction of its natural position), resulting in a visible slip-plane across the exposed Wadhurst Clay (highlighted yellow). This should not be confused with the earlier large-scale movement which was in the opposite direction.

At the opposite end of Fairlight Cove a second reverse-fault (Fairlight Reverse Fault) can be seen (Fig. 4). Here the underlying Fairlight Clay (belonging to the Ashdown Formation) can be seen in the slumping cliffs and foreshore south-west of the fault line. These clays were formed by fine sediment transported by rivers and streams then deposited in deeper parts of the lake/lagoon. Some authors have attributed the finer sediments to periods to reflect periods of reduced rainfall during which erosion of the source rocks was less.

Figure 4: View west across Fairlight Cove towards the Fairlight Fault, marking a change from sandstone to clay at beach level.

Where to look for fossils?

Fossils can be found throughout the rocks at Fairlight and Pett Level, although the volume of finds tends to be relatively low compared to neighbouring coastal stretches. It can take several visits to Fairlight, without expert guidance, before a sufficient number of fossils have been observed in order to build a picture of how this prehistoric environment may have looked.

The best place to search is on the exposed foreshore and among the boulders and shingle. At low-tide, provided shingle isn't covering its surface, the exposed Ashdown Sandstone can be viewed on the foreshore (see photo below-left). During a recent Discovering Fossils event a number of well preserved dinosaur footprints were located in situ at this location.

Left: View from Fairlight Cove - the Ashdown Sandstone is exposed on the foreshore. **Right:** Ashdown Sandstone at Pett Level.

Occasionally dinosaur, crocodile and turtle bones can be found loose among the boulders and shingle, these bones tends to be dark brown, with a slightly pitted surface. The best technique to find bones is to walk very slowly, carefully scanning your eyes for suspect rocks; they're not easily found, but not impossible to find either.

At Pett Level some of the fallen boulders, originating from the upper part of the cliff (Wadhurst Clay Formation), are comprised of a course conglomerate, known as the Cliff End Bone Bed. The photo below-left shows a split fragment of bone bed containing a circular tooth belonging to the fish *Lepidotes*; a small rectangular piece of unidentified bone can also be seen. Other finds include teeth belonging to the freshwater shark *Hybodus* and even small mammals.

Left: A fragment of the Cliff End Bone Bed containing a small bone, possibly rib, and fish tooth *(Lepidotes)*. **Right:** A close-up reveals broken quartz pebbles.

As with all coastal locations, a fossil hunting trip is best timed to coincide with a falling or low-tide. For a relatively low one-off cost we recommend the use of Neptune Tides software, which provides future tidal information around the UK. To download a free trial click here. Alternatively a free short range forecast covering the next 7 days is available on the BBC website click here.

What fossils might you find?

The most commonly found fossils at Fairlight and Pett Level are collections of the bivalve *Neomiodon*, which are visible on the surface of many foreshore boulders. Plant remains are also common, in particular roots belonging to horsetail plants. Although dinosaur remains are rare the most frequently found include teeth, jaws, vertebrae, ribs and limb bones of the large bipedal (two-legged) *Iguanodon*.

Left: A dinosaur footprint *(Iguanodon)*, visible on the exposed Ashdown Sandstone at Fairlight Cove. **Right:** A second print nearby.

Please respect the footprints and do not damage or attempt to collect any part of them. We wish to remind visitors that these are rare and scientifically important, as well as protected.

Left: Participants on a Discovering Fossils fossil hunt examine a large theropod dinosaur footprint *(Baryonyx* perhaps?). **Right:** Close-up.

Left: A collection of small bivalves *(Neomiodon)* on the surface of a foreshore boulder. **Right:** A close-up.

Left: A small unidentified plant fragment. **Right:** A close-up.

Left: A rolled beach pebble from the Ashdown Sandstone containing fragments of carbonised plant material.
Right: A fragment of the Cliff End Bone Bed containing a small unidentified bone and fish tooth *(Lepidotes)*.

Left: An isolated fern pinnule, found within the Fairlight Clay.
Right: A large well preserved bivalve *(Pseudunio valensis)* from the Fairlight Clay.

Left: A member of Discovering Fossils holding a large piece of carbonised wood, found within the Fairlight Clay. **Right:** A close-up.

Tools & equipment

Left: A well equipped group of people on a fossil hunt at Fairlight. **Right:** Walking boots are recommended as the terrain is rocky and slippery.

It's a good idea to spend some time considering the tools and equipment you're likely to require while fossil hunting at Fairlight. Preparation in advance will help ensure your visit is productive and safe. Below are some of the items you should consider carrying with you. You can purchase a selection of geological tools and equipment online from UKGE.

Hammer: A strong hammer will be required to split prospective rocks. The hammer should be as heavy as can be easily managed without causing strain to the user. For individuals with less physical strength and children (in particular) we recommend a head weight no more than 500g.

Chisel: A chisel is required in conjunction with a hammer for removing fossils from the rock. In most instances a large chisel should be used for completing the bulk of the work, while a smaller, more precise chisel should be used for finer work. A chisel founded from cold steel is recommended as this metal is especially engineered for hard materials.

Safety glasses: While hammering rocks there's a risk of injury from rock splinters unless the necessary eye protection is worn. Safety glasses ensure any splinters are deflected away from the eyes. Eye protection should also be worn by spectators as splinters can travel several metres from their origin.

Strong bag: When considering the type of bag to use it's worth setting aside one that will only be used for fossil hunting, rocks are usually dusty or muddy and will make a mess of anything they come in contact with. The bag will also need to carry a range of accessories which need to be easily accessible. Among the features recommended include: brightly coloured, a strong holder construction, back support, strong straps, plenty of easily accessible pockets and a rain cover.

Walking boots: A good pair of walking boots will protect you from ankle sprains, provide more grip on slippery surfaces and keep you dry in wet conditions. During your fossil hunt you're likely to encounter a variety of terrains so footwear needs to be designed for a range of conditions.

For more information and examples of tools and equipment recommended for fossil hunting click here or shop online at UKGE.

Protecting your finds

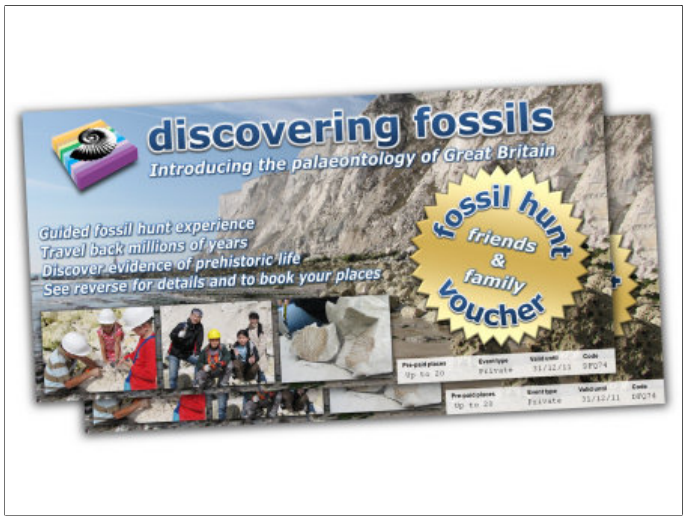
It's important to spend some time considering the best way to protect your finds onsite, in transit, on display and in storage. Prior to your visit, consider the equipment and accessories you're likely to need, as these will differ depending on the type of rock, terrain and prevailing weather conditions.

Left: Fossil wrapped in foam, ready for transport. **Right:** A small compartment box containing cotton wool is ideal for separating delicate specimens.

When you discover a fossil, examine the surrounding matrix (rock) and consider how best to remove the specimen without breaking it; patience and consideration are key. The aim of extraction is to remove the specimen with some of the matrix attached, as this will provide added protection during transit and future handling; sometimes breaks are unavoidable, but with care you should be able to extract most specimens intact. In the event of breakage, carefully gather all the pieces together, as in most cases repairs can be made at a later time.

For more information about collecting fossils please refer to the following online guides: Fossil Hunting and Conserving Prehistoric Evidence.

Join us on a fossil hunt



Left: A birthday party with a twist - fossil hunting at Peacehaven. **Right:** Send someone special a Fossil Hunt Experience Gift Voucher

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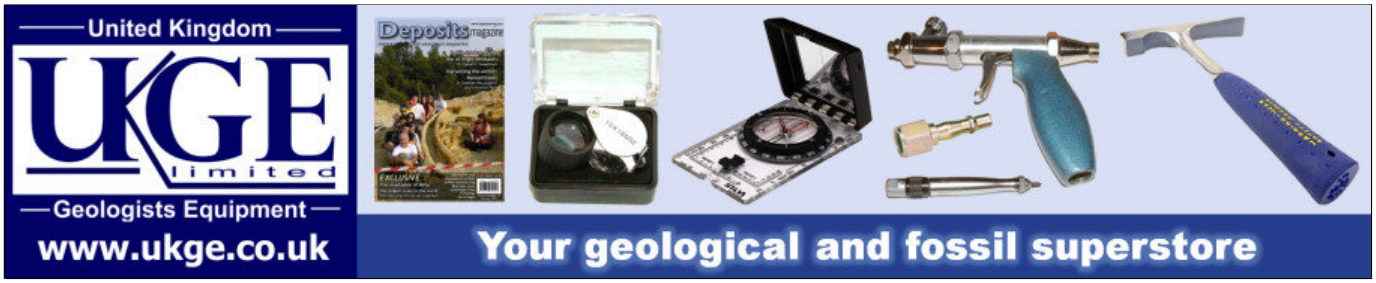

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References: www.english-nature.org.uk; Geology and Fossils of the Hastings area, Ken Brooks; Department of Palaeontology, Natural History Museum, Fairlight field trip notes, Oct '03; Geological Conservation Review Series, Fossil Reptiles of Great Britain; A Dynamic Stratigraphy of the British Isles, R.Anderton and co; The Geology of Britain, P.Toghill; A Geologic Time Scale 2004, by F. Gradstein, J. Ogg and A. Smith.

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