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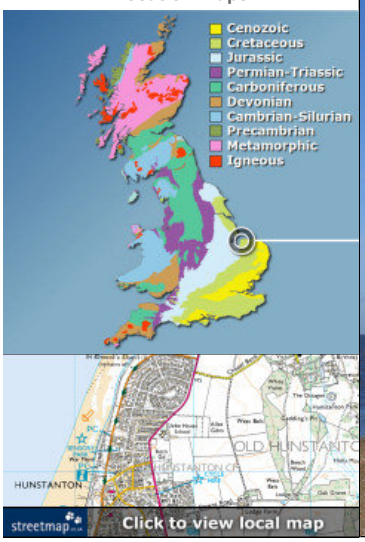
Written and designed by Roy Shepherd ©2011. Special thanks to my wife Lucinda Shepherd, friend Robert Randell and various experts for their support.

**Contact details**

# Hunstanton (Norfolk)

Location maps




How might the Hunstanton area have looked 99 million years ago?

Location summary

**Geological period**

Early to Late Cretaceous Epoch

**Approximate age**

108-99 million years

**Fossil diversity**

Ammonites, belemnites, bivalves...

**Supply of fresh material**

Moderate

**Dangers to consider**

Falling rocks, rising tide... read more

**Equipment needed**

Hammer, chisel, eye protection...

**Protection status**

This location is designated a SSSI

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## Introduction

Hunstanton is a small town on the northwest coast of Norfolk and home to approximately 5,000 people. The town is fringed along its western edge by a stretch of dramatic colour contrasting cliffs of orange, red and white sedimentary rocks, reflecting changing depositional conditions towards the end of the Early Cretaceous and the onset of the Late Cretaceous 108-99 million years ago (mya).

Although macro fossils are less frequently encountered within the Carstone Formation, the overlying Hunstanton Formation and Ferriby Chalk Formation are highly fossiliferous and attract significant palaeontological interest. These latter formations contain evidence of a variety of prehistoric marine fauna, including ammonites, belemnites, brachiopods, bivalves, sponges and many other groups.

Access to the beach is made at St Edmond's Point a short distance north of the ruins of St Edmond's Chapel and the lighthouse (now a private residence). The coastal footpath traces the cliff-top before descending to beach level a short distance from Old Hunstanton (see map above and photos below). From the access point the cliffs extend south towards Hunstanton.

**Left:** Facing north, the ruins of St Edmund's Chapel and the lighthouse beyond. **Right:** Walking north along the cliff-top footpath towards the beach access point.

## The geology of Hunstanton

The rocks exposed along the 1.5km stretch of cliff and beach at Hunstanton date from the Albian Stage of the Early Cretaceous Epoch c.108 mya to the Cenomanian Stage of the Late Cretaceous Epoch c.99 mya. The geology features three distinctive formations of marine origin - the Carstone Formation (orange) at the cliff base, followed above by the Hunstanton Formation (red) formerly known as the Red Chalk, and the Ferriby Chalk (white) extending to the cliff-top (see figures 1 and 2 below).

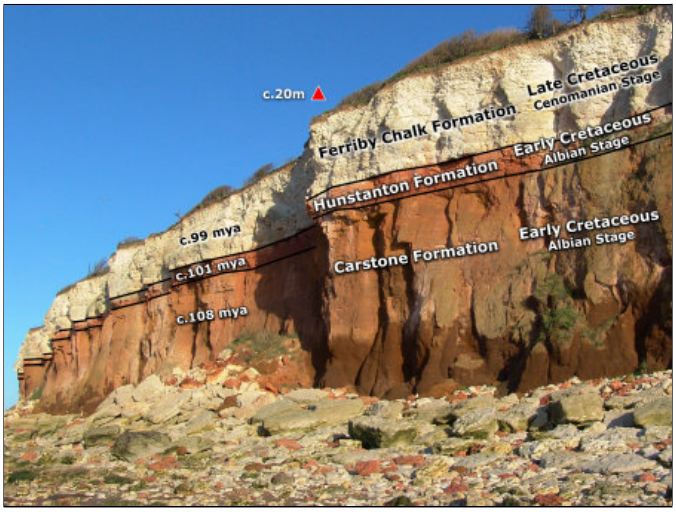




**Figure 1:** The contrasting colours of the Carstone, Hunstanton and overlying Ferriby Chalk Formations. **Figure 2:** Visitors examine the geology in the cliff-face.

The earliest rock exposed *in situ* at Hunstanton is the Carstone Formation - an orange (when weathered, otherwise greenish-brown) sandstone deposited during the early to mid-Albian Stage of the Early Cretaceous Epoch. A generalised age of c.108 million years is applied here, however the formation is understood to span a wider window of time.

**Left:** The Carstone Formation - Robert and Harald examine the sedimentary structures in the cliff-face at St Edmond's Point.
**Right:** A collection of rolled pebbles can be seen within the Carstone Formation indicating the close proximity of land and strong currents.

The Carstone Formation is comprised of coarse sand particles interspersed with rolled pebbles indicative of deposition in a high energy, shallow, near-shore environment with strong currents. Fossils are reported within the Carstone and include rolled ammonite fragments, bivalves and traces of burrowing organisms, though none were observed during the fieldwork undertaken for this report.

Above the Carstone is the Hunstanton Formation a c.1m thick layer of red coloured limestone deposited during the mid-late Albian Stage of the Early Cretaceous Epoch (c.101 mya). Analysis of the Hunstanton Formation in Yorkshire where its thickness increases to c.30m has identified the Early/Late Cretaceous boundary to occur towards its top. For the purposes of this report the formation is assigned wholly to the Early Cretaceous.


**Left:** The Hunstanton Formation visible in the cliff-face a short distance south of the beach access point at St Edmond's Point.
**Right:** A *Neohibolites* belemnite guard protruding *in situ* from the Hunstanton Formation.

The red colouration of the Hunstanton Formation is due to limonite ore and probably reflects the low rate of sedimentation during which oxidisation (rusting) extended into the sea bed. Macro fossils are common throughout the formation in particular belemnites, brachiopods, echinoids and corals.

Resting above the Hunstanton Formation and extending to the cliff-top is the Ferriby Chalk Formation, a white/grey chalk limestone deposited during the Cenomanian Stage at the start of the Late Cretaceous Epoch (c.99 mya). The formation measures c.10m thick locally.


**Left:** The Ferriby Chalk Formation overlying the Hunstanton Formation in the cliff-face a short distance south of the beach access point.
**Right:** A *Burrirhynchia(?)* brachiopod - the aperture where the foot extended to clasp the rock is visible. Observed on a fallen boulder, Ferriby Chalk Formation.

The Ferriby Chalk is largely comprised of the skeletal remains of planktonic algae known as coccolithophores which accumulated to form a white ooze on the seafloor. This soft sediment was later compacted and hardened (lithified) to form chalk - a relatively soft rock itself. The purity of the chalk indicates its formation took place far from land, largely free of terrestrial sands and silts that would otherwise have coloured it.

In comparison with present-day conditions, global sea-levels during the Late Cretaceous were over 200 meters higher. The higher sea levels likely reflect a combination of extreme greenhouse conditions and heightened plate tectonics. Elevated plate tectonic activity and the associated volcanics delivered greenhouse gases to the atmosphere, fuelling the greenhouse effect. Global high temperatures melted much (perhaps all) of the ice at high latitudes, introducing significant amounts of water to the world's oceans. Uplift of the ocean-floor in regions of active plate tectonics displaced further water onto the continental shelves.

## Where to look for fossils?

Much of the *in situ* chalk at Hunstanton occurs high in the cliff-face and out of reach of visitors, however, natural erosion of the cliff-face provides a fresh supply of fallen material throughout the year, especially during the winter months. These fallen boulders provide productive fossil hunting, with a range of marine fossils visible on the wave and air-weathered surfaces.


**Left:** Fossils are frequently found protruding the surface of wave and air-weathered boulders. **Right:** A visitor uses a hammer and chisel to extract a fossil.

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?

A single visit to Hunstanton is sufficient to locate a range of marine fossils, in particular ammonites, belemnites, echinoids, brachiopods, bivalves, sponges, worm tubes, corals and crustacean burrows. Less common finds include shark teeth and occasionally parts of the cartilage skeleton, and fish bones/skeletons. Below are a selection of fossils observed during two visits to Hunstanton.


**Left:** A partial internal mould of an *Parapuzosia(?)* ammonite with the suture marks clearly visible. Found loose on the foreshore, Ferriby Chalk Formation.
**Right:** The internal mould of an unidentified ammonite, the ridged keel of the specimen can be seen protruding the grey boulder. Ferriby Chalk Formation.


**Left:** A collection of *Neohibolites* belemnite guards on the surface of an wave-weathered boulder, Hunstanton Formation.
**Right:** The outer surface of a squashed brachiopod, found loose among fallen cliff debris, Ferriby Chalk Formation.


**Left:** A well preserved *Moutonithyris* brachiopod, extracted from a loose boulder on the foreshore, Hunstanton Formation. **Right:** A similar specimen.


**Left:** The outer surface of an *Inoceramus* bivalve, found loose on the foreshore, Ferriby Chalk Formation.
**Right:** The internal mould of an air-weathered gastropod. Found on the surface of a fallen boulder, Ferriby Chalk Formation.


**Left:** The partially crushed test of a *Hyposalenia(?)* regular echinoid. Found on the air-weathered surface of a fallen boulder, Ferriby Chalk Formation.
**Right:** A *Gautheria(?)* regular echinoid test observed laterally on the surface of an air-weathered boulder, Ferriby Chalk Formation.


**Left:** The test of a *Holaster* irregular echinoid, observed on the surface of a fallen boulder, Ferriby Chalk Formation.
**Right:** The partial internal flint mould on an irregular echinoid test, found among loose beach pebbles. The flint pebbles are not locally derived.


**Left:** The tip of an unidentified Lamniform shark tooth (15mm), found among fallen cliff debris, Ferriby Chalk Formation.
**Right:** An unidentified shark vertebra observed in cross-section of the surface of a fallen boulder, Ferriby Chalk Formation.


**Left:** A small unidentified fish vertebrae observed in cross-section of the surface of a fallen boulder, Ferriby Chalk Formation.
**Right:** A 2.5cm fragment of highly degraded bone, possible a fish vertebra. Found on the surface of a fallen boulder, Ferriby Chalk Formation.


**Left:** A sponge, found on the air-weathered surface of a fallen boulder, Ferriby Chalk Formation.
**Right:** A sponge protruding from the surface of an air-weathered fallen boulder, Ferriby Chalk Formation.


**Left:** A *Serpula* worm tube, found on the air-weathered surface of a fallen boulder, Ferriby Chalk Formation.
**Right:** A trace fossil, possibly a back-filled crustacean burrow. Found on the air-weathered surface of a fallen boulder, Ferriby Chalk Formation.


**Left:** A network of *Thalassinoides* crustacean burrows from the Paradoxica Bed at the base of the Ferriby Chalk Formation. **Right:** Another example.

## Tools & equipment


**Left:** Roy indicates where to strike a rock to a fossil hunt participant. **Right:** A geologist's hammer is an ideal tool for splitting prospective rocks.

It's a good idea to spend some time considering the tools and equipment you're likely to require while fossil hunting at Hunstanton. 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

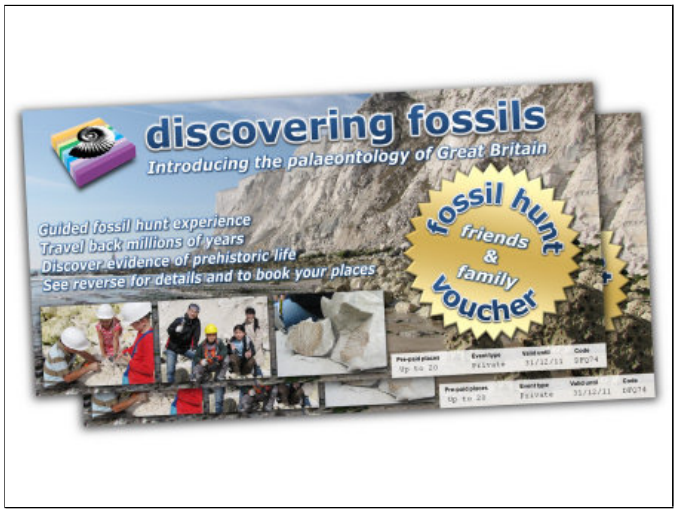
It's important to spend some time considering the best way to protect your finds onsite, in transit, on display and in storage. Prior to your visit, consider the equipment and accessories you're likely to need, as these will differ depending on the type of rock, terrain and prevailing weather conditions.


**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

Discovering Fossils guided fossil hunts reveal evidence of life that existed millions of years ago. Whether it's your first time fossil hunting or you're looking to expand your subject knowledge, our fossil hunts provide an enjoyable and educational experience for all. To find out more **CLICK HERE**

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More information

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**References:** British Geological Survey, A stratigraphical framework for the Lower Cretaceous of England, Research report RR/08/03; British Regional Geology, East Anglia and adjoining areas, 4th edition, C. P. Chatwin, 1968; Burrows and Surface Traces from the Lower Chalk of Southern England, W. J. Kennedy, 1967; A Dynamic Stratigraphy of the British Isles, A. Anderton, P. H. Bridges, M. R. Leeder and B. W. Sellwood, 1992; British Upper Cretaceous Stratigraphy, R. N. Mortimore, C. J. Wood and R. W. Gallois, 2001; Fossil of the Chalk, second edition, A. B. Smith and D. J. Batten, 2002; NHM Earth Lab Datasite, http://www.nhm.ac.uk/jdsml/nature-online/earthlab/index.dsml.

**Safety notice:** Fossil hunting can at times pose a risk to personal safety, in particular within environments close to the coast, cliffs or in quarries and when using the tools and equipment illustrated. Discovering Fossils provides a free resource to inform you about this fascinating subject and does not accept any liability for decisions made using this information. We recommend all individuals abide by the fossil hunting guidelines available by clicking on the icon at the top of the page.