



FAIRLIGHT COVE FIELD MEETING MAY 6 2012

THIS FIELD TRIP was a joint venture with members of Oxford Geology Group and Hastings and District Geological Society (HDGS) attending.

The Oxford Group left Oxford at around 10.30 and arrived at The Smuggler Inn at Pett Level shortly after 13.00 where we met the Hastings Society. The weather was dry but overcast, cool and with light airs. The field trip was timed to allow the group to examine the foreshore at an exceptionally low tide. Following a good carvery lunch we were introduced to our guides from the Hastings Society, Ken Brooks and Peter Austen prior to our site visit.

Lower Cretaceous

Ken, fresh from his wedding the day before, showed us an artistic impression of the palaeoenvironment of this Lower Cretaceous Period. He explained that at that time 120-140 Mya south-east England was part of a land mass sitting 40° N with a hot humid climate. The illustration showed a landscape set in an area of meandering rivers, flood plains and lakes. The dinosaurs *Iguanodon*, *Polacanthus* and *Baryonyx* could be seen eating lush vegetation and each other.

The Cretaceous rivers flowing down into this lowland area, from



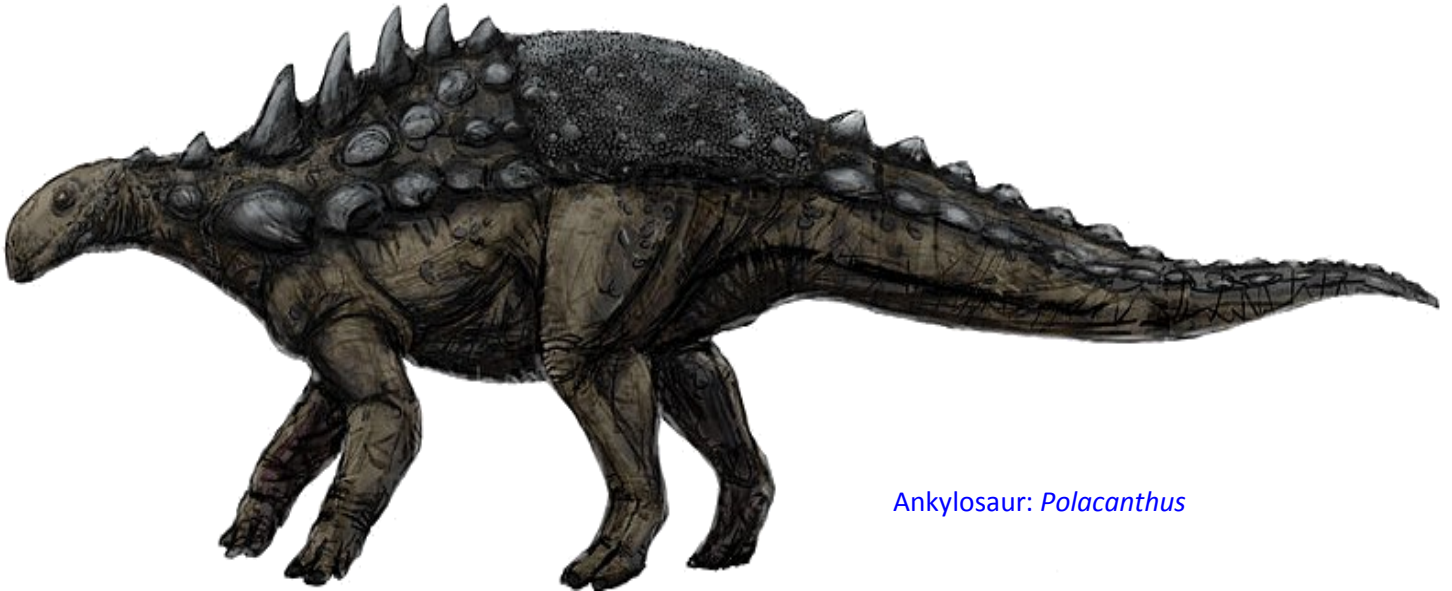
**Siderite (FeCO₃) nodules in sandstone,
located above the littoral zone.**



**The cliffs between Fairlight Cove
and Pett Level.**

the London Uplands and the west, deposited great quantities of sand, silt and mud. This was subsequently consolidated to form the Hastings Group comprising of the Ashdown Formation, overlain by the Wadhurst clay Formation, which includes at its base the Cliff End Sandstone. The aforementioned rock units are all exposed in the cliffs and foreshore between Pett Level and Fairlight Cove. During the Alpine Orogeny the rock units at Fairlight Cove were compressed laterally causing one side to slip upwards over the other. The beds are therefore faulted by sets of reverse thrust faults. Two sets were shown to us by our guides, (Haddock's & Fairlight Cove reversed faults). These beds are now tilting very gently southwards and are uplifted to form the southern part of the Wealden Anticline.

Ken showed us examples of various fossils found in these beds. These included a fine specimen of fish scales c. 25 cm by 15 cm. Each scale was about 15 mm square and formed part of a *Lepidotes* fish which was probably 1 m long at its demise. Casts of dinosaur bones included a metatarsal, two vertebrae with dorsal bony prominences, probably from the tail of the armoured ankylosaur, *Polacanthus*, along with a braincase and partial skull of an Ankylosaur. We were also shown a cast of the snout of a large Wealden crocodile *Goniopholis*, found by a child on the beach. These specimens were dis-articulated suggesting that they had been washed down into the rivers and lakes. Fibreglass moulds of the footprints of several different species of three-toed theropod dinosaurs were handed round;



Ankylosaur: *Polacanthus*

these footprints are often found in the once soft muds now visible on the foreshore, and in fallen blocks of sandstone. Unusual parallel ridges in the mudstones were formed by slow trickling water across the once soft muds; an example of these 'gutter casts' was shown. A polished block of the attractive banded buff coloured sandstone showing the effects of iron staining with iron mineral haematite (red), and siderite (dark brown) and the hydrated iron oxide minerals, known as limonite (yellow), was passed around.

Peter explained that a variety of Cretaceous molluscs, fish and sharks lived in the brackish to freshwater environments of this area. The land was dominated by crocodiles, turtles and dinosaurs. Carbonated plants found here such as horsetails, ferns, cycads, conifers and tree ferns indicate that the summers were hot and dry, followed by wet and humid conditions in the winters. The group was shown samples and

drawings of these plants.

The group then set off, walking along the sea wall promenade at Pett Level. Tree stumps are visible on the foreshore. These are a 'fossilised forest'. Remnants of a drowned wooded area used as a hunting ground in the Mesolithic, hand axes have been found in a cave in the cliffs overlooking this foreshore. It was suggested that this cave was used as a vantage point for Mesolithic hunters.

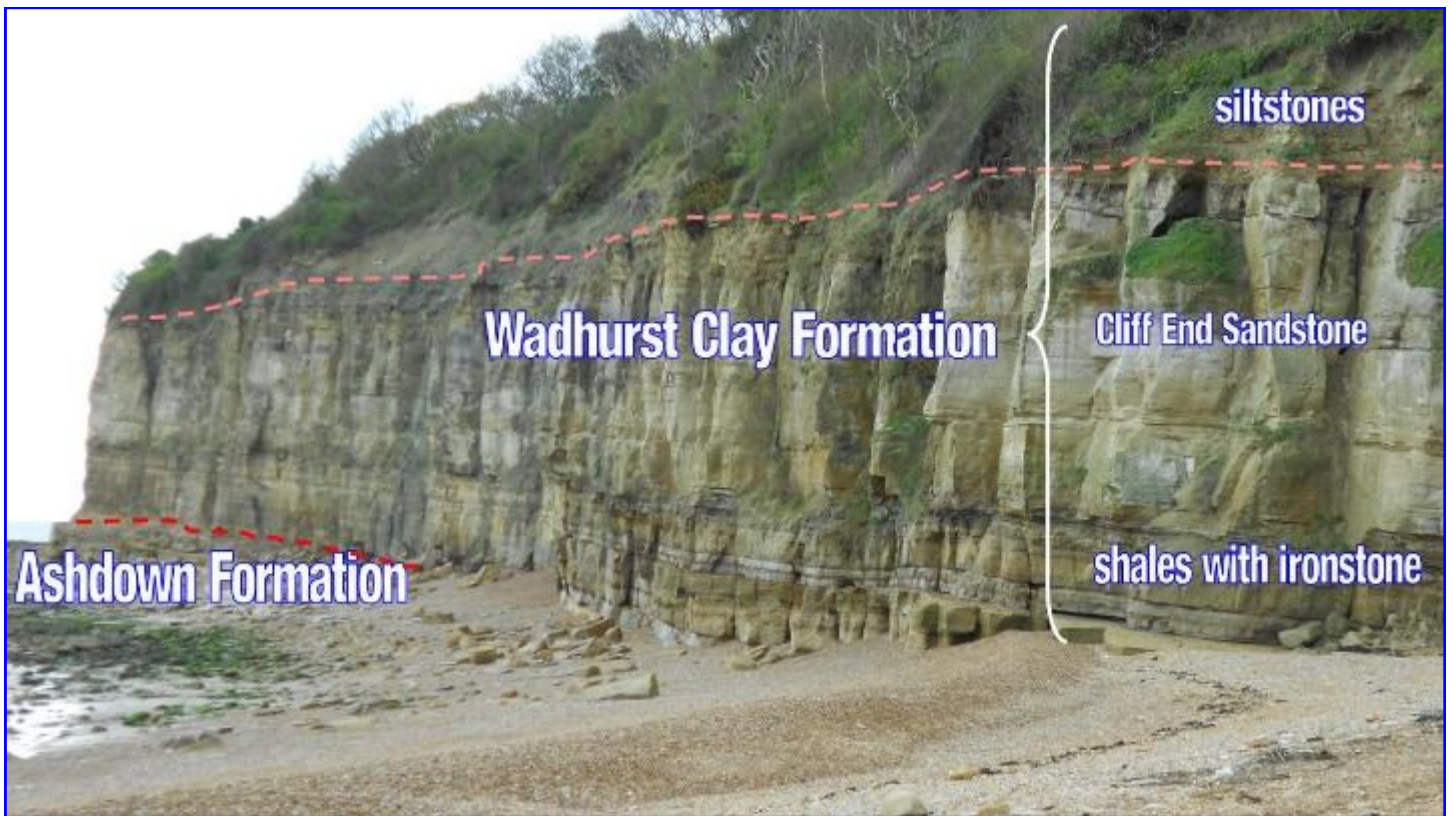
Normal faults

The cliffs that rise-up from Pett Level are promptly punctuated by the Cliff End faults. These normal faults form a graben type depression with the Cliff End Sandstone visibly off-set.

Ken explained that he had witnessed a significant cliff fall last year. Cracks and fissures extend up the full face of the cliff rendering it very unstable. The group was therefore advised not



Larvikite revetment protecting the cliffs at Fairlight Cove.



The Cliff End normal fault.



Theropod dinosaur.

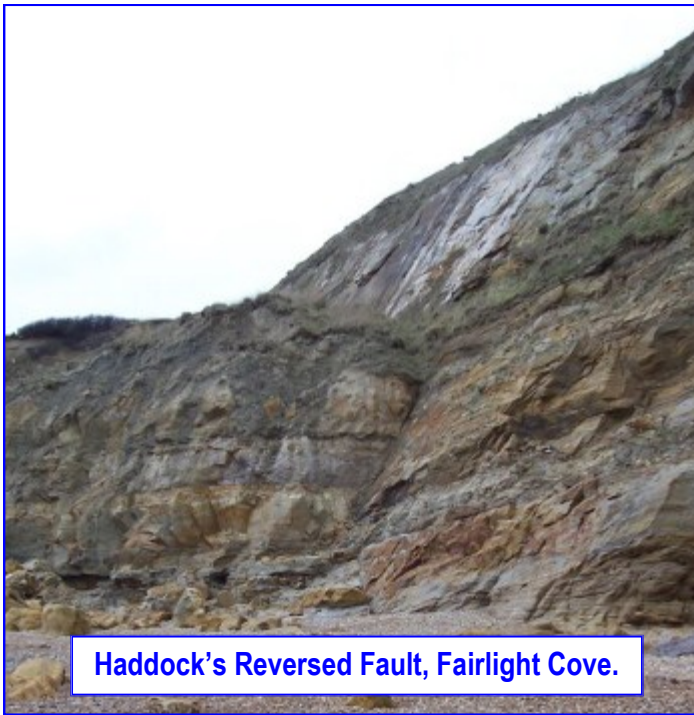
to approach the foot of the cliffs and search instead for fossils mainly in the littoral zone.

A rock sample containing fish scales, fish teeth and a turtle scute was found by a member of the group searching in fallen blocks from the Cliff End Bone Bed, part of the Wadhurst Clay Formation. The stems of quillworts (clubmosses) were visible as 5cm raised circular discs on blocks of sandstone from the Ashdown Formation. Some blocks of mudstone in this area were pitted with small *Neomiodon* bivalve fossils, iron-stained brown. On the shallowly dipping mudstones of the foreshore, dinosaur footprints were seen, some more convincing than others. Two sets of three-toed footprints about 50 cm across indicated 2 dinosaurs moving in opposite directions across the then soft estuarine muds.

Celebrated

A celebrated reverse fault, Haddock's Fault, has thrust the rocks on the south-west side upwards resulting in the softer Wadhurst clays now forming the cliff. Tectonic activity associated with the Alpine orogeny has caused uplift on the immediate south-west side of Haddock's fault which has slipped backwards (in the direction of its natural position), resulting in a visible slip-plane across the exposed Wadhurst Clay.

The Ashdown beds have been eroded to form Fairlight Cove. With the rate of cliff erosion accelerating since the mid 20th century with property lost in cliff falls, a cottage now sits abandoned on the cliff edge. Efforts have been made to protect the village of Fairlight on the cliff top from



Haddock's Reversed Fault, Fairlight Cove.



Mary Edginton's find: *Gleichenites* sp.

further losses. Two revetments have been placed in the vicinity of the cove. The easterly one is made of blocks of dark grey Norwegian larvikite, a form of monzonite containing ternary feldspar and its purpose is to stabilise the cliff slopes at an angle of 40 degrees. The lagoon that was initially created behind the berm has now been filled in by storm thrown flint pebbles. The lower slopes are now starting to stabilise with

gorse, brambles and grasses growing on them. The top of the slopes still have fractured strata. Further cliff falls will presumably occur before the 40° angle of stability is reached but these efforts appear to be having some success. The westerly berm is made of massive blocks of white Carboniferous coralliferous limestone from the Bordeaux region.

On the western side of the cove Peter showed us a second reverse fault (Fairlight Reversed Fault). This had thrust up the reddish-purple Fairlight Clay facies; foundering of these soft clays, rocks and recent midden deposits had resulted in huge landslips down onto the beach. Butchered cattle bones were found in the clays but alas none from dinosaurs.

On the foreshore we were shown a small localised deposit of mudstone containing abundant plant material. This deposit is part of the Fairlight Clays facies which shows a unique Lower Cretaceous flora. The plant material was not *in situ* but appeared to have floated in from elsewhere. The group collected samples of carbonised conifer wood, bennettitalean leaves and fern pinnules, including one species (possibly *Gleichenites* sp.) rarely found.

The group then walked back along the foreshore to The Smuggler Inn and following a much needed drink returned home.

Filed by
Alison Nicholls



Joyce Austen's (HDGS) find: *Gleichenites* sp.