
Orford Lodge, Chillesford, Suffolk

[TM 390 508]

Potential GCR site

Highlights

The pit at Orford Lodge is one of the best exposures in the sandflat facies of the Red Crag.

Introduction

This pit is excavated into the flank of a small hill which lies beside the estuary of the Butley River, approximately 1.5 km south of the B1084 and the village of Chillesford. The pit is approximately 60 m wide and exposes approximately 4 m of Red Crag. According to evidence from old Ordnance Survey maps, the pit was excavated between 1881 and 1902. It was recorded by Spencer (1971)

Description

Three units are present (Figure 11.17). The lowest, unit 1, consists of tabular planar medium- to coarse-grained, cross-bedded sands with an abundance of comminuted shell debris. This is truncated by unit 2, a lens of bioturbated finer-grained, often shell-free sands with conspicuous mud drapes. The erosive boundary separating units 1 and 2 is approximately horizontal, with occasional shallow scours, and can be traced around the exposure. Unit 3 comprises trough cross-bedded shelly sands. It has a markedly undulatory base which is marked by a pebble lag including flint pebbles and clay clasts. Erosive scouring has removed unit 2 at the southern end of the pit so that unit 3 rests directly upon unit 1.

Unit 1 consists of planar cross-bedded coarse-grained sands which include phosphatic mudstone and flint pebbles up to 1 cm and 3 cm in diameter respectively, as well as abundant shell fragments, usually of coarse sand to granule size. Foreset dip directions vary around the pit: at the southern end directions are towards the west-south-west, whereas in the centre and north of the pit recorded directions are between south and south-west. In the upper part of the unit at the southern end of the pit, reactivation surfaces are associated with horizons of shallow mud-draped small troughs. Rare small vertical burrows are present. The planar cross-bedding of unit 1 is the product of sandwave migration. Foreset dip directions suggest this sandwave had a slightly sinuous crestline.

Unit 2 is characterized by a finer mean grain size, the presence of clay drapes, bioturbation and the scarcity of shell debris. The bedding consists of low-angle trough sets with numerous truncation surfaces. Shallow scours with concordant sediment fills, locally with mud drapes at the base of the scour, are present, especially at the base of the unit. At the northern end of the pit, packets of sandy foreset laminae are separated by packets of up to 17 thin mud layers (Figure 11.18), each separated by thin sand laminae. Within these muddy packets, individual mud-sand lamina couplets resemble tidal bundles. Bioturbation is important in unit 2, with frequent perforation of clay laminae. Two types of trace fossil are seen. The most conspicuous of these occurs as vertical, tapering clay-lined shafts with numerous lateral branches. The shafts are up to 15 mm in diameter, slightly wider in places, and they usually thin to a few millimetres towards their base. They can be traced vertically for over 35 cm. The second type of trace consists of small clay-filled tubes, 2.5 mm or less in diameter, which have meandering and branching networks. These may compare with irregularly ramified boxworks which were attributed to the polychaete worm *Nereis* by Frey *et al.* (1973).

The clay partings of unit 2 exposed at the northern face of the pit reflect systematic variations in foreset lamina thickness and composition. The mud partings imply sedimentary cycles of two differing time-scales. The first time-scale, relating to mud-sand couplets, is short term and may correspond to diurnal tidal cycles as described, for example, by Allen (1982). The second time-scale relates to the packets of up to 17 thin mud and sand layers deposited conformably on the foresets

which alternate with clay-free, thicker sand laminae. These can be interpreted as spring-neap tidal cycles with deposition within a nearshore or inshore, tide-dominated setting.

The shelly fauna in this unit is sparse and restricted to thin, scattered layers. Fragments of the umbonal region of *Mytilus* together with fragments of *Macoma*, *Aequipecten* and *Haustator* are present.

Unit 3 comprises coarse-grained shelly sands. The base of the unit is marked by a continuous pebble lag comprising quartz, flint and phosphatic pebbles, up to 2 cm, 5 cm and 1.5 cm in maximum dimension respectively. Clay rip-up clasts up to 15 cm are also present. The unit is characterized by shallow scours on various scales that are filled by low-angle trough cross-bedding or low-angle planar bedding. Smaller-scale ripple sets are also present.

Conspicuous solution pipes can be seen descending from the undulose upper surface of the Red Crag (Figure 11.19). The pipes are typically up to a metre or more across, tapering downwards and extending up to 2 or 3 m into the Crag sediments. Bedding planes can be traced through the sediments within the pipes from the shelly sediments on either side showing that the pipes originated by in-situ dissolution of the carbonate grains. In some cases the loss of volume caused by the dissolution has resulted in a slight downwarping of the bedding planes. Fissures seen in the face may represent joint planes as described by Balson and Humphreys (1986) and are often infilled with white powdery micritic calcite which may be in the form of conspicuous branching rhizocretions.

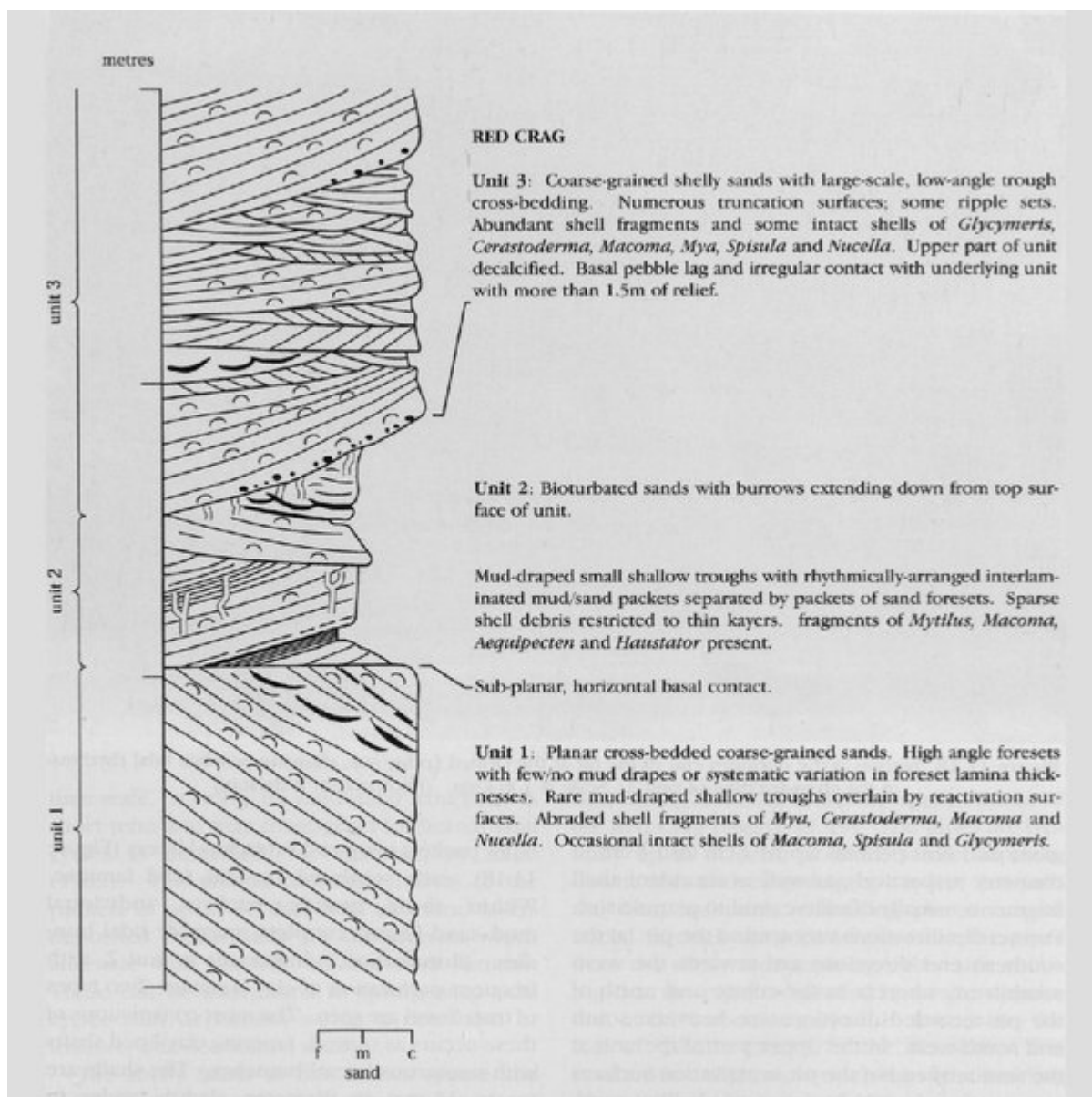
Interpretation and evaluation

The pit at Orford Lodge exposes an excellent section showing a typical Red Crag shallowing-upward sequence and can be compared with the sections at Neutral Farm, Butley and Broom Covert to the west. The section here lies close to the Coralline Crag outcrop to the east, the topographical form of which may have influenced Red Crag environments and deposition.

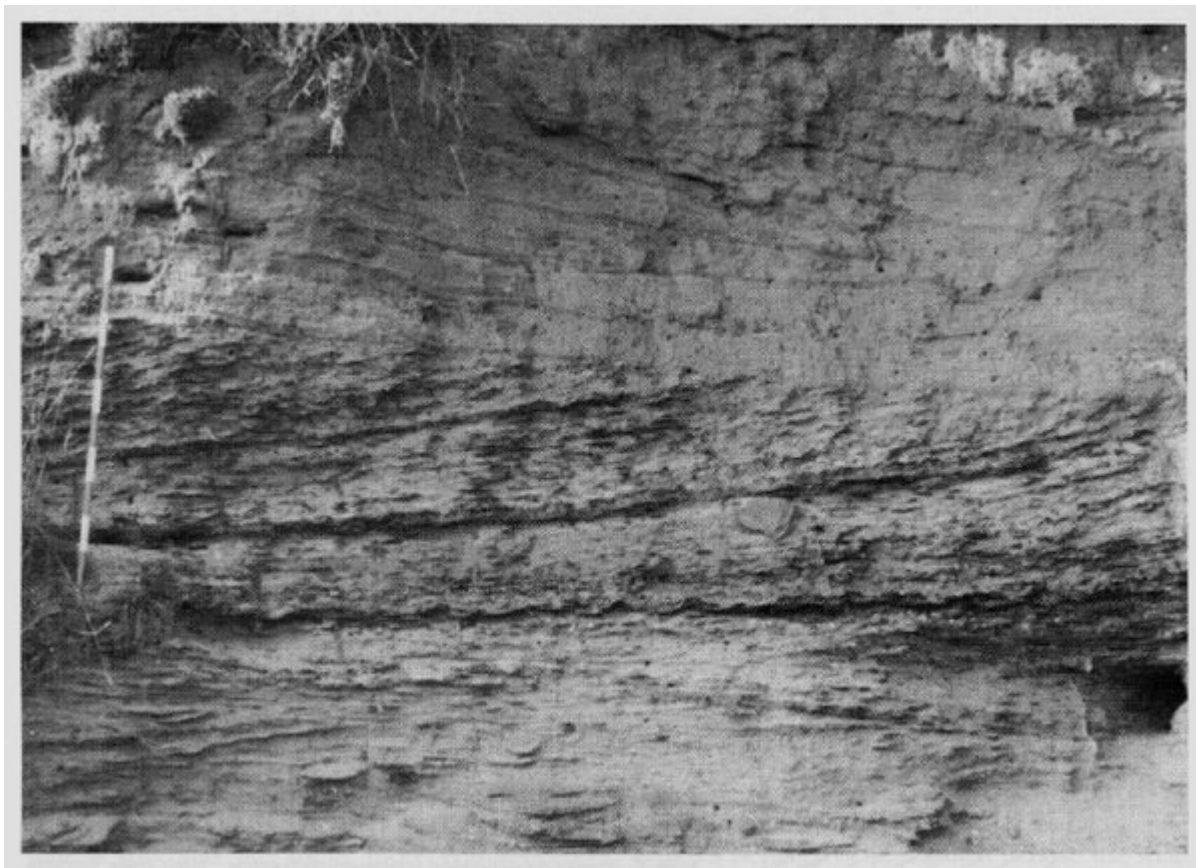
Conclusions

Orford Lodge is an important site for the study of vertical and lateral variations in the sedimentary environments of the Red Crag.

[References](#)



(Figure 11.17) Composite section of the Red Crag section at Orford Lodge. Metre scale approximate. (After Balson et al., 1991.)



(Figure 11.18) Section at the northern end of the pit at the Orford Lodge site, showing possible tidal rhythms in the cross-bedding of unit 2. Scale is 1 m long. (Photograph: P Balson.)



(Figure 11.19) Section at Orford Lodge showing prominent solution pipes. Scale is 1 m long. (Photograph: P Balson.)