Pivington Quarry, Lenham, Kent

[TQ 915 525]

Highlights

This quarry exposes solution pipes in the Chalk that contain the ferruginous fossiliferous sands of the Lenham Beds within their infills. It is one of the very few remaining places where the Lenham Beds fauna can be observed and the ferruginous sandstone blocks that contain the fossils can be seen in the context in which they were originally described. The site is close to the type locality at Lenham.

Introduction

Pivington Quarry is a disused Chalk pit cut into the hillside formed by the Chalk escarpment about 500 m north of the A20. According to Worssam (1963), the excavation of this Chalk pit commenced in 1947. However, Ordnance Survey maps show the presence of a small quarry before this time. A pit at this approximate location was mentioned by Reid (1890, p. 48). This earlier quarry probably forms the eastern end of the present quarry [TQ 916 525]. The quarry is presently being used as a landfill site.

Description

When the quarry was being extended in 1947, the removal of the topsoil revealed the surface of the Middle Chalk which was seen to be riddled with solution pipes that were largest and most numerous towards the crest of the escarpment. Their density was estimated at 15 in a 50 yard square (45.7 m square) area. Most were roughly circular in plan and up to 15 feet (4.6 m) across (Worssam, 1963).

At the present time the quarry exposes faces of Chalk up to approximately 10 m high. Solution pipes can be seen in section on the face. The upper surface of the Chalk is obscured by vegetation on the graded slope above the quarry faces and therefore in most cases the uppermost parts of the solution pipes are absent as the plane of the face slopes away from vertical. However, part of the quarry face is being conserved from landfill tipping. The visible pipes on the conserved face (Figure 9.5) are up to 1.3 m wide and the longest could be traced vertically for over 3 m in length. At the eastern end of the quarry the partial mould of a solution pipe from which the fill has been lost is over 7 m deep and more than 4 m wide.

The pipes are lined with a dark grey silty clay 2–3 cm thick. The remainder of the fill appears chaotic with abundant subangular flints up to 100 mm diameter and Chalk granules in a silty sand matrix. In some pipes the central core of the pipe contains a disturbed deposit of orange-brown ferruginous sand (Figure 9.6). This sand is moderately sorted and dominantly fine-grained, and is occasionally cemented into irregular blocks, which have an apparent random orientation. The decalcified cemented blocks may contain poorly preserved moulds of molluscan shells.

Interpretation and evaluation

Solution pipes are common in the surface of the Chalk and indeed are found in the surface of many carbonate-rich formations including, for instance, the Pliocene Coralline Crag formation to be described later in this volume. They form as the result of dissolution caused by the downward movement of groundwater. Solution pipe contents may be dominated by the insoluble residue of the formation undergoing dissolution as in the case of the Coralline Crag. However, the pipes at Pivington Quarry are formed in Chalk, which is a relatively pure limestone with only a small lithic fraction. The thin lining of dark grey silty clay may in part represents the insoluble residue of the Chalk but may also in part be derived from the eluviation of clay from overlying deposits. The gravelly flint-rich deposits which 'overlie' this clay lining within the pipe represent a weathering deposit formed on the exposed surface of the Chalk during Tertiary times and probably

related to the 'Clay-with-flints' (Catt and Hodgson, 1976). This deposit sagged into the pipe as solution took place. The ferruginous sand deposit was probably originally deposited over the flint-rich gravel and has also sagged into the pipe so that it now occupies the central core of the infill. If cementation preceded pipe formation this might help explain the occurrence of randomly orientated blocks resulting from the breakup of a formerly continuous layer.

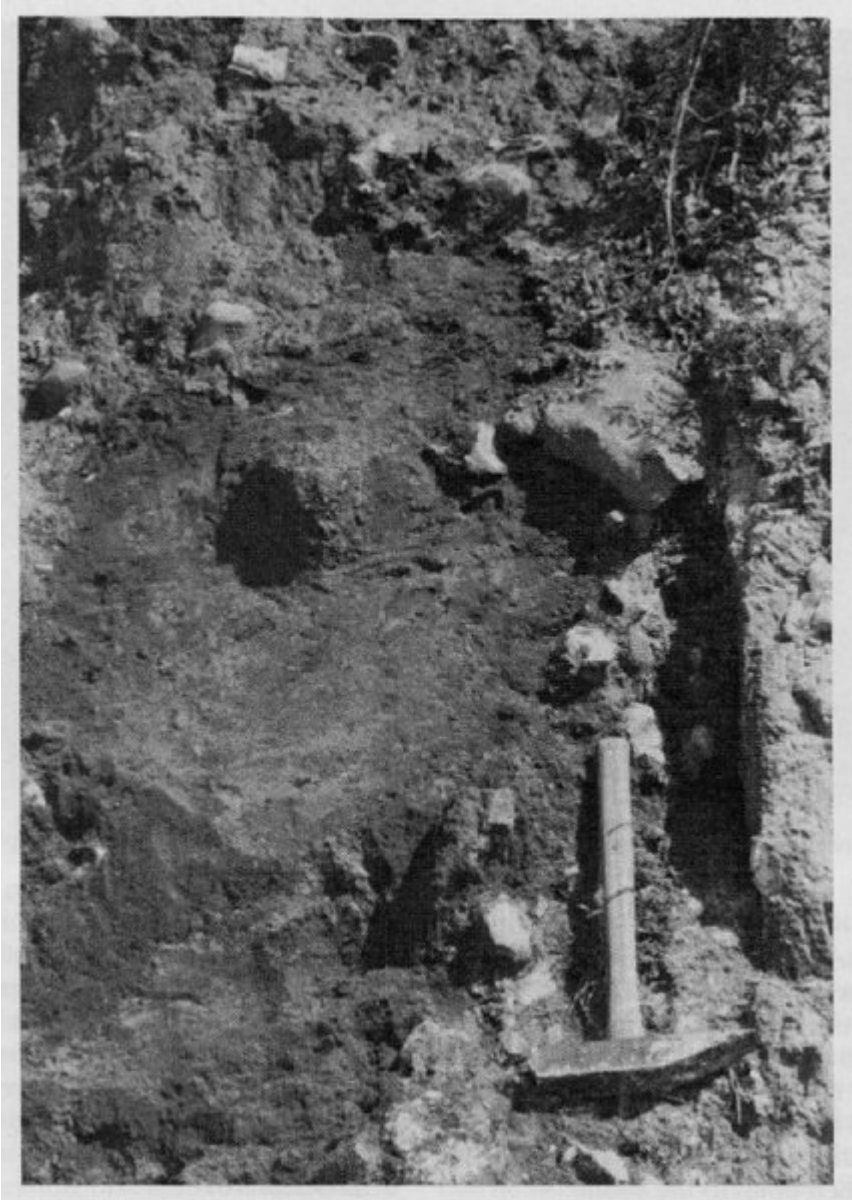
Fossiliferous Lenham Beds appear to be restricted to the type area between Harrietsham and Charing where the cessation of Chalk quarrying means that exposures of Lenham Beds are becoming increasingly degraded. The type locality at Lenham, just over a kilometre to the west, is now much degraded such that the quarries at Pivington and Hart Hill are among the last remaining sites where fossiliferous Lenham Beds can be observed, which therefore increases the importance of these sites. The exposed solution pipes clearly show the relationship between the Chalk and the overlying residual deposits (clay-with-flints) with disturbed and contorted Lenham Beds sands occupying the central portion of the pipes.

Conclusions

Pivington Quarry is one of two remaining sites that expose solution pipes containing fossiliferous Lenham Beds sediment. As such, the site is important in that it illustrates faunal and sedimentological evidence of a marine transgression of Neogene age in north Kent. The age and elevation of the deposits are important in the reconstruction of the timing and extent of uplift of the Weald–Artois axis and consequently have implications for the determination of the time of breaching of the uplifted barrier to form the Dover Straits.

References

(Figure 9.5) Conserved face in Pivington Quarry showing remnants of solution pipes. The photograph shows 15 m of lateral exposure. (Photograph: P Balson.)



(Figure 9.6) Solution pipe infill showing sharp vertical wall (right) and disturbed structure in ferruginous sands at centre of pipe infill. (Hammer shaft is 33 cm long). (Photograph: P Balson.)