Upware South Pit

[TL 539 709]

J.K. Wright

Introduction

Upware South Pit, known as the 'Southern Quarry' in older literature, and as 'Commissioners' Pit' in more recent literature, has been in existence for some two centuries. It was the custom to include the pit in geological excursions as far back as the 1830s (Kelly, 1985), and this occurrence of coralliferous Oxfordian limestones within the area of the Cambridgeshire fens has attracted considerable interest ever since. The pit lies on a small topographical high, the 'Isle of Upware' or 'Upware Ridge', which is nowhere more than 7 m above ordnance datum, and lies on the east side of the River Cam (Figure 3.3). This isolated inlier of Oxfordian strata is only 3 km long and 1.5 km wide at its maximum extent.

Description

Though referred to frequently in the early literature (for details, see Kelly, 1985), the first full description of the site was given by Blake and Hudleston (1877). These authors described a 6 m section, the upper 3 m being a tough limestone containing numerous corals, and the lower 3 m being softer, with ooids and pisoids and an extensive bivalve–echinoid fauna. Though the matrix of the coralliferous beds was not precisely the same as that of the Coral Rag elsewhere in the country, Blake and Hudleston had little hesitation in equating the Upware strata with this unit.

Further detailed decriptions of Upware South Pit were given by Woodward (1895), Reed (1897) and Wedd (1898). Little improvement was made on Blake and Hudleston's description, however, excepting that the fossil lists grew longer. Subsequently, the section became very overgrown, and the attention of workers was drawn primarily to the Bridge Pits to the north (Forbes, 1960; Worssam and Taylor, 1969). Upware South Pit then became a nature reserve owned by the Cambridgeshire Education Department, and the north-east face of the old quarry was cleaned up in the early 1980s as a geological reserve. The following section is a revised version of that of Kelly (1985), as seen by the present author in 1998.

	Thickness (m)
West Walton Formation	
Upware Limestone Member	
(Rubbly weathered limestone and soil seen to	1.50)
7. Micritic limestone with tabular corals	0.25
6. Seam of brown clay	0.04
5. Tough limestone composed of tabular or foliaceous colonies of *Microsolena* with fine, pelletal, micritic limestone in between the coral colonies. Also seen by Kelly (1985) was a large calcite-replaced coral head of *Isastraea.* Moulds of *Montlivaltia* in life position are common	0.25
4. Flaggy, thin-bedded, largely micritic limestone with *Microsolena* at the base, bored by *Lithophaga,* also with *Plagiostoma* sp. and thin foliae of *Thamnasteria concinna* (Goldfuss)	0.40

3. Seam of brown clay	0.04
2. Tough, coralliferous limestone containing tabular corals in a fine, micritic matrix. *Isastraea* and *Microsolena* are both present, bored by *Lithophaga,* and with *Plicatula, Opis,* pectinids and *Paracidaris*	0.30
1. Porous, poorly cemented, bioclastic limestone. The clasts comprise coral, oyster and serpulid fragments, cemented with only a minimum of sparry calcite. Occasional ooidal patches are present. Poorly fossiliferous	seen to 1.00

The hard, shelly limestone at the top of Bed 1 forms a ledge upon which rest many fallen blocks from beds 2 to 5. Bed 7 was not recognizable in 1998. Beds 2, 4 and 5 are basically biomicrites. Layers and lenses of *Microsolena* and *Thecosmilia* form a reef framework, with fine, micritic mud in the interstices and in *Gastrochaenolites* borings, which are sometimes still occupied by the boring bivalves *Lithophaga* and *Gastrochaena.* A cemented epifauna includes *Liostrea* and *Nanogyra.* The layers containing coral in living position alternate with layers of shelly, partly decalcified biomicrite, with the fine, micritic matrix full of fragments of *Thecosmilia, Thamnasteria, Microsolena, Nanogyra* and *Trichites.* Most of the larger bivalves are dissolved out and present as moulds. Ammonites are rare, one specimen of *Cardioceras* (*Miticardioceras*) aff. *tenuiserratum* (Oppel) being known (K.N. Page collection).

Interpretation

The presence of Ampthill Clay to the north, a little above the section (?Upper Oxfordian; Worssam and Taylor, 1969, fig. 2), and the Lower Elsworth Member (Lower Oxfordian; Page, 1986) below are stratigraphically important in constraining the age of these limestones, which, from this information and from the single recorded ammonite, can be dated as Middle Oxfordian, Tenuiserratum Zone.

Bed 1 represents high-energy, shallow-water conditions, with shell and coral fragments and ooids in a sparry matrix with no lime mud, winnowed away by currents. A shallow coral reef, probably situated to the north (see site report for Dimmock's Cote Quarry, this volume), was being eroded, providing coral fragments. Much of the overlying sequence consists of a coral–micrite association, a bioclastic wackestone, which accumulated in a more protected part of the Upware reef complex where micrite was not winnowed away. Interdigitation of clay may indicate fore-reef conditions, and this was the conclusion of Insalaco (1996) in his study of coral morphology at Upware. The colonial corals do not form the rounded, dome-shaped masses normally associated with Corallian reefs. The interlocking framework of platy, foliaceous corals found here, especially with the presence of *Microsolena,* is typical of deep-water biostromes. The coralliferous beds at Upware South Pit accumulated in a moderately deep area below the fairweather wave base in a region with minimal sediment input. Coral growth was very slow — less than 1 mm per year in *Thamnasteria concinna.*

The bivalve fauna of the coralliferous beds is characterized by surface- and near-surface dwelling forms. Shallow burrowers such as *Trigonia, Neocrassina* and *Sowerbya* are accompanied by nestling bivalves, especially *Barbatia,* and *Opis.* Byssate forms such as *Mytilus, Isognomon, Plagiostoma* and *Chlamys,* the shells now dissolved out and represented by moulds, are common. There was plenty of scope for colonization of the reef by cemented forms (*Plicatula, Nanogyra* and *Lopha*) and borers (*Lithophaga, Gastrochaena*) . There is a common vagile epifauna, mainly comprising neritid gastropods and *Paracidaris.* The clays are largely smectite (Kelly, 1985), probably derived by the breakdown of contemporary volcanic material (Ali, 1977).

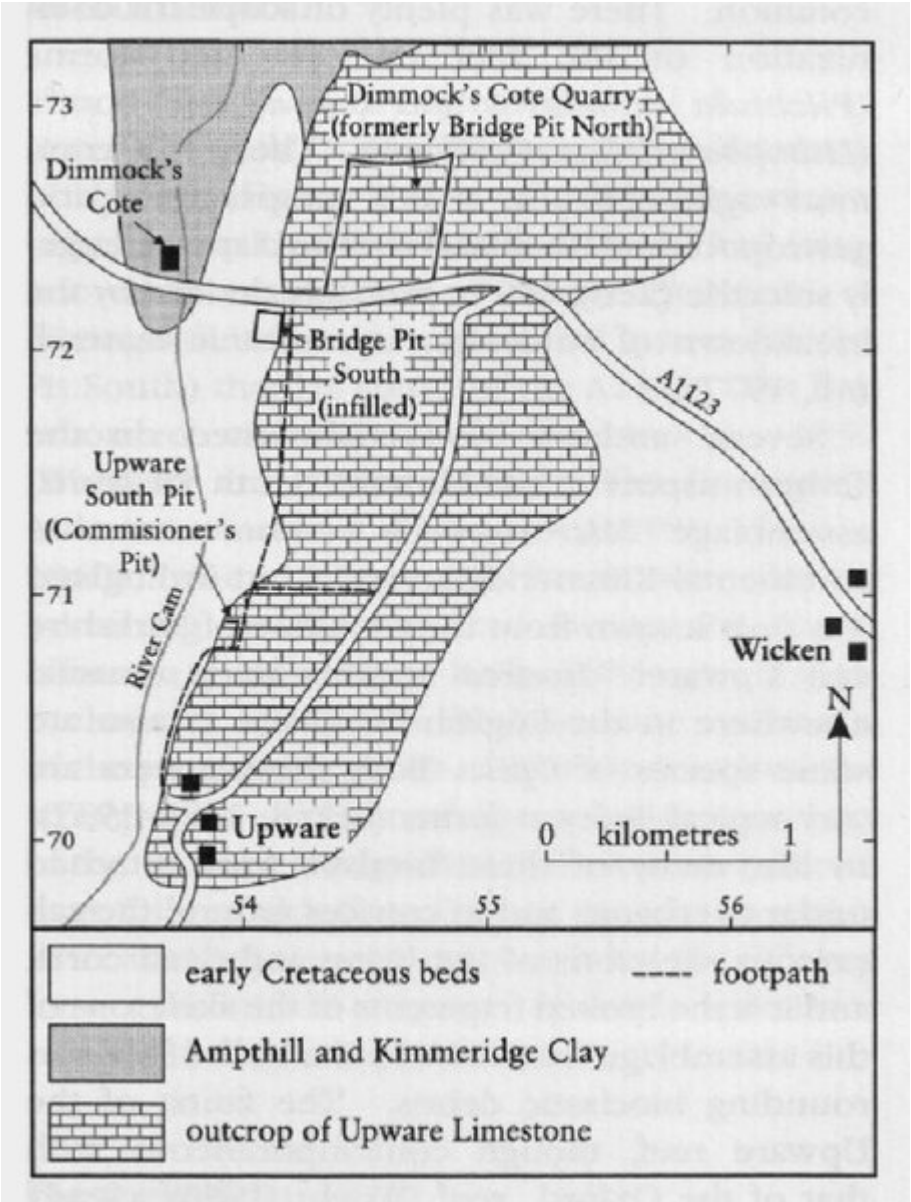
Several authors have commented on the Tethyan aspect of the Upware South Pit faunal assemblage. *Microsolena* is a common coral in continental Kimmeridgian reefs, but in England it is only known from the Corallian of Yorkshire and Upware. *Isoarca* is particularly unusual elsewhere in the English Corallian, as also are some species of *Opis.* Both these genera are very typical Tethyan forms (Arkell, 1929–1937). In life, many of these bivalves were attached under overhangs and in crevices around the calcareous skeletons of the living and dead coral, and it is the broken fragments of the skeletons of this assemblage that make up the bulk of the surrounding bioclastic debris. The fauna of the Upware reef, though contemporaneous with that of the Oxford reef (Wright, 1980), clearly has its own, unique elements. This suggests the transport of larval corals and bivalves from the margins of Tethys to the south, rather than from the Oxford

area to the south-west.

Conclusions

Upware South Pit contains one of the more remarkable exposures of coralliferous strata in the British Oxfordian. This deep-water facies of the coralliferous beds, with their folicaeous colonies set in fine micrite, is unique in the British Oxfordian. Only the Ringstead Coral Bed of Dorset approaches this type of preservation. Upware South Pit also contains one of the most varied coral faunas in the British Oxfordian, only exceeded by that at Steeple Ashton (see Steeple Ashton site report, this volume). The presence of bivalves and corals normally found only well to the south, on the Continent, makes this a key site for our understanding of Oxfordian palaeobiogeography.

References



(Figure 3.3) Locality map of quarries in the Upware inlier. Outcrop of the Upware Limestone (mapped as 'West Walton Beds'), Ampthill and Kimmeridge clays from BGS Sheet 188 (Cambridge) (1981) and Wright et al. (2000).