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## East Fleet

[SY 653 771]–[SY 657 770]

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### Introduction

A gently dipping Corallian succession is exposed in the foreshore and low cliff extending for 600 m along the East Fleet shore 1 km west of Wyke Regis (Figure 2.22). It constitutes an important site for the study and conservation of Middle and Upper Oxfordian rocks, particularly as other equivalent sections in the vicinity of Weymouth are no longer accessible. The succession provides important comparisons with the equivalent strata in the Osmington section (Wright, 1986a).

The earliest recorded reference to this site appears in Conybeare and Phillips (1822, p. 192). Buckland and De la Beche (1836) provided the first direct account of the locality, whilst Blake and Hudleston (1877), Damon (1884) and Woodward (1895) each briefly described the section. Arkell (1936a, 1947a) published a detailed measured section of the site. Since then the locality has figured prominently in the specialist study of carbonate facies variation within the Osmington Oolite (Wilson, 1968b). Reference to the site has been made by Fürsich (1973, 1974, 1975, 1976a, b, 1977) and Brookfield (1973a, 1978), while Wright (1986a) has provided a detailed re-appraisal of this section, with a revised measured section.

### Description

The East Fleet locality displays a 14 m Corallian succession spanning four stratigraphical units (see (Figure 2.24)). There is a well-exposed 12 m section through all three constituent members of the Osmington Oolite Formation, and the succession also includes the lowest two subdivisions of the Clavellata Formation, which overlies the Osmington Oolite non-sequentially (Wright, 1986a). The nomenclature, bed numbers and bed thicknesses below are taken from Wright (1986a). Due to mis-correlations by Arkell it was not possible to continue the use of Arkell's bed numbers (Arkell 1936a, 1947a).

The Upton Member contains highly bioturbated sandy siltstones with remarkably well-preserved *Teichichnus* burrows (beds 1–3). This is the only locality in the district where such burrowing can be seen. The Shortlake Member is dominated by oolite in its lower part (Bed 4), here partly cross-bedded. Quartz sand and clay succeed the oolite (beds 5–7), and these are followed by three beds of very fossiliferous oomicrites exposed at the base of the low cliff (beds 8–10). Arkell (1936a, 1947a) listed a substantial fossil assemblage from these beds comprising the bivalves *Myophorella* sp., *Plicatula* sp., *Lucina* sp., *Chlamys* sp., *Opis* sp., *Nanogyra nana* and *Ostrea* sp., the gastropods *Nerinea* sp., *Bourguetia* sp., *Pseudomelania* sp., *Ampullina* sp., *Dicroloma* sp., *Littorina* sp. and *Procerithium* sp., and the echinoid *Nucleolites scutatus* Lamarck. The Nodular Rubble exposed 100 m to the south-east consists of three prominent beds of concretionary limestone, the concretions being much larger than those seen at Osmington.

The East Fleet section exposes only the lower part of the Clavellata Member. The Sandy Block subdivision is seen particularly well. Sand-filled borings descend from the Nodular Rubble from a 0.07–0.14 m bed of fine quartz sand that wraps around the irregular hummocks at [SY 6565 7695]. Soft, argillaceous sand is then succeeded by 1.2 m of flaggy, fine-grained sandstone (Bed 12) best seen at the centre of the bay [SY 658 770]. In a separate exposure 100 m to the east, the Chief Shells Beds subdivision is represented by 0.55 m of flaggy, immature, sandy oolite containing *Myophorella clavellata* (Parkinson) and *Nanogyra nana* (J. Sowerby) (Bed 13).

### Interpretation

With its clays, silts and sands and subordinate carbonates, the Upton Member represents offshore shelf deposition with the input of considerable amounts of clastic sediment. The facies is more shallow water than that at Bran Point (see the Osmington GCR site report, this volume). There is then a marked break (Wright, 1986a, fig. 4), and the lower part of the

Shortlake Member is thought to represent tidal ooid shoals and deltas, with marginal sponge-stabilized lagoonal intramicrites. The lagoonal content of the sequence increases upwards as beds of shelly micrite become common. The presence of these very fossiliferous beds is in marked contrast to Osmington, where the high-energy conditions with cross-bedded oolites precluded the preservation of any significant fauna.

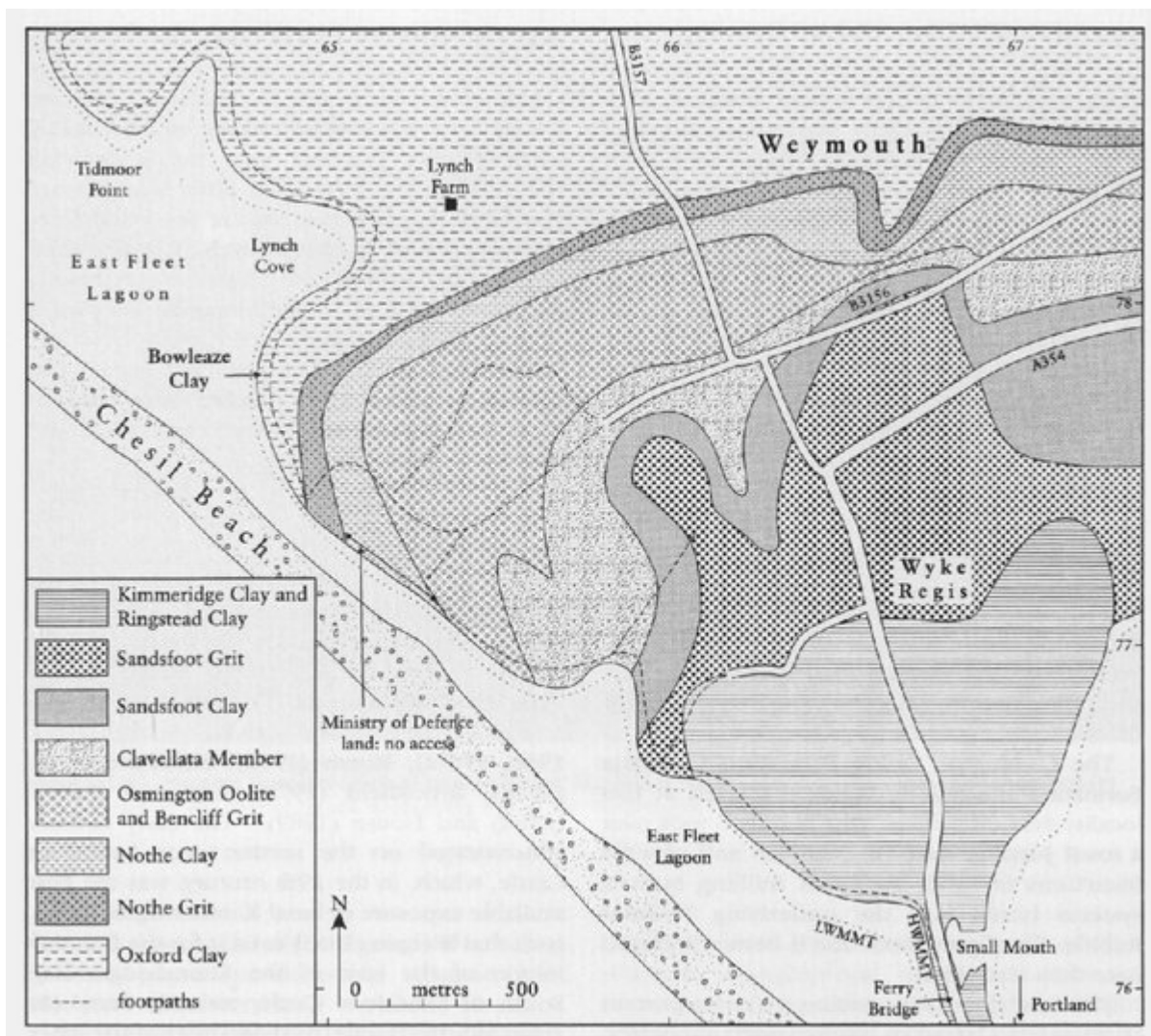
The Nodular Rubble marks a return to deeper water, more settled conditions favouring the growth of the sponge *Rhaxella*. Wilson (1968b) and Fürsich (1973) each explained the nodular appearance of this limestone by intense bioturbation causing mixing of the sediments. However, there is a strong possibility that the effects of diagenesis have also played a role in the establishment of the nodular character.

The stratigraphical break that separates the Osmington Oolite Formation from the overlying Clavellata Formation almost certainly represents the omission of strata in the Nunningtonense Subzone (Wright, 1986a). There is very clear evidence for erosion of the Nodular Rubble at this site, the junction with the Clavellata Formation being more easily distinguished than at Black Head, as quartz sand rests on carbonates. As the Sandy Block passes up into the Chief Shell Beds, there is a reduction in quartz sand content, though the facies is still much more marginal than that at Osmington.

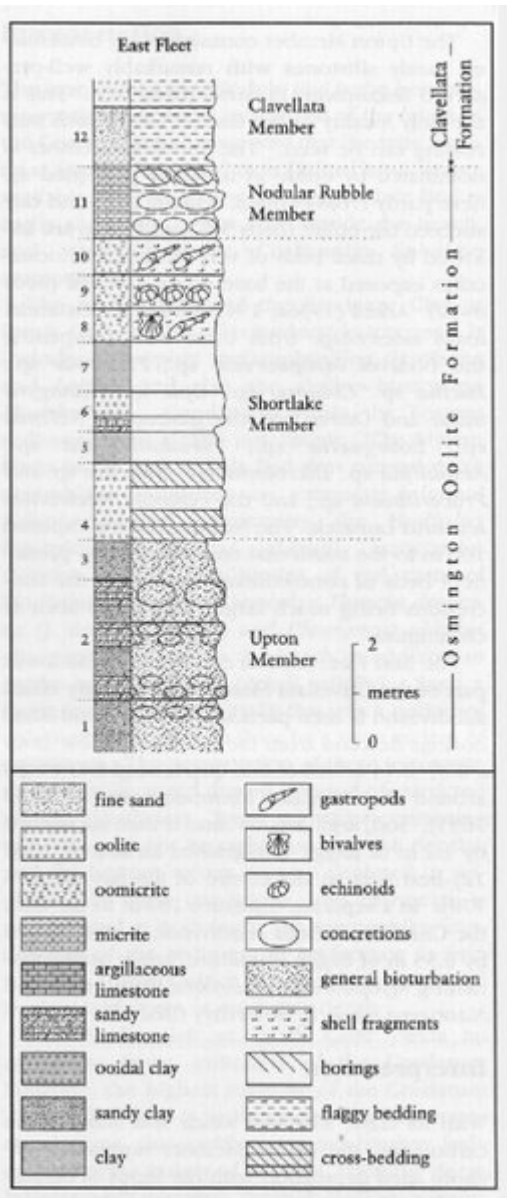
## **Conclusions**

Study of the succession of sediments seen in the East Fleet site is essential to any full understanding of the sedimentology and palaeoenvironments of the Osmington Oolite Formation in southern Britain. The rich bivalve/gastropod fauna of beds 8–10 is of substantial interest, this being the only locality in south Dorset where such fossiliferous beds occur in the Osmington Oolite Formation. The clastic-dominated Upton Member and Clavellata Member demonstrate the passing of the fully marine sequence at Black Head (see site report for Osmington, this volume) into more marginal facies in the west.

## **References**



(Figure 2.22) Geological map for the Small Mouth, East Fleet and Lynch Cove GCR sites.



(Figure 2.24) Log of the Corallian succession at East Fleet, after Wright (1986a, fig. 4). Note that Bed 7 is only 0.9 m thick — the thickness of 3.5 m given in Wright (1986a) is a misprint.