BLACK HEAD

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OS Grid Reference: SY723820–SY735817

Introduction

The GCR site known as Black Head covers about 1.25 km of landslipped cliffs to the west of Osmington Mills, Dorset (Figure 2.5). Viewed from there, the landslips appear to form an almost continuous black cliff that gives the locality its name. West of Black Head and eastwards to Osmington Mills village, there are scattered exposures in smaller slip faces, which provide additional details to the section on the main ridge. These can vary from year to year as new cliff falls occur. As at Ringstead Bay (see site report forRingstead, this volume), the sections here expose the lower part of the Lower Kimmeridge Clay, which is not seen in the type sections at and adjoining Kimmeridge Bay (see site report forTyneham Cap–Hounstout, this volume). There is little overlap between the Lower Kimmeridge Clay exposed in Kimmeridge Bay and that at Black Head (Figures 2.12 and 2.14); the beds in the range of overlap are considerably thinner at the latter locality and are generally poorly exposed but they nevertheless provide the best sections through this interval on the Dorset coast.

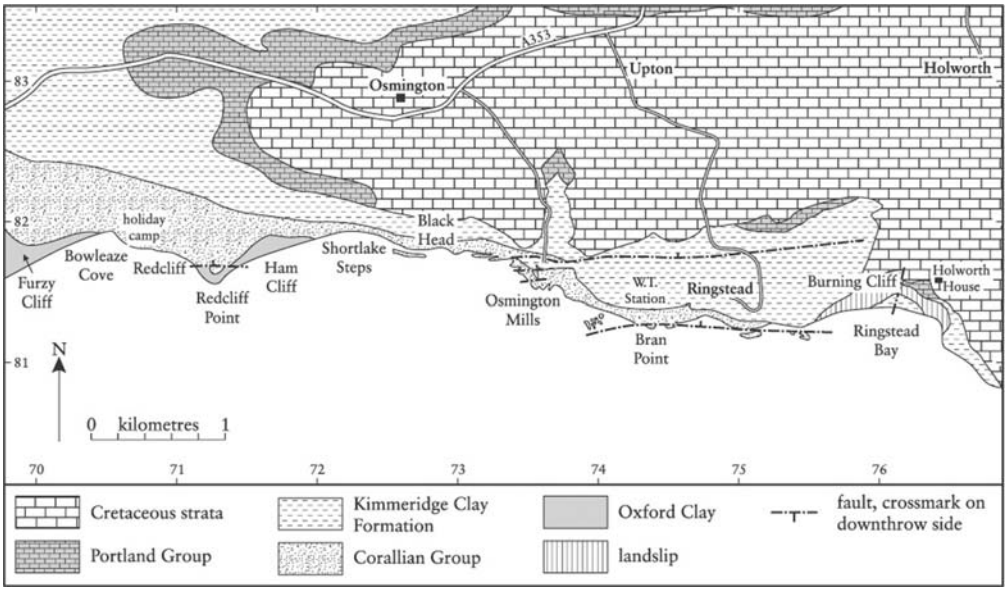


Figure 2.5: Sketch map of the solid geology of the Furzy Cliff–Ringstead Bay area (based on Cox and Gallois, 1981, fig. 5 and BGS Sheet 341/342 (West Fleet and Weymouth) 1976).

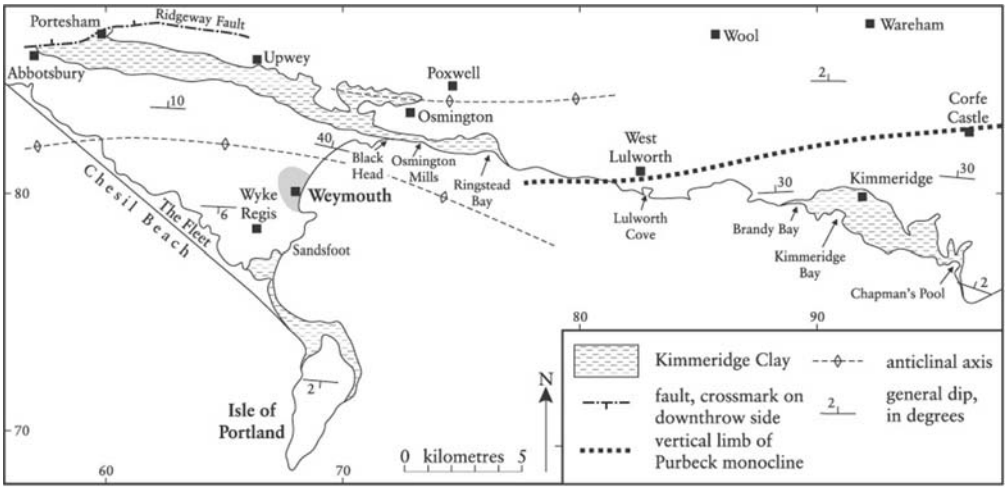


Figure 2.12: Kimmeridge Clay outcrops in the Dorset type area (after Cox and Gallois, 1981, fig. 1).

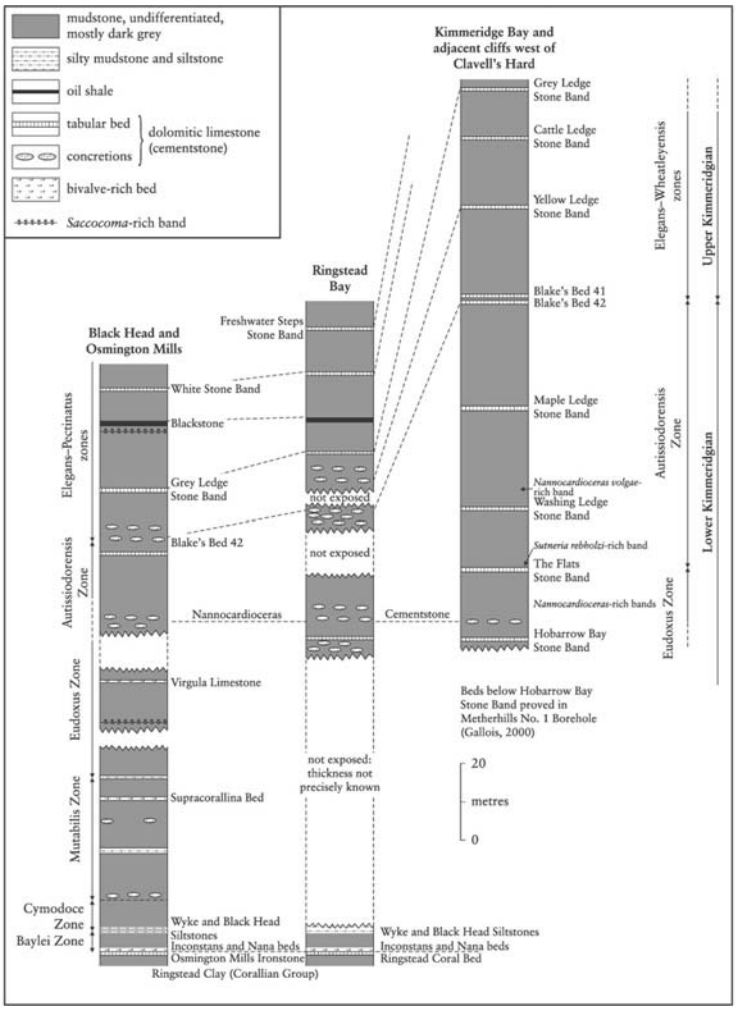
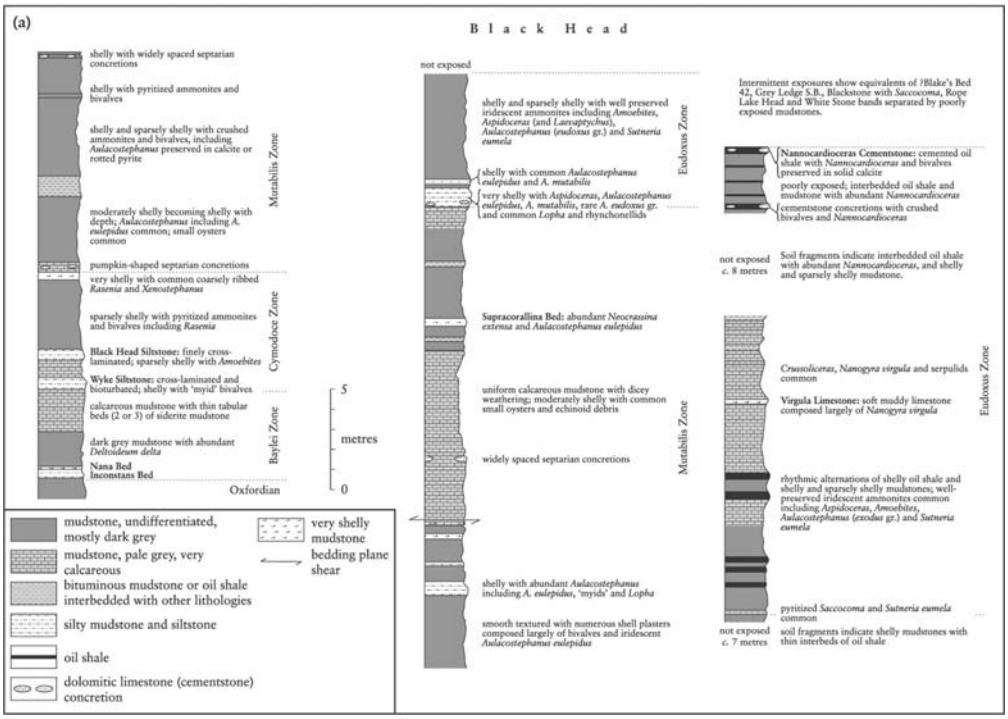


Figure 2.14: Correlation between the main sections of Kimmeridge Clay on the Dorset coast. Youngest zones not shown. (After Cox and Gallois, 1981, fig. 5.)

Description

The following description is based mainly onCox and Gallois (1981). Earlier citations include those of Arkell (1933, 1947a) and Ziegler (1962). Viewed from the beach, there are few prominent marker bands visible in the cliffs of the main ridge at Black Head but two or three

tabular beds or dogger horizons of cementstone, including the Virgula Limestone (a soft muddy limestone composed almost entirely of the oyster *Nanogyra virgula* (Defrance)) and the Nannocardioceras Cementstone (a nodular cementstone with the ammonite *Amoeboceras (Nannocardioceras)* preserved in uncrushed, translucent calcite), divide the succession (Figure 2.13). Dips are generally steep throughout the section, ranging from 80° near the base of the Kimmeridge Clay, to 50°–60° in the upper part. Camber and landslip add to the difficulties of making accurate thickness measurements. Much of the lower part is obscured by a thin crust of weathered clay but in dry weather this can be readily cleared away to expose clean sections of largely unweathered material, often with beautifully preserved calcareous fossils.



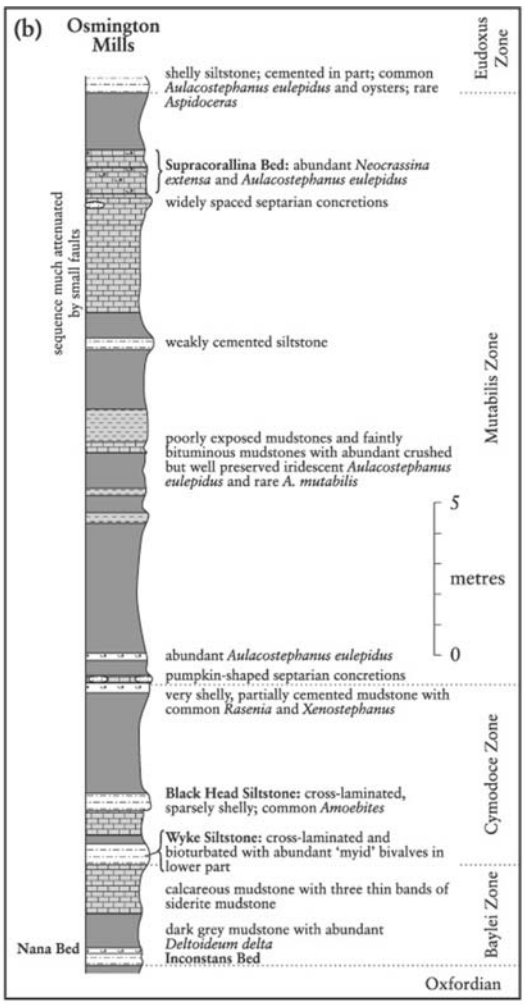


Figure 2.13: Graphic section of the lower part of the Kimmeridge Clay at Osmington Mills (SY 7342 8174). (After Cox and Gallois, 1981, pp. 33–4.)

Small exposures of the lowest Kimmeridge Clay occur for about 300 m on the western side of Black Head (SY 7259 8192–SY 7229 8198), and to the east, almost as far as Osmington Mills

village, there are a number of adjacent exposures in the cliffs on the eastern edge (SY 7336 8186) of a large landslip. Although complicated by faulting and locally steep dips, these provide an almost continuous section from the base of the Kimmeridge Clay up into the upper part of the Eudoxus Zone. The basal Kimmeridgian zones are often well displayed here as well as in a fault-bounded mass of Kimmeridge Clay at beach level (SY 7342 8174) (Figure 2.5) where there are steep (70°–80°) dips. The northern margin of the outcrop here shows clays low in the Mutabilis Zone faulted against the Corallian Group. The boundary of the latter with the Kimmeridge Clay is well exposed. Earlier accounts of the boundary beds include those of Blake and Hudleston (1877) and Arkell (1936a). The basal bed of the Kimmeridge Clay (and Kimmeridgian Stage) is the Inconstans Bed, which is a dark grey, intensely bioturbated clay up to *c*. 0.4 m thick with wisps and burrowfills of silt, fine-grained sand and scattered limonite ooids (from the underlying Osmington Mills Ironstone) in its lower part. Phosphatic pebble beds occur at the base and 0.3 m above the base; phosphatized serpulids, the gastropod *Pleurotomaria*, the bivalves *Goniomya*, *Pholadomya* and *Pleuromya*, the eponymous gastropod *Torquirhynchia inconstans* (J. Sowerby) and the ammonite *Pictonia* occur in both pebble beds and throughout the intervening clay. These forms also occur as crushed shells, together with *Chlamys* (as clay casts), nests of *Lopha*, and *Trigonia*. This part of the succession can be matched in detail with that at Ringstead Bay (see Figures 2.14, 2.23), although at Black Head and Osmington Mills, a shelly, ooidal ironstone (Osmington Mills Ironstone) replaces the Ringstead Coral Bed at the top of the underlying Oxfordian. A little higher in the basal beds of the Kimmeridge Clay, the Wyke Siltstone forms a prominent hard band and line of seepage. It consists of intensely burrowed, finely cross-laminated, muddy quartz silt, crowded in its lower part with bivalves, particularly ‘myids' in growth position. The overlying Black Head Siltstone, which takes its name from this locality, is equally prominent but is readily distinguished from the Wyke Siltstone; it is shelly throughout with small oysters and *Thracia*, and abundant *Amoeboceras (Amoebites)* in a calcite ghost preservation. Both siltstones contain common phosphatic pebbles in their lowest part and rest with an irregular, interburrowed contact on the underlying clays. The total thickness of Kimmeridge Clay in the Black Head–Osmington–Ringstead area is estimated to be about 244 m (Cox and Gallois, 1981). Additional marker beds recognized here are shown in Figure 2.14 and discussed below.

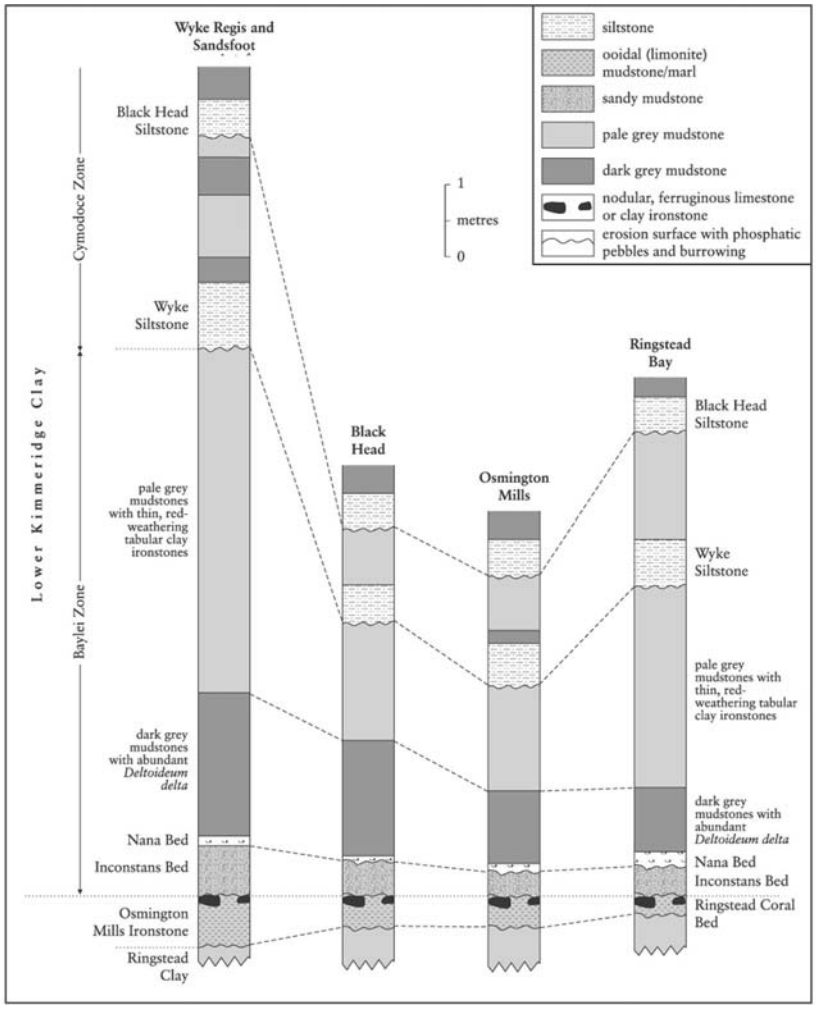


Figure 2.23: Correlation of the basal beds of the Kimmeridge Clay exposed at Wyke Regis, Sandsfoot, Black Head, Osmington Mills and Ringstead Bay (based on Cox and Gallois, 1981, fig. 6 and unpublished borehole data, R.W. Gallois, pers. comm.).

Interpretation

The marker beds recognized in the Kimmeridgian succession at Black Head and Osmington Mills enable correlation with other sections in the Dorset type area (Figure2.14) and further afield. These are, from below, the Inconstans Bed, Nana Bed (rich in the small oyster*Nanogyra nana* (J. Sowerby) and serpulids), Wyke Siltstone, Black Head Siltstone, Supracorallina Bed (pale calcareous mudstone with abundant *Neocrassina extensa* (Phillips) (formerly *Astarte supracorallina*)), Virgula Limestone, Nannocardioceras Cementstone, ?Blake's Bed 42, Grey Ledge Stone Band, Blackstone (with tiny pyritized plates of the pelagic crinoid*Saccocoma*) and the coccolith-rich White Stone Band (Figure 2.14). Together with the recorded ammonite faunas, these substantiate a zonal succession through the greater part of the Kimmeridgian Stage. As elsewhere in southern and eastern England, minor erosion surfaces occur at the bases of the Baylei, Cymodoce, Mutabilis and Eudoxus zones, although, with the possible exception of the Baylei Zone, these have not yet been formally defined in terms of their base in a type section. Cox and Gallois (1981) believed that the erosion surfaces could be regarded, for all practical purposes, as isochronous. The sections in the Lower Kimmeridge Clay, the lower parts of which are constantly being rejuvenated by marine erosion, are particularly important. The Kimmeridgian Boundary Working Group of the International Subcommission on Jurassic Stratigraphy (ISJS) has considered a section through the base of the Kimmeridge Clay here as a candidate Global Stratotype Section and Point (GSSP) for the base of the Kimmeridgian Stage (Atrops, 1997). The sections in the higher parts of the formation are adjacent to a large, presumed Pleistocene, landslip and are unlikely to improve unless further major landslipping occurs.

As elsewhere on the Dorset coast, Brookfield's (1978) suggestion, following Blake (1875), that the boundary beds between the Kimmeridge Clay and underlying Corallian Group should be differentiated as a separate 'Passage Beds Formation' has not found acceptance (see site report for East Fleet–Small Mouth, this volume, for discussion).

Conclusions

The landslipped exposures at and adjacent to Black Head provide the best section through the lower part of the Lower Kimmeridge Clay on the Dorset coast. The lower parts of the section are constantly being rejuvenated by marine erosion. There is some overlap with the magnificent sections at and east of Kimmeridge Bay (see site report for Tyneham Cap–Hounstout, this volume) as well as the more fragmented, landslipped sections at Ringstead Bay (see site report for Ringstead, this volume). A section through the Corallian Group–Kimmeridge Clay Formation boundary at Black Head–Osmington Mills has been considered as a candidate for the basal Kimmeridgian GSSP. The base of the Kimmeridgian succession is marked by the base of the Inconstans Bed. Other marker beds in this basal part of the Kimmeridgian include the Wyke and Black Head siltstones, which can also be seen in the coastal sections south of Weymouth (see site report for East Fleet–Small Mouth, this volume) but only fortuitously at Ringstead Bay (see Figure 2.23). The locality is thus an important one for regional, national and, most importantly, international stratigraphical studies.

Reference list

Arkell, W.J. (1933) *The Jurassic System in Great Britain*, Clarendon Press, Oxford.

Arkell, W.J. (1936a) The Corallian Beds of Dorset, Part 1: The Coast. *Proceedings of the Dorset Natural History and Archaeological Society*, **57**, 59–93.

Arkell, W.J. (1947a) *The Geology of the Country around Weymouth*, *Swanage*, *Corfe and Lulworth*. Memoir of the Geological Survey of Great Britain (England and Wales).

Atrops, F. (1997) Kimmeridgian B[oundary] W[orking] G[roup]. *Newsletter of the International Subcommission on Jurassic Stratigraphy*, **24**, 43–4.

Blake, J.F. (1875) On the Kimmeridge Clay of England. *Quarterly Journal of the Geological Society of London*, **31**, 196–233.

Blake, J.F. and Hudleston, W.H. (1877) On the Corallian rocks of England. *Quarterly Journal of the Geological Society of London*, **33**, 260–405.

Brookfield, M.E. (1978) The lithostratigraphy of the Upper Oxfordian and Lower Kimmeridgian beds of south Dorset. *Proceedings of the Geologists' Association*, **89**, 1–32.

Cox, B.M. and Gallois, R.W. (1981) The stratigraphy of the Kimmeridge Clay of the Dorset type area and its correlation with some other Kimmeridgian sequences. *Report of the Institute of Geological Sciences*, **80/4,** 44 pp.

Ziegler, B. (1962) Die ammoniten-gattung *Aulacostephanus* im Oberjura (Taxionomie, stratigraphie, biologie). *Palaeontographica*, **119A**, 1–172.