

RINGSTEAD

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OS Grid Reference: SY751813–SY766811

Introduction

The Kimmeridgian GCR site at Ringstead Bay, Dorset (Figures 2.5 and 2.12), comprises mainly unconnected small cliff exposures of Kimmeridge Clay separated by landslip. The lower part of the formation is poorly exposed although for many years an exposure of the basal beds here has been the recommended basal boundary stratotype for the Kimmeridgian Stage (George *et al.*, 1969; Morton, 1974; Cox and Sumner, 1994). Above the boundary beds, Arkell (1933, 1947a, 1949, 1951), who spent many of his vacations in a chalet here (Cox, 1958; House, 1989), described most of the sections that were available between about 1930 and 1950, and suggested that they could be correlated with one another to provide an almost continuous succession from the Baylei Zone to the lower Eudoxus Zone. A less interrupted Upper Kimmeridgian succession includes a number of marker beds enabling correlation with the type sections east of Kimmeridge Bay (see site report for Tyneham Cap–Hounstout, this volume).

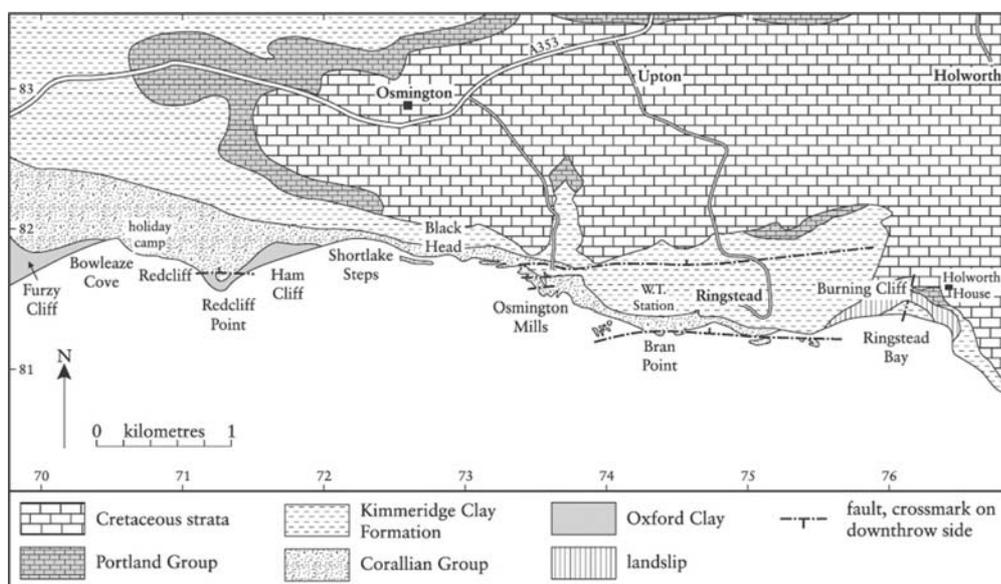


Figure 2.5: Sketch map of the solid geology of the Furzy Cliff–Ringstead Bay area (based on Cox and Gallois, 1981, fig. 5 and BGS Sheet 341/342 (West Fleet and Weymouth) 1976).

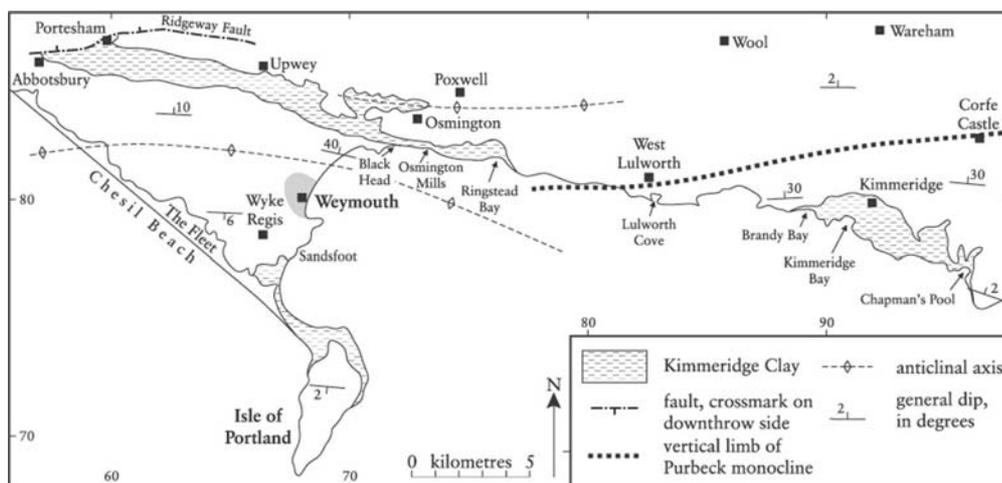


Figure 2.12: Kimmeridge Clay outcrops in the Dorset type area (after Cox and Gallois, 1981, fig. 1).

Description

The degree and quality of exposure of Kimmeridgian strata at Ringstead Bay varies from year to year with the state of the beach and the landslips. The following description is based largely on Cox and Gallois (1981) who estimated that the thickness of the Lower Kimmeridge Clay was of the order of 95 m, much of which was either unexposed or too damaged by landslip to permit accurate measurement (Figure 2.14). The boundary of the Kimmeridge Clay with the underlying Ringstead Coral Bed, the topmost bed of the Oxfordian, was recorded by Waagen (1865), Blake and Hudleston (1877), Salfeld (1914), Arkell (1933, 1936, 1947a), Brookfield (1978) and Cox and Gallois (1981) (see Figure 2.23). According to Arkell (1933), the lowest Kimmeridgian beds could be conveniently studied in the low cliffs for about 1.5 km along the west side of the bay but even within the time span of Arkell's published work, the sections, including that illustrated by Arkell (1933, pl. 21) and later recommended as the boundary stratotype, had deteriorated and soon became largely obscured. In the late 1970s, the boundary was visible in only two small and degraded landslipped sections below the western end of Ringstead village (SY 7478 8139 and SY 7486 8137). At other times, for example in 1990, 1991 and 1996 following winter storms, there have been much better exposures of the basal Kimmeridge Clay in the low grassy cliffs and foreshore to the east and west of the slipway, but much of the exposure east of the slipway was later compromised by coastal protection work along some 30 m of the cliff (Anon, 1995). Following the storms, local collectors were able to build up substantial collections of Upper Oxfordian and Lower Kimmeridgian ammonites (J.K. Wright, pers. comm.). Eastwards from here, the next exposure reported by Cox and Gallois (1981) as being worthy of measurement is in the Eudoxus Zone. The upper part of the latter zone up to about the middle of the Autissiodorensis Zone was reported by these authors in two small overlapping sections (SY 7619 8147 and SY 7606 8147) but the Lower–Upper Kimmeridgian boundary was obscured by slipped material (Figure 2.15). Cox and Gallois (1981) measured the Upper Kimmeridge Clay, up to the equivalent of the Freshwater Steps Stone Band, in a partly overgrown section (SY 765 813) in which there were steady dips of 10° to 20°. As well as this latter stone band, the equivalents of the White and Grey Ledge stone bands formed prominent features, and a thick oil shale with calcareous concretions appeared to be the equivalent of the Blackstone. The latter was mainly deeply weathered, and the tiny pyritized plates of the pelagic crinoid *Saccocoma*, which in the type sections (see site report for Tyneham Cap–Hounstout, this volume) characterize this bed, were not recorded. At the east end of the bay, the high cliff west of Holworth House is still known as 'Burning Cliff' after spontaneous combustion of a bituminous shale (almost certainly the equivalent of the Blackstone) which took place in 1826 and continued for several years (Buckland and De la Beche, 1836; Arkell, 1933, 1947a). The Holworth House Fault, with a downthrow to the east of about 45 m, affects the succession at this eastern end of the bay. The highest beds of the Kimmeridge Clay, down to the level of the White Stone Band, are intermittently exposed beneath the Portland Group on its downthrown side (Arkell, 1947a; Cope, 1980; House, 1989).

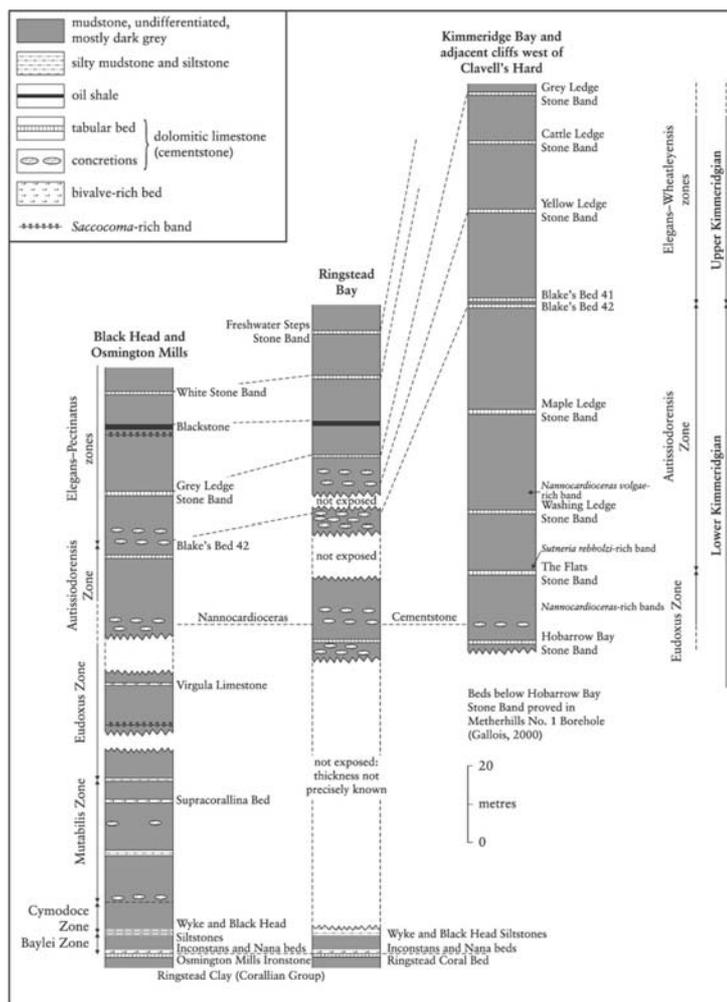


Figure 2.14: Correlation between the main sections of Kimmeridge Clay on the Dorset coast. Youngest zones not shown. (After Cox and Gallois, 1981, fig. 5.)

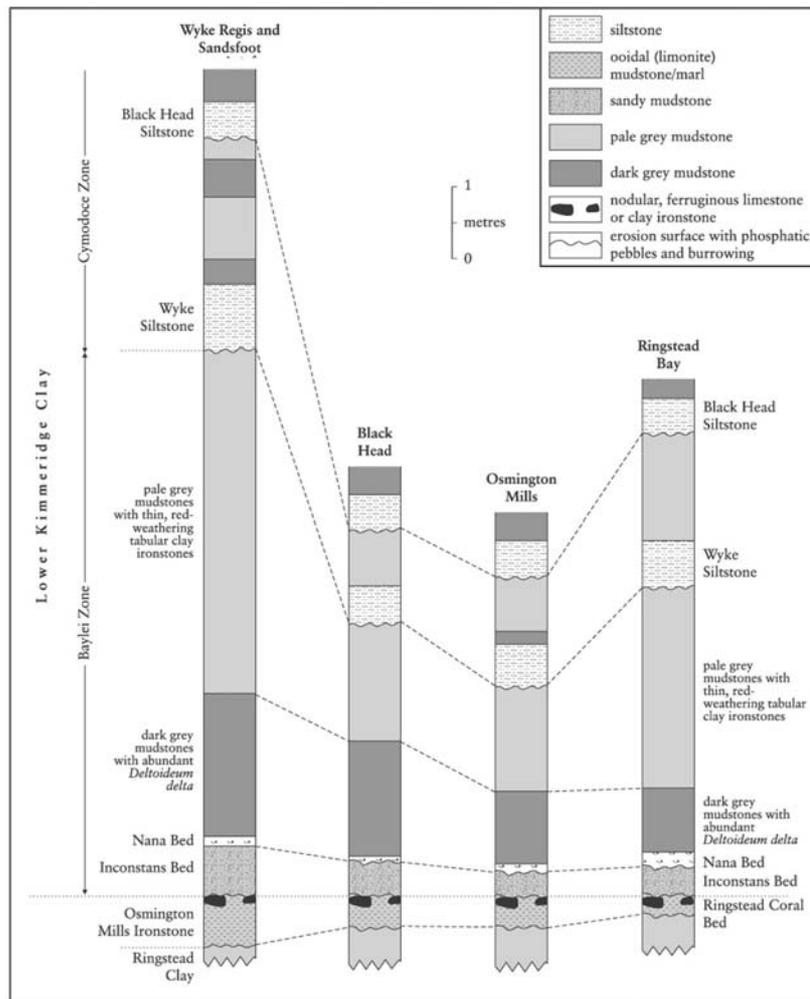


Figure 2.23: Correlation of the basal beds of the Kimmeridge Clay exposed at Wyke Regis, Sandsfoot, Black Head, Osmington Mills and Ringstead Bay (based on Cox and Gallois, 1981, fig. 6 and unpublished borehole data, R.W. Gallois, pers. comm.).

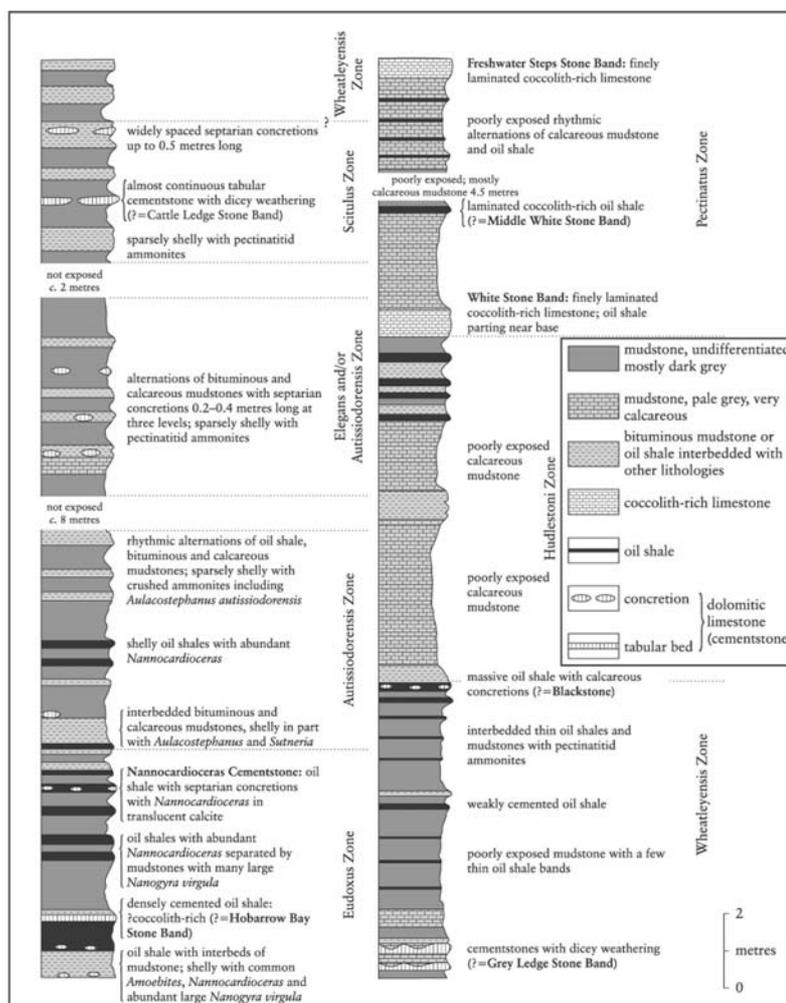


Figure 2.15: Graphic section of the Eudoxus–Pectinatus zonal interval at Ringstead Bay (SY 7619 8147, SY 7606 8147 and SY 765 813). (After Cox and Gallois, 1981, p. 35.)

Interpretation

The marker beds recognized in the Kimmeridgian succession at Ringstead Bay enable correlation with other sections in the Dorset type area (Figure 2.14) and further afield. These include, from below, the Inconstans Bed, Nana Bed, Wyke Siltstone, Black Head Siltstone, ?Hobarrow Bay Stone Band, Nannocardioceras Cementstone, ?Cattle Ledge Stone Band, ?Grey Ledge Stone Band, ?Blackstone, White Stone Band, ?Middle White Stone Band and Freshwater Steps Stone Band (Figures 2.15 and 2.23). Together with the recorded ammonite faunas, these substantiate an almost complete Kimmeridgian zonal sequence; the Fittoni Zone has not been proved definitely at the top of the succession but Cope (1980) considered that it was almost certainly present. Although, historically, a section at Ringstead Bay has been considered as the stratotype for the base of the Kimmeridgian Stage, recent deliberations by the Kimmeridgian Boundary Working Group of the International Subcommittee on Jurassic Stratigraphy (ISJS) tended to favour a section a little further west at Black Head (see site report for Black Head, this volume) as British candidate for the Global Stratotype Section and Point (GSSP) (Atrops, 1997).

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

Although exposure is patchy and variable, an almost complete Kimmeridge Clay succession has

been recorded in the landslipped cliffs at Ringstead Bay and there are a number of marker beds that enable correlation with other Kimmeridgian sections on the Dorset coast and further afield. The locality is best known for the exposures of the basal beds of the formation and the underlying Corallian Group that have provided a long-standing candidate GSSP for the base of the Kimmeridgian Stage. Although affected by modern coastal protection work, the boundary crops out in the low, grassy cliffs to the west and east of the slipway at Ringstead village. The base of the Kimmeridgian is marked by the base of the *Inconstans* Bed, named after the brachiopod *Torquirhynchia inconstans* (J. Sowerby) and including the ammonite *Pictonia densicostata* Salfeld (Arkell, 1947a, pl. 4, fig. 1). The locality gives its name to the Late Oxfordian ammonite genus *Ringsteadia* (Salfeld, 1913) and is the type locality of the Ringstead Coral Bed, the youngest bed of the Oxfordian, which represents a local facies development within the Osmington Mills Ironstone Member. The locality had a long association with W.J. Arkell (1904–1958) who spent most of his vacations in the chalet called 'Faraways' where he wrote much of the classic memoir on this area for the Geological Survey (Arkell, 1947a). Ringstead Bay is thus a key site, of national and international importance, for stratigraphy and stratigraphical palaeontology, as well as having close associations with one of the greatest world authorities on the Jurassic System.

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