

SPEETON SANDS

B.M. Cox

OS Grid Reference: TA142764

Introduction

The Yorkshire coast has long been known for its magnificent exposures of Jurassic rocks. Northwards from Filey Brigg, at the northern end of Filey Bay, Jurassic beds from the Upper Jurassic Corallian Group down to the Lower Jurassic Lias Group are displayed in superb cliff and foreshore exposures giving an unprecedented insight into the Hettangian to Oxfordian geological history of the Cleveland Basin. South of Filey Brigg, younger Jurassic beds are much less well exposed, and Kimmeridgian strata are seen only intermittently in generally poor exposures at the base of the cliffs and, occasionally, on the foreshore at the southern end of Filey Bay (Leckenby, 1859; Judd, 1868; Fox-Strangways, 1892; Pavlow and Lamplugh, 1892; Lamplugh, 1896, 1924; Arkell, 1933; Callomon in Callomon and Cope, 1971; Cope, 1974) (see Figure 4.26). The GCR site comprises over a kilometre of foreshore south-eastwards from near Reighton Gap. It is usually covered by beach sand but occasional exposures of the underlying strata have provided sections of the Lower Kimmeridgian *Autissiodorensis* Zone and Upper Kimmeridgian *Elegans* Zone; these zones are not exposed elsewhere in Yorkshire.

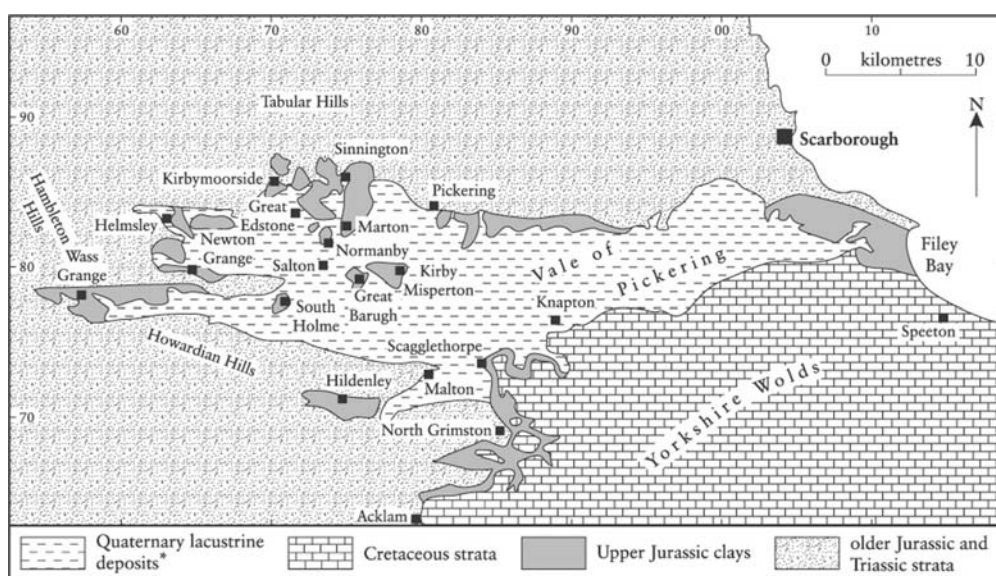


Figure 4.26: Simplified geological drift sketch map of the Vale of Pickering showing localities cited in the text (based on Geological Survey 1:50 000 sheets 53 and 54). The Green Lane Pit and Golden Hill Pit GCR sites are located at Marton. *Other drift deposits are omitted for clarity.

Description

The following description is based on the section recorded by Prof. J.H. Callomon in the spring of 1964 near Reighton Gap when the foreshore between tide-marks was free of sands and exposure exceptionally good; the outcrop occurs in a small planed-off, south-pitching anticline near an old concrete gun-emplacement bunker (TA 143 764) (Callomon in Callomon and Cope, 1971). No new stratigraphical data have since been added to this original record because of the rare and largely unpredictable availability of these exposures.

Thickness (m)

Kimmeridge Clay Formation

Shales, black, hard, crowded with layers of crushed but otherwise complete <i>Pectinatites</i> (<i>Virgatosphinctoides</i>) <i>elegans</i> Cope and <i>P. (Arkillites)</i> spp.	seen c. 6
Shales, black, more or less hard, with calcareous bands; numerous crushed ammonites often concentrated in shell beds; 'pectinatitids' fairly abundant in top c. 1.5 m; concretionary horizons with large, uncrushed ammonites seen in lowest beds at low tide; <i>Aulacostephanus autissiodorensis</i> (Cotteau), <i>A. kirghisensis</i> (d'Orbigny), <i>A. volgensis</i> (Vischniakoff); <i>Sphinctoceras</i> sp. and abundant <i>Subdichotomoceras</i> cf. <i>lamplughii</i> Spath	seen c. 6

The cliffs adjacent to the GCR site are mainly of slumped Quaternary till. At their base, exposures of the underlying Speeton Clay (Lower Cretaceous) and Kimmeridgian strata vary with the state of the beach and cliff, but the *Wheatleyensis*, *Hudlestoni* and *Pectinatus* zones of the Upper Kimmeridgian have been recorded from time to time (Cope, 1974, emend. 1980; Wignall, 1990a, 1993; Rawson and Wright, 2000) and, in recent years, have been regularly exposed. Younger Kimmeridgian and Portlandian strata are cut out by the unconformity, marked by the Coprolite Bed, at the base of the Speeton Clay. Cored boreholes through the Kimmeridge Clay have been drilled for the British Geological Survey (Gallois, 1979a) and the Institut Français du Pétrole (Herbin *et al.*, 1991; Oschmann, 1994) on or near the cliff top here.

Interpretation

The two units into which Callomon (in Callomon and Cope, 1971) divided his section were separated on the basis of a sharp faunal break rather than a marked lithological change. The ammonite fauna of the upper unit, comprising species of *Pectinatites*, indicates the Upper Kimmeridgian *Elegans* Zone, and the more varied ammonite assemblage, including *Aulacostephanus*, of the lower unit indicates the Lower Kimmeridgian *Autissiodorensis* Zone. The section thus shows the Lower–Upper Kimmeridgian substage boundary. Callomon (in Callomon and Cope, 1971) referred the 'pectinatitids' of the lower unit to *Pectinatites* (*Arkillites*) but Cope (1974), on the basis of material seen by him on a subsequent visit to the site, believed they belonged to the genus *Propectinatites*, including forms apparently intermediate between *Propectinatites websteri* Cope and early *P. (Arkillites)*; according to Cope (1974), true *Pectinatites* had yet to be recorded from the Lower Kimmeridgian strata.

The concretionary horizons with uncrushed ammonites recorded in the lower unit are almost certainly the source of many museum specimens, marked 'Filey Bay' or 'Speeton', which probably came from material washed up on the shore in the past (Callomon in Callomon and Cope, 1971). These include species figured and described by Pavlow (in Pavlow and Lamplugh, 1892), Spath (1925) and Ziegler (1961, 1962), amongst which are the type specimens of *Aulacostephanus fallax* Ziegler, *A. rigidus* Ziegler and *Subdichotomoceras lamplughii* Spath (Figure 4.7). According to Callomon (in Callomon and Cope, 1971), this latter genus, together with *Sphinctoceras*, is definitely more abundant here than in southern England and, because these genera are also known from East Greenland, he suggested that they represented a genuinely Boreal group.

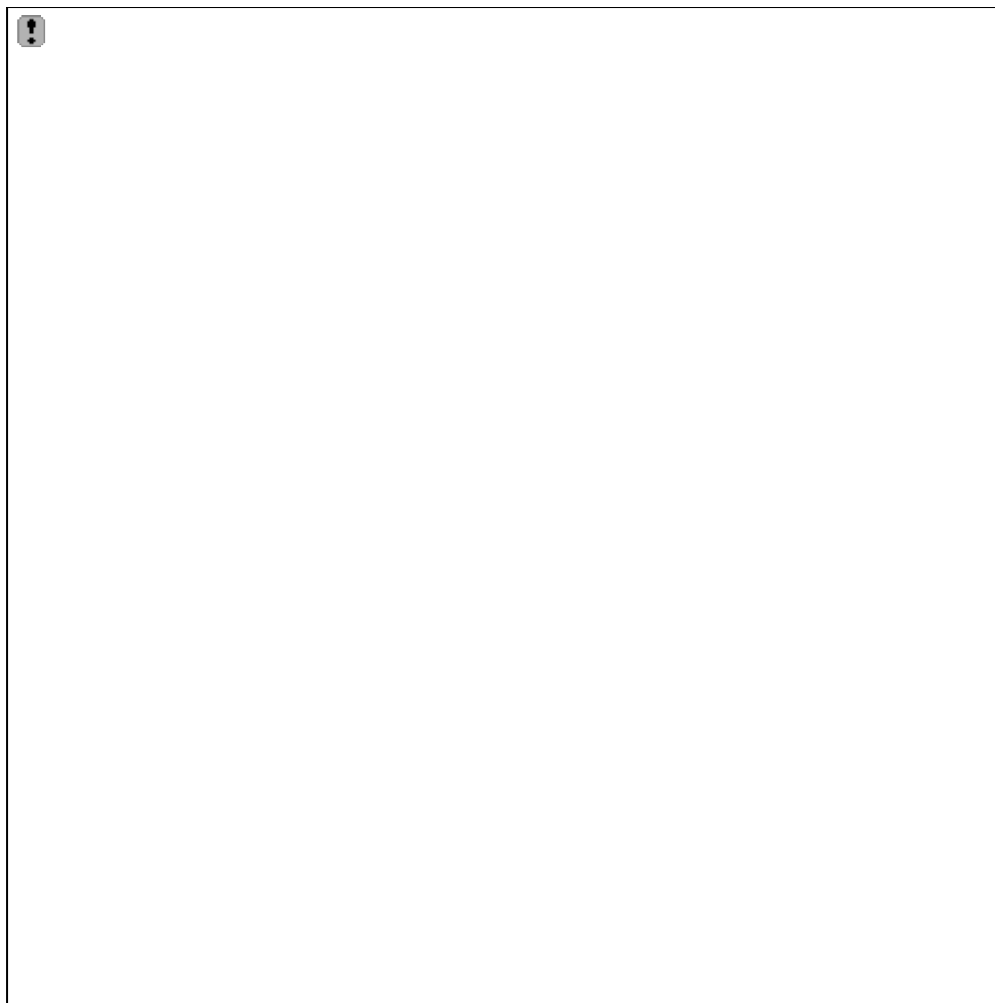


Figure 4.7: The type specimen of *Subdichotomoceras lamplughii* Spath, type species of the genus, from the Eudoxus Zone at Speeton, as figured by Pavlow and Lamplugh (1892, p. 111). Approximately natural size.

Conclusions

The elusive exposures on the foreshore near Reighton Gap in Filey Bay provide an occasional opportunity, depending on the erosional state of the beach, to observe the Lower–Upper Kimmeridgian substage boundary succession, including diagnostic ammonite faunas. This interval is not exposed elsewhere in the Cleveland Basin where it is otherwise known only from cored boreholes. Although ammonites are the only fauna to have been reported from here, these show a more Boreal aspect than those of southern England (see also

Reference list

- Arkell, W.J. (1933) *The Jurassic System in Great Britain*, Clarendon Press, Oxford.
- Callomon, J.H. and Cope, J.C.W. (1971) The stratigraphy and ammonite succession of the Oxford and Kimmeridge Clays in the Warlingham borehole. *Bulletin of the Geological Survey of Great Britain*, **36**, 147–76.
- Cope, J.C.W. (1974) New information on the Kimmeridge Clay of Yorkshire. *Proceedings of the Geologists' Association*, **85**, 211–21.
- Fox-Strangways, C. (1892) *The Jurassic Rocks of Britain, I. Yorkshire*, Memoir of the Geological Survey of the United Kingdom, HMSO, London.
- Gallois, R.W. (1979a) *Oil Shale Resources in Great Britain*, 2 vols, Institute of Geological Sciences, London. Unpublished report for the Department of Energy.
- Herbin, J.-P., Müller, C., Geysant, J.R., Mélières, F., Penn, I.E. and Yorkim Group (1991) Hétérogénéité quantitative et qualitative de la matière organique dans les argiles du

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- Kimméridgien du Val de Pickering (Yorkshire, UK). Cadre sédimentologique et stratigraphique. *Revue de l'Institut Français du Pétrole*, **46**, 675–712.
- Judd, J.W. (1868) On the Speeton Clay. *Quarterly Journal of the Geological Society of London*, **24**, 218–50.
- Lamplugh, G.W. (1896) On the Speeton Series in Yorkshire and Lincolnshire. *Quarterly Journal of the Geological Society of London*, **52**, 179–220.
- Lamplugh, G.W. (1924) A review of the Speeton clays. *Proceedings of the Yorkshire Geological Society*, **20**, 1–31.
- Leckenby, J. (1859) Note on the Speeton Clay of Yorkshire. *The Geologist*, **1859**, 9–11.
- Oschmann, W. (1994) Der Kimmeridge Clay von Yorkshire als ein Beispiel eines fossilen Sauerstoff-kontrollierten Milieus. *Beringeria*, **9**.
- Pavlow, A. and Lamplugh, G.W. (1892) *Argiles de Speeton et leurs équivalents*, Imprimerie de l'Université Impériale, Moscow.
- Rawson, P.F. and Wright, J.K. (2000) *The Yorkshire Coast*, 3rd edn, Geologists' Association Guide No. 34, Geologists' Association, London.
- Spath, L.F. (1925) Ammonites and aptychi. In The Collection of Fossils and Rocks from Somaliland made by Messrs B.N.K. Wyllie, B.Sc., F.G.S. and W.R. Smellie, D.Sc. F.R.S.ED. *Monograph of the Geology Department of the Hunterian Museum Glasgow University*, **1**, 111–64.
- Wignall, P.B. (1990a) Benthic palaeoecology of the late Jurassic Kimmeridge Clay. *Special Papers in Palaeontology*, **43**, 74 pp.
- Wignall, P.B. (1993) The stratigraphy of the Upper Kimmeridge Clay (late Jurassic) of Golden Hill, Vale of Pickering, North Yorkshire. *Proceedings of the Yorkshire Geological Society*, **49**, 207–14.
- Ziegler, B. (1961) Stratigraphische und zoogeographische Beobachtungen an *Aulacostephanus* (Ammonoidea–Oberjura). *Palaeontologische Zeitschrift*, **35**, 79–89.
- Ziegler, B. (1962) Die ammoniten-gattung *Aulacostephanus* im Oberjura (Taxionomie, stratigraphie, biologie). *Palaeontographica*, **119A**, 1–172.