



Book Review

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Mortimore, R.N., Wood, C.J. & Gallois, R.W. 2001: *British Upper Cretaceous Stratigraphy*. Geological Conservation Review Series 23, xx + 558 pp. Joint Nature Conservation Committee, Peterborough. ISBN 1 86107 488 3. Price: GBP 53.00. Distributed by NHBS Mailorder Bookstore, 2-3 Wills Road, Totnes, Devon, TQ9 5XN. Tel: +44 (0) 1803 865 913; Fax: +44 (0) 1803 865 280; E-mail: nhbs@nhbs.co.uk; Web: www.nhbs.com. <https://doi.org/10.37570/bgds-2003-49-15>

The Upper Cretaceous rocks and fossil faunas of Britain

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This substantial volume covers 37 sites that merit GCR (Geological Conservation Review) status and thereby long-term conservation, because of their especial significance to the study and understanding of Upper Cretaceous stratigraphy in Britain. These sites have been proposed for notification as Sites of Special Scientific Interest (SSSIs). The general principles guiding GCR site selection can be encapsulated in three broad components: 1) International geological importance as Global Stratotype Section and Point sites and palaeontological type localities; 2) presence of classic or exceptional features that are scientifically important; and 3) presence of representative Earth science features.

The GCR sites includes pits, e.g. the Caistor St Edmund Chalk Pit in Norfolk, a group of exposures, such as the Beinn Iadain and Beinn na h-Uamha, Morvern, west Scotland, an area, such as the Gribun area, Mull, west Scotland and cliff sections, such as the cliffs between Folkestone and Kingsdown in Kent, southeastern England. The treatment of each GCR sites conforms to a standard template, with a site description, an interpretation of the geology and finally some conclusions. Sites are illustrated with maps and lithological logs, together with photographs of the localities and key features of the geology.

The volume is subdivided into six chapters: 1) The Upper Cretaceous rocks of the British Isles (24 pages); 2) Fossils of the Chalk and the ecology of the Upper Cretaceous Chalk seas (54 pages); 3) Southern Province, England (209 pages); 4) Transitional Province, England (77 pages); 5) Northern Province, England (53 pages); and 6) Inner Hebrides Province, north-west Scotland (44 pages). The chapters on the four provinces comprise a general review, including tectonic structure and sedimentation history, lithostratigraphy, biostratigraphy and chronostratigraphy.

Upper Cretaceous rocks of the British Isles

The Upper Cretaceous rocks of the British Isles occur in five provinces: the Southern Province, Transitional Province and Northern Province in England, in addition to the Inner Hebrides Province in northwest Scotland and the North Ireland Province. The Upper Cretaceous of the North Ireland Province is not treated, but there is scattered information on this province in the volume, especially in Chapter 6, Inner Hebrides Province.

The chapter includes sections on Global Geological Setting, Upper Cretaceous Tectonic Setting in Europe, The Rocks of the Upper Cretaceous Series, Upper Cretaceous Lithostratigraphy and Biostratigraphy in the British Isles.

The Upper Cretaceous Chalk Group in England is subdivided into two subgroups, the Grey Chalk Subgroup and the White Chalk Subgroup, and these subgroups are in turn subdivided into mappable formations in the four provinces. In addi-

tion, numerous marker beds, such as marl beds and flint bands, have been recognized. For instance, 108 Cenomanian to Campanian marker beds have been recognized and named in the Southern Province (Figs 2.8, 2.9, 2.21, 2.22, 2.27).

Fossils of the Chalk and the ecology of the Upper Cretaceous Chalk seas

This chapter comprises paragraphs on ammonites, belemnites (not figured), inoceramid bivalves, other bivalves, brachiopods (not figured), echinoids, crinoids (not figured), trace fossils, and microfossils.

Southern Province, England

This province includes Kent, Sussex, Hampshire, Dorset, Devon, Somerset, Wiltshire and the Isle of Wight; 20 GCR sites are described.

There are, however, inconsistencies. In Fig. 1.16 the Plenus Marls Member of the Holywell Nodular Chalk Formation is placed in the White Chalk Subgroup as the basal member of this formation, whereas in Fig. 3.3 (based on Bristow et al. 1997) the Plenus Marls Member is regarded as the highest member of the Zig Zag Formation, which belongs to the Grey Chalk Subgroup. However, according to the text the Plenus Marls Member is the base of the White Chalk Subgroup and the base of the Holywell Nodular Chalk Formation.

The succession of the Thanet coast, Kent is included in the chapter on the Southern Province, but in Figs 1.6-1.8 this area belongs to the Transitional Province. On p. 293 it is noted that the succession of the Thanet coast '... provides a standard for the succession developed over the Anglo-Brabant Massif in the Transitional Province'.

Transitional Province, England

This province includes Berkshire, Oxfordshire, Bedfordshire, Cambridgeshire, Norfolk, Suffolk and Essex; 11 GCR sites are described.

The chalk of East Anglia overlies the northern extension of the buried Anglo-Brabant Massif. Subdivisions of the stratigraphy of this province follows the scheme established in the Southern Province for the greater part of the region. The Northern Province stratigraphy applies in the most northerly part of East Anglia.

The onshore Maastrichtian chalk, informally named the Tringham Chalk by earlier workers, is exposed only in cliff and foreshore sections cut through isolated glacio-tectonic deformed

erratic masses on the Norfolk coast, from Overstrand to Trimmingham. Mortimore et al. have identified three marl seams, in ascending order, the uppermost Campanian Overstrand Lower Marl, the Overstrand Upper Marl, which is taken as the Campanian-Maastrichtian boundary, and the lowest Maastrichtian Siderstrand Marl. The authors correlated the Siderstrand Western Mass and the Overstrand Hotel Lower Mass on the basis of the Siderstrand Marl and presented a composite, simplified section for the uppermost Campanian and Lower Maastrichtian of the north Norfolk coast (Fig. 4.28). I am a little curious about the correlation based on the Siderstrand Marl, because the successions above this marl in the Overstrand Hotel Lower Mass (Fig. 4.32) and Siderstrand Western Mass (Fig. 4.33) differ. It seems that the authors were not strongly convinced about this correlation, because they noted '... the broad correlation, which involves the recognition of a more or less flintiness interval is indisputable!' (p. 368). Such strength of language may possibly serve to conceal a number of problems with this correlation.

On pp. 364 and 372, the authors refer to the basal Lower Maastrichtian restricted *Belemnella lanceolata* Zone of the standard scheme. The conventional Maastrichtian belemnite zones were critically assessed by Christensen (1996). The Lower Maastrichtian includes two zones, the *Belemnella lanceolata* Zone below and the *B. occidentalis* Zone above. The *B. lanceolata* Zone is the total range zone of the eponymous species, and *B. occidentalis* occurs in the upper half of the zone. Therefore, Christensen (1975) used the term restricted *B. lanceolata* Zone for the lower half of the conventional *B. lanceolata* Zone. I am not sure that the authors use the term restricted *B. lanceolata* Zone in the same sense.

On p. 372, Mortimore et al. suggested that the onshore Maastrichtian strata on the Norfolk coast should be placed in the Rowe Formation of the North Sea Chalk Group. However, this formation is placed in the uppermost Campanian on Fig. 5.3, although it is noted (p. 384) that the base of the Rowe Formation appears to be approximately coincident with the Campanian-Maastrichtian boundary as recognized on the Norfolk coast.

Northern Province, England

This province includes Yorkshire, Lincolnshire and the northern part of Norfolk; four GCR sites are described.

The authors show that there is a strong similarity both lithostratigraphically and faunally to the limestone and chalk succession in north Germany. The chalk of this province is subdivided into four formations.

Inner Hebrides Province

This province includes northwestern Scotland; two GCR sites are treated. The Upper Cretaceous succession of this province is highly condensed, some 2–20 m thick for the inferred Cenomanian to Maastrichtian strata, compared to 110 m in Northern Ireland and 500 m in Norfolk. All key sections on Mull, Morvern, Eigg and Skye were visited and measured by the authors. The Upper Cretaceous strata are subdivided into four formations, including the Gribun Chalk Formation. The Gribun Conglomerate Formation of Hancock (2000) (not cited by Mortimore et al.) may be equivalent to the Beinn Iadain Mudstone Formation of Mortimore et al.

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The volume is completed by 27 pages of references, an appendix on the definition of the Upper Cretaceous Stages and Substages (7 pages), a glossary (13 pages), a fossil index (7 pages) and a general index (22 pages).

This volume is an essential encyclopedia for students of the Upper Cretaceous Series and I think that it will be the Bible for many years. It is an extremely detailed yet quite readable archival record of the current state of knowledge of the Upper Cretaceous of Britain. Even references to some articles published in 2001 are included. However, the proposal by Odin (2001) for a Global Stratotype Section and Point for the base of the Maastrichtian Stage to be placed at level 115.2 m on platform IV in the abandoned Tercis quarry near Dax, in the Landes, southwestern France on the basis of a multi-biovents approach is not included. This proposal was ratified by the International Union of Geological Sciences in February 2001. As shown by Christensen et al. (2000) and Christensen (2001) the belemnite standard for the base of the Maastrichtian, as defined by first occurrence of *Belemnella lanceolata* at Krons Moor, northwest Germany, virtually coincides with the Campanian-Maastrichtian boundary at level 115.2 m at Tercis. Therefore, *Belemnella lanceolata* is not uppermost Campanian, as shown in Fig. 4.5.

It is mentioned on p. xv that the volume is not intended as a field guide. I agree completely, because it weighs a little more than 2 kg. The layout, line drawings and comprehensive reference list, together with a useful glossary and indexes combine to make the information accessible. There are few typographical errors. The authors use the terms 'planktonic' and 'benthic'. In order to be consistent the terms should have been 'planktic' and 'benthic' (the correct terms in my view) or 'planktonic' and 'benthonic'. Sadly the quality of reproduction of many photographs is poor, lacking contrast. Nevertheless, the volume is an authoritative record of the Upper Cretaceous of England and Scotland, presented with clarity and precision. The volume is a worthy replacement of the Vol. 1-3 of The Cretaceous Rocks of Britain by Jukes-Brown & Hill (1900, 1903, 1904). The volume should be on the shelves of all major geological libraries.

References

- Bristow, C.R., Mortimore, R.N. & Wood, C.J. 1999: Reply to discussion on 'Lithostratigraphy for mapping the Chalk of southwestern England'. Proceedings of the Geologists' Association 110, 68-71.
- Christensen, W.K. 1975: Upper Cretaceous belemnites from the Kristianstad area in Scania. Fossils and Strata 7, 69 pp.
- Christensen, W.K. 1996: A review of the Upper Campanian and Maastrichtian belemnite biostratigraphy of Europe. Cretaceous Research 17, 751-766.
- Christensen, W.K. 2001: The Campanian-Maastrichtian Stage Boundary. Bulletin of the Geological Society of Denmark 48, 208.
- Christensen, W.K., Hancock, J.M., Peake, N.B. & Kennedy, W.J. 2000: The base of the Maastrichtian. Bulletin of the Geological Society of Denmark 47, 81-85.
- Hancock, J.M. 2000: The Gribun Formation: clues to the latest Cretaceous history of western Scotland. Scottish Journal of Geology 36, 137-141.
- Jukes-Brown, A.J. & Hill, W. 1900: The Cretaceous Rocks of Britain. Volume 1: The Gault and Upper Greensand of England. Memoir of the Geological Survey of the United Kingdom, HMSO, London, 499 pp.
- Jukes-Brown, A.J. & Hill, W. 1903: The Cretaceous Rocks of Britain. Volume 2: The Lower and Middle Chalk of England. Memoir of the Geological Survey of the United Kingdom, HMSO, London, 568 pp.
- Jukes-Brown, A.J. & Hill, W. 1904: The Cretaceous Rocks of Britain. Volume 3: The Upper Chalk of England. Memoir of the Geological Survey of the United Kingdom, HMSO, London, 566 pp.
- Odin, G.S. (compiler) 2001: The Campanian-Maastrichtian boundary: definition at Tercis (Landes, France), principle, procedure, and proposal. In Odin, G.S. (Ed.) The Campanian-Maastrichtian Stage Boundary. Developments in Palaeontology and Stratigraphy 19, 820-833.