VOLUMINA JURASSICA, 2015, XIII (2): 159–164

Report of the Oxfordian Task Group (OTG) Meeting: the section of Ham Cliff, Redcliff Point, Weymouth, UK (11–14th June 2014)

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INTRODUCTION

A meeting of the Oxfordian Task Group (OTG) took place in Weymouth, Dorset, (SW England) from 11th to 14th June 2014, as a natural follow-up to an equivalent meeting held in Orpierre, Provence (SE France) from 29th September to 2nd October 2013. A primary aim of the meeting was to present and review the English candidate Oxfordian GSSP at Ham Cliff, just to the east of Redcliff Point, Weymouth, Dorset, UK (Page *et al*., 2010; Page, Meléndez, Wright, 2010; Fig. 1) to the OTG, including of the French Jurassic Group. The Redcliff section has been established as an alternative candidate to the outcrops of Thuoux and Savournon, proposed by the members of the French Jurassic Group (Pellenard, 2014; Pellenard *et al*., 2014).

ATTENDEES AND TOPICS DISCUSSED

A total of 15 OTG members attended the meeting and took part in sampling and discussions, which covered all topics related to the boundary, including lithostratigraphy, ammonite successions, geochemistry, microfossil successions including foraminifers, and nannoplankton. The field sessions were supported by documentation compiled by one of us (KNP) and included a review of the then current state of stratigraphical, palaeontological and geochemical studies on the section. This included, as in the meeting held in 2013 at Orpierre, Provence, the display of a representative collection of ammonite specimens from earlier sampling, giving an opportunity to the participants to revise the recorded succession of the key cardioceratid ammonites, as well as other relevant forms.

Attendees at the meeting included a number of other colleagues involved with the original proposal of the candidate GSSP (John Wright, Royal Holloway, University of London; Malcolm Hart and Gregory Price, both Plymouth University) as well as the ISJS chair, Stephen Hesselbo (University of Exeter). Clemens Ullmann (University of Exeter), Chris Korte (Denmark) and Aisha Al-Suwaidi (United Arab Emirates) and now form part of the OTG working on the Redcliff section. Poland was represented by Ewa Głowniak (University of Warsaw), whilst the French Jurassic Group was represented by Pierre Pellenard (chairman of the FJG), Dominique Fortwengler, Bruno Galbrun, Silvia Gardin and linguistic advisor Carmela Chateau (Fig. 3). We missed some French colleagues: Jacques Thierry, R. Enay, and Didier Marchand, who were eventually unable to attend, as was Giulio Pavia from Italy.

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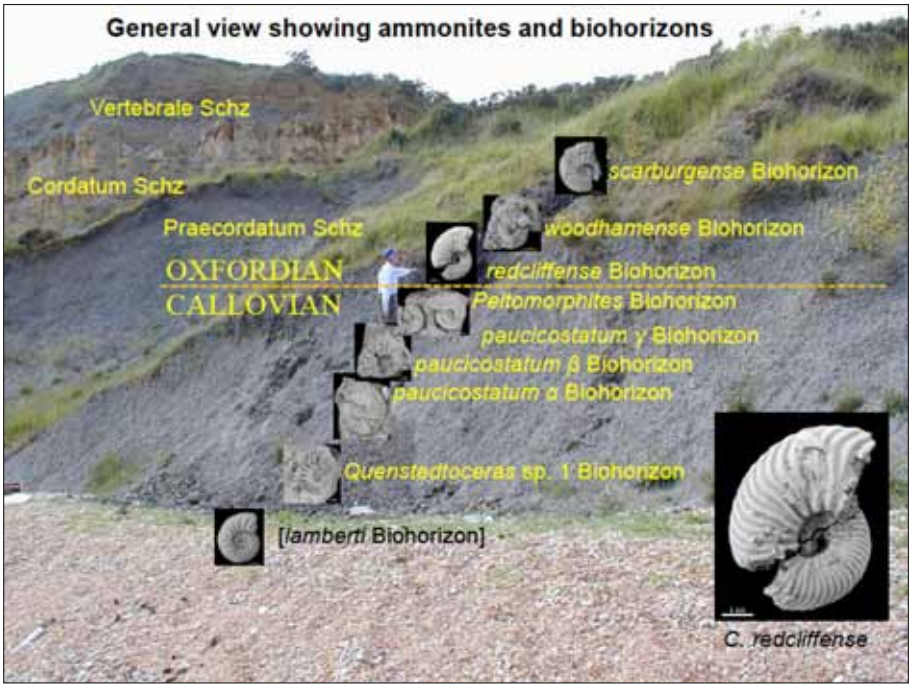

Fig. 1. General view of the Section at Hamcliff showing the position of the ammonite biohorizons across the Callovian-Oxfordian boundary as proposed by Page *et al.* (2010a, b)

The presence of a Callovian-Oxfordian boundary at Ham Cliff, was probably first alluded to by W.J. Arkell in his classic work '*The Jurassic System in Great Britain'* (1933). The section is on the east side of the prominent coastal feature of Redcliff Point, a short walking distance from Bowleaze Cove, on the east side of Weymouth, southern England. Its location along the coast provides good outcrop conditions, easy access (at all states of the tide due to a high storm beach) and excellent possibilities for sampling and study.

The topics discussed and analysed during the three days covered all aspects concerning the characterisation of the Callovian-Oxfordian stage boundary. This included a new, detailed sampling for chemostratigraphy from around 5 m below to around 4.5 m above the boundary (Fig. 2). Although good geochemical results have already been obtained and published (Price, Page, 2008), indicating no significant gap at the boundary, it was decided to repeat the study carrying out more detailed sampling, including characterisation of aspects of the geochemistry not analysed originally. The new results will supply valuable information relevant to correlations and help substantiate and supplement the data available from the different invertebrate fossil groups.

Besides geochemical sampling, new sampling was also carried out for nannofossils, and passed on to Paul Bown (University College London) – part of the original project group – to study and revise. New microfossil sampling was also carried out by Gregory Price and Malcolm Hart. Crucially, the Ham Cliff section yields belemnites throughout, and has already been demonstrated to be an excellent location for such studies, as presented in the ISJS symposium in Kraków in 2006 (Page *et al*., 2010a, b).

A new sampling of the ammonite faunas was also initiated, centimetre-by-centimetre, and continued through the remainder of the summer of 2014 by KNP. As a result, a new and very large new collection of ammonites – around 3000 ammonite specimens – is now available for further study. These faunas are dominated by cardioceratids but many representatives of other Late Callovian–Early Oxfordian groups, including kosmoceratids, perisphinctids, hecticoceratids and peltoceratids have now been recovered. These new records will allow a revision of the standard ammonite correlation framework for the Upper Callovian, Lamberti Chronozone, to Lower Oxfordian, Mariae Chronozone interval, including the establishment of an updated framework of biohorizons.

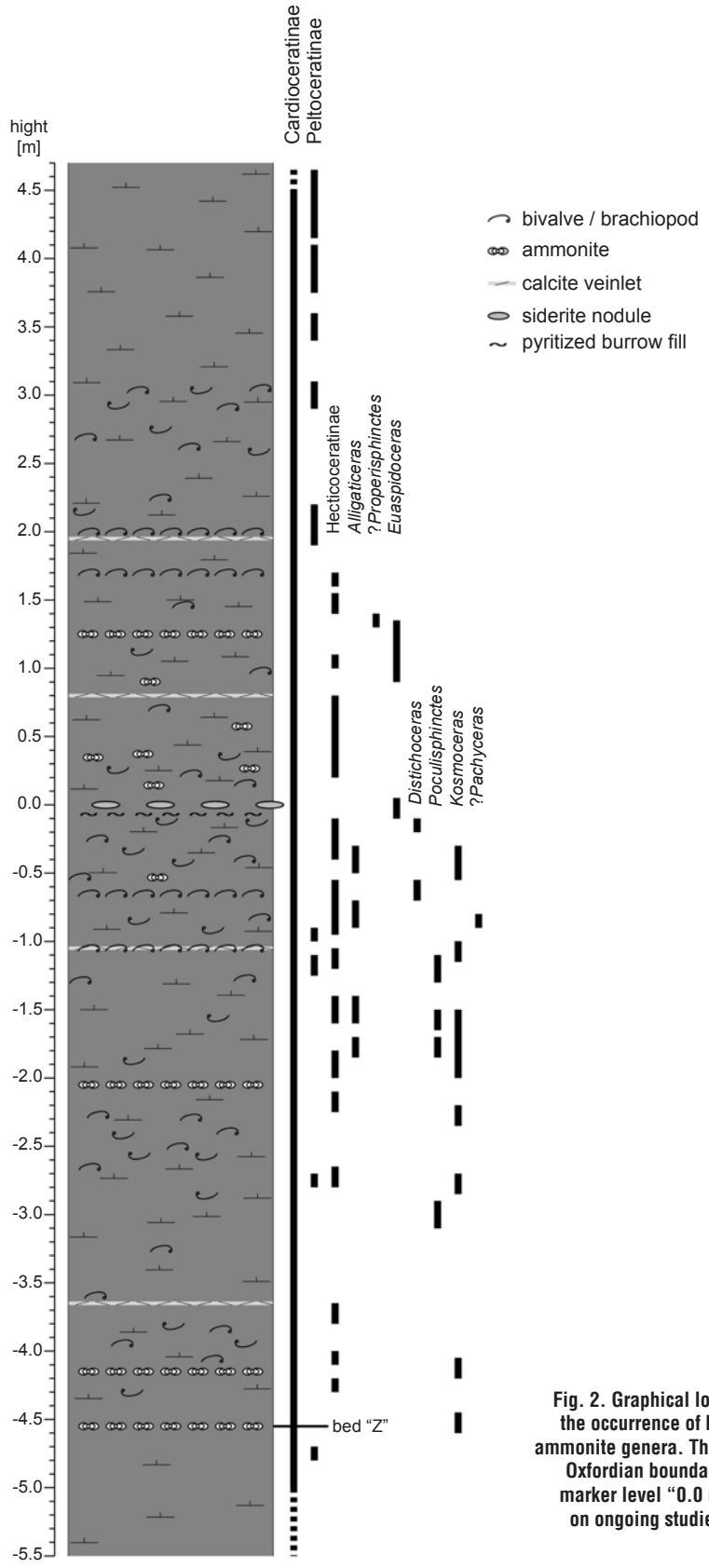

Fig. 2. Graphical log of the Redcliff section showing the occurrence of late Callovian to early Oxfordian ammonite genera. The candidate level for the Callovian-Oxfordian boundary is around 0.4 to 0.6 m above marker level "0.0 m" and will be confirmed based on ongoing studies of the new ammonite faunas

Fig. 3. Participants in the field meeting (from left to right: Dominic Fortwengler, Pierre Pellenard, Bruno Galbrun, Carmela Chateau, Clemens Ullmann, Stephen Hesselbo, Sylvia Gardin, Guillermo Melendez, John Wright, Ewa Głowniak, Aisha Al-Suwaidi, Gregory Price, Kevin Page, Christophe Korte, and Malcolm Hart)

The precise characterisation of the Callovian-Oxfordian boundary was of course a key theme of the meeting and discussion concerned the interpretation of *Cardioceras (Pavloviceras) redcliffense* Page, Meléndez and Wright, which was taken as the indicator of the basal Oxfordian by Page *et al*. (2010a, b – and its relationship to topmost Callovian, *Quenstedtoceras* ex grp *paucicostatum* Lange, Fig. 1). Problematic issues here include the wide morphological variability of the successive fauna of this group, and the need for large collections to adequately characterise each successive evolutionary link, as well as to provide a practical biostratigraphic framework.

The lower part of the section showed the stratigraphic succession of key species of the cardioceratid genus *Quenstedtoceras* characterizing the successive stages of Lamberti Chronozone. Good, complete adult microconch specimens of *Qu.* ex grp *lamberti* (J. Sowerby), as well as inner whorls of macroconchs, were recorded from the basal levels of the section, confirming the age of the lowest part of the section. The recorded species succession above followed with the record of at least three evolutionary links of the *Qu.* ex grp *paucicostatum* (Lange), from an early form (alpha) to later, evolved, links (beta and gamma), as described by Page *et al*. (2010b). The evolutionary transition from this last form to the first representative of *Cardioceras (Pavloviceras*) *i.e*. *C. (P.)* ex grp *redcliffense*, marks the basal horizon of the Mariae Chronozone and, hence, the base of the Oxfordian Stage. This transition sees assemblages of the last *Qu. paucicostatum*-gamma Page, Meléndez and Wright, transforming into assemblages in which coiling becomes progressively more involute, ribbing finer and the appearance and extension through ontogeny of a ventral keel (which first develops in the inner whorls of the phragmocone and eventually reaches the body chamber in the typical microconch forms of *Cardioceras (Pavloviceras) scarburgense* (S. Buckman) – a typical proterogenetic process.

Nevertheless, not all individuals in a particular assemblage from a defined level may show such features and some coarsely ribbed and inflated variants, even of *C. scarburgense*, may never develop a clear keel. This gradual 'transformation' clearly represents an evolutionary progression, with the morphological 'balance' of each fauna changing through time – hence Page *et al*.'s decision in 2010 to characterise *C. redcliffense* sensu stricto as the assemblage within which around 20% of the individuals have a keeled inner phragmocone. Characterising and demonstrating these changes and translating them into clear biostratigraphical markers is an important challenge for both ongoing taxonomic studies and the correlation of the Callovian-Oxfordian boundary (Fig. 2).

Higher in the section, a succession of faunas of typical *Cardioceras (Pavloviceras)* ex grp *scarburgense* confirms *C. redcliffense* as the first *Cardioceras* s.s. in an continuous sequence of cardioceratid faunas, and hence its potential value as an indicator species for the base of the Oxfordian stage. The latter species has also been recorded at the French locality of Savournon by Page, and Meléndez, Atrops and Page (2007), hence confirming its international correlation potential for the base of the Oxfordian Stage.

A preliminary review of the initial results of the June meeting and subsequent detailed sampling by Kevin Page was presented at the annual meeting of the SW England, Ussher Society in Paignton, Devon, in January 2015.

We are grateful to all participants for actively taking part in the meeting, which was conducted in a very collaborative and friendly atmosphere (Fig. 3). We believe that work carried out to date has demonstrated that the French and English sections are entirely complimentary – hence we might not be too far from the day in which the active members of the OTG can definitively decide on GSSP or ASSP status for the candidate Oxfordian GSSPs.

Acknowledgements. Warm thanks are due to all participant members. Clemens Ullmann (University of Exeter) kindly compiled Figure 2. Also thanks are due to the ISJS (International Subcommission on Jurassic Stratigraphy) and especially to Stephen Hesselbo, ISJS Chair, for supporting the meeting. GM was also supported by research project **CGL2011-23947 (MICINN)** from the Spanish Ministry of Science, Research and Innovation. Many thanks are also due to Mr Peter Broatch of Eweleaze Farm, for his continued support for the scientific sampling of the Hamcliff section and also to Matthew Low (Natural England) for advice in relation to the national conservation site within which the section lies.

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