

## A REVISED DESCRIPTION OF THE LITHOSTRATIGRAPHY OF THE KIMMERIDGIAN-TITHONIAN AND KIMMERIDGIAN-VOLGIAN BOUNDARY BEDS AT KIMMERIDGE, DORSET, UK: DISCUSSION TO GALLOIS 2011



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It is always a pleasure to see new scientific results, especially if these are coupled with a due appreciation of the vital contribution made by earlier workers. The author of this paper should have, but did not, make reference to critical earlier work and major Kimmeridge Clay publications, for instance those of Arkell and Cope, also to the bed notation of earlier authors including J.F. Blake, J.C.W. Cope, etc.

The Kimmeridge Clay is a coherent unit, a very thick formation (500 m), and this paper describes less than one twentieth part of it (24 m). It has to be said that this contribution could have been improved by inputs from workers involved in late Jurassic stratigraphy, because it does not accord with present-day understanding, methodology or usage. Although the illustrations are interesting, the text contributes little new material and lacks significant and widely useful new stratigraphic or sedimentary data; bed numbering is all very well, but it is not an end in itself. And a work that deals with such a thin interval in such a thick formation is not the place to make changes to the names of established lithostratigraphic units (i.e. the Maple Ledge Shales): this is a matter requiring consensus amongst involved workers, and, if necessary at all, it should be done as part of a comprehensive re-assessment and re-description. The method also ignores the basic rules of priority in stratigraphical nomenclature.

The very title of the 2011 paper introduces confusion and is anachronistic. The final stage/age of the Jurassic, by international agreement, is the Tithonian. The stage below is the Kimmeridgian (encompassing the lower Kimmeridge Clay) and the stage above the Berriasian (including the middle Purbeck beds). Alternative stage names for Tithonian were suppressed when the International Jurassic Subcommission voted and adopted that unique label for the last part of the Jurassic in 1991 (Sarjeant and Wimbledon, 2000). Subsequently this decision was ratified by the International Commission on Stratigraphy. The international stratigraphic community thus knows very precisely what the Tithonian is, where it begins and where it ends, as they do for the Kimmeridgian. Kimmeridgian and Tithonian are the terms used globally, from Mexico to Japan, from Poland to Antarctica.

The recognition of Tithonian by the International Jurassic Subcommission automatically meant that the historical British definition of Kimmeridgian (Arkell, 1933) had to be emended, and therefore the limits of Kimmeridgian were curtailed: it now has a shorter extent (conforming to the old French sense of Kimmeridgian = Kimmeridgian *sensu gallico* of the literature) - the upper Kimmeridge Clay falls in the Tithonian and only the lower half of the formation is still Kimmeridgian. However, Gallois' conception of 'Kimmeridgian' seems to be much more flexible: he has a Kimmeridgian Stage encompassing/equivalent to the entire Kimmeridge Clay in an earlier publication (Gallois 2010), where he describes beds that are only of Tithonian age; but in the paper under discussion he cuts the Kimmeridge Clay in half and refers higher beds to a 'Volgian' stage, when he only describes a short interval that falls entirely in the Kimmeridgian. The author also makes no mention of the Bolonian substage/age (Blake 1881) or the Portlandian substage/age (d'Orbigny 1842-9). Because of faunal provincialism, both still

have their uses as divisions of the Tithonian in the Anglo-French region, at least for the present (Cope 1993).

Further, the stage name 'Volgian' has never been used for any later Jurassic interval in Dorset (the type area for both the historical Kimmeridgian and Portlandian stages). 'Volgian' should be recognised as being redundant as a stage term: it was always a junior synonym of earlier proposed stage names which took priority. Though globally the names Kimmeridgian, Tithonian and Berriasian are used for the later Jurassic-earliest Cretaceous interval, it is true that a few Russian authors persist in using 'Volgian' for thin successions in the landlocked boreal basins of the Russian platform and Siberia. This is for an understandable nationalistic reason - after all, it took its name from the River Volga. An additional reason why Volgian is a confusing and unhelpful name is that it is still used in Russia in such way that it extends into the Cretaceous, and thus includes part of the Berriasian! It tries to do something that is impossible, to be a stage that straddles two geological systems! It is something like trying to invent a time unit that is part Monday and part Tuesday, and therefore totally useless in the normal calendar. It can be seen from this that there is no room for 'Volgian' in the global standard nomenclature of Kimmeridgian, Tithonian and Berriasian.

The author misunderstands how ammonites are used in stratigraphy, notably in the definition of biozones and stages, in claiming (p. 291) that the Last Appearance Datum of *Aulacostephanus* is a proxy for the base of the Tithonian. Biostratigraphy is much more preoccupied with appearances, not disappearances: no ammonite zone or stage has been defined on a disappearance, such boundaries are based on the first appearance of index fossils. The base of the Tithonian is normally recognised by the first appearance of *Hybonotoceras hybonotum* (which does not occur in Britain).

In conclusion, I would like to suggest that authors should be aware of, and uphold, widely observed conventions, usage and standards.

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