

CORRESPONDENCE AND NOTES

The Withycombe Formation (Oxfordshire subcrop) is of early Cambrian age

SIRS – A re-examination of fossils from the Withycombe Formation, hitherto recorded as being of doubtful Silurian age (Poole, 1978), has shown that it is early Cambrian. As this result not only bears on Cambrian and Silurian palaeogeography but also sets a minimum age for the underlying volcanic rocks, we briefly record our new observations and conclusions here.

The Withycombe Formation refers to a sequence of c. 190 m of mudstones encountered in the Withycombe Farm Borehole 1.6 km west of the centre of Banbury, Oxfordshire, described in detail by Poole (1978). The formation underlies Upper Coal Measures and overlies highly altered basaltic andesite lavas, both upper and lower contacts being unconformable.

Although the formation yielded numerous macrofossils and some organic-walled microfossils, these proved difficult to interpret and gave ambiguous evidence of age. However, on the evidence of the microfossils Poole (1978, p. 20) speculated that the Withycombe Formation might represent Silurian beds, possibly part of the Llandovery Series, in an unusual near-shore facies.

We undertook a review of the fossil evidence when consideration of results from a seismic profile and evidence from other boreholes around Banbury suggested that a Silurian age for the Withycombe Formation was anomalous (N. J. P. Smith, pers. comm.).

1. Macrofossils

Besides the hyolithids and other fossils discussed by Dr D. E. White (in Poole, 1978, p. 18), re-examination of the borehole core revealed some well preserved *Platysolenites antiquissimus* Eichwald, two examples of the gastropod-like mollusc *Aldanella* (determined by Dr M. D. Brasier), and sclerites of a halkieriid (determined by Dr S. Conway Morris). Furthermore the figured 'bivalved molluscs?' (Poole, 1978, pl. 2, figs 14–16) are now identified as examples of the rostroconch *Watsonella* (see Landing, 1989). The *P. antiquissimus*, *Aldanella* and *Watsonella* are all indicative of an early Cambrian age (Brasier, 1989); it seems that halkieriids are also known only from early Cambrian strata, although the descendant genus *Wiwaxia* is of middle Cambrian age (Bengtson & Conway Morris, 1984). The other fossils, especially the abundant hyolithids, are consistent with an early Cambrian age; indeed, Dr White (in Poole, 1978, p. 20) had compared some hyolithid opercula from the Withycombe Formation with examples from the Lower Cambrian of Siberia.

2. Microfossils

Earlier work recorded that poorly preserved chitinozoa, suggesting an Ordovician or Silurian age, were present in the Withycombe Formation. Re-examination of the existing slides, together with the examination of several new preparations, has not revealed anything definitely determinable as chitinozoan. Acritarchs are present, however; most are sphaeromorphs of no stratigraphical value, but also present are examples of *Granomarginata squamacea* Volkova, a species that has been recorded in Britain only from the Cambrian, mainly the Lower and Middle Cambrian and questionably from the Upper Cambrian (T. L. Potter, unpub. Ph.D. thesis, Univ. Sheffield, 1974; Downie, 1984).

Reconsideration of the microfossil evidence thus does not support a post-Cambrian age but is consistent with the early Cambrian age indicated by the macrofossils.

Poole (1978) assigned the volcanic rocks lying unconformably below the Withycombe Formation to the Ordovician, with doubt. The new evidence indicates that a Precambrian age for the volcanic rocks is much more probable, and that they are part of the Proterozoic complex that makes up the basement of the Midlands Microcraton of Pharaoh *et al.* (1987a). The volcanic rocks are basaltic andesite lavas, but preliminary results by Dr T. C. Pharaoh (pers. comm.) indicate that they are geochemically akin to the late Precambrian diorites of the Charnwood area (Pharaoh *et al.* 1987b).

Acknowledgements. We thank Dr M. D. Brasier, Dr S. Conway Morris, Mr N. J. P. Smith, Dr T. C. Pharaoh and Dr D. E. White for discussion, and Dr T. L. Potter for access to his unpublished thesis. This letter is published by permission of the Director, British Geological Survey (NERC).

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6 February 1990