REVIEW OF THE BUS SWAMP 1 PALYNOLOGICAL RESULTS

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Thirty six core, sidewall core and cuttings samples from Bus Swamp 1 were submitted for palynological analysis to R. Morgan (Morgan Palaeo Associates), D. Burger (AGSO) and N.F. Alley (SADME). A comparison of their results reveals significant differences, only partly explicable by the use of different zonation schemes.

The most generally accepted palynological zonation scheme for Australian Mesozoic strata is that established by Helby et al. (1987). This was used both by Morgan (with modifications) and Alley. Burger used the scheme of Dettmann & Douglas (1976), but his conclusions can be readily expressed in terms of the Helby et al. (1987) scheme, as done in Table 8.

Helby et al. (1987, p. 35,37) defined the *C. australiensis/F. wonthaggiensis* zone boundary as marked by the first appearance of *F. wonthaggiensis*, and the *F. wonthaggiensis/C. hughesii* zone boundary as marked by the first appearance of *F. asymmetricus*. In a range chart (Fig. 13, p.22) they showed the first appearance of *P. notensis* in eastern Australia as coinciding with that of *F. asymmetricus*.

In the Otway Basin, Morgan (1985, 1986 and later) recognises these zone boundaries according to different criteria. He equates the base of the *F. wonthaggiensis* Zone with the first appearance of *D. speciosus* (slightly earlier than *F. wonthaggiensis*) and the top of the zone with the first appearance of *P. notensis*. '...*F. asymmetricus* is consistent to base *C. striatus* Zone, then extremely rare down to, and just past, the oldest occurrence of *P. notensis*...' (R. Morgan, written comm., 25.11.93). Morgan (1985, 1986) regarded the differences as minor modifications which do not significantly alter the sense or usage of the existing zonation (essentially that of Helby et al., 1987). Alley disagrees, in particular regarding the *F. wonthaggiensis/ C. hughesii* zone boundary in Bus Swamp 1. He considers *F. asymmetricus* as a good indicator for the *C. hughesii* Zone; its absence in the presence of *P. notensis* and/or *T. reticulatus* is taken to indicate the *F. wonthaggiensis* Zone. *P. notensis* is shown to appear more than 5m.y. earlier than *F. asymmetricus*. The lower part of Morgan's *C. hughesii* Zone is equated with the upper part of the *F. wonthaggiensis* Zone of Helby et al. (1987) and other authors.

The disagreement between Alley and Morgan regarding the recognition and placement of the *F. wonthaggiensis/C. hughesii* zone boundary is essentially a question of whether in the Otway Basin the first appearance of *P. notensis* is distinctly older than that of *F. asymmetricus* (Alley) or whether this only appears so because *F. asymmetricus* is rare and sporadic near the base of its range (Morgan).

Examination of available Otway Basin palynological data reveals that in some bores *P. notensis* appears below *F. asymmetricus* (Tirrengowa 1, Woolsthorpe 1). or *P. notensis* is present whereas *F. asymmetricus* is not (South Caramut 1, Terang 1). In other bores, however, *P. notensis* and *F. asymmetricus* first appear at the same level (Casterton 1, Greenslopes 1, Lindon 1, Moyne Falls 1).

The pattern of distribution outlined above appears to support Morgan's view, and I have accepted his assignment of Bus Swamp 1 samples from 862 to 886m to the *C. hughesii* Zone, rather than to the *F. wonthaggiensis* Zone or its equivalent

as done by Burger and Alley. Samples from 913 to 1765 m represent the *F. wonthaggiensis* Zone. Burger assigns samples from 913 m and below to the equivalent of the *C. australiensis* Zone, mainly because of the absence of *F. wonthaggiensis*; however, this palynomorph has been recorded from these levels by Alley. Samples from 1787 to 1805 m come from the *C. australiensis* Zone.

Differences in the placement of the *F. wonthaggiensis/C. hughesii* zone boundary are not merely of academic concern as they affect rock unit biostratigraphic age estimation. Largely on the basis of Morgan's work, we regarded the base of the Eumeralla Formation as well as the uppermost strata of the underlying Pretty Hill Formation as being within the *C. hughesii* Zone. According to Alley, however, the lowermost Eumeralla Formation beds (those not containing *F. asymmetricus)* should be assigned to the *F. wonthaggiensis* Zone.

Depth (m)	Morgan	Burger	Alley
210.0 -215.0	Lower paradoxa		
300	Lower paradoxa		
465	striatus		
657		Indeterminate	
756	Lower hughesii		
830			Upp. F. wonthaggiensis
830.4 - 836.4		Middle C. hughesii	Upp. F. wonthaggiensis
862	Lower hughesii	Middle C. hughesii	
865.0 - 870.0	Lower hughesii		
886	Lower hughesii		
913		Upper C. australiensis	
957			Lwr F. wonthaggiensis
982			Indeterminate
1105			Lwr F. wonthaggiensis
1145			Indeterminate
1190	Lwr F. wonthaggiensis		
1325	Lwr F. wonthaggiensis		
1406			Indeterminate
1509.8 - 1515.8		Upper C. australiensis	
1515			Lwr F. wonthaggiensis
1560	Lwr F. wonthaggiensis		
1640	Lwr F. wonthaggiensis		
1730	Lwr F. wonthaggiensis		
1756		Upper C. australiensis	
1760.0 - 1765.0	Lwr F. wonthaggiensis		
1787	Lwr C. australiensis - R. watherooensis		
1785.2 - 1790.1		Upper C. australiensis	Upp. C. australiensis
1800.0 - 1805.0			Upp. C. australiensis
1803			Younger than R. watherooensis
1815		Indeterminate	
1840	Indeterminate		

Table 10. Summary of Results of Palynology Analyses.

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