

FORAMINIFERAL BIOSTRATIGRAPHY - PORT CAMPBELL NO. 4

Rotary cutting samples to 4800 feet and cores 1 to 14 have been examined from Frome-Broken Hill's Port Campbell No. 4 Well.

No comment can be made on the biostratigraphy above 3519 feet as no fauna was found in cores 1 to 5 and the cuttings were so heavily contaminated that no conclusion could be drawn.

3519 to 4400 feet.

The first appearance of Upper Cretaceous arenaceous foraminifera was noted in Core 6 (3519 to 3536 feet). This fauna consisted mainly of *Haplophragmoides* spp. which occurred sporadically throughout this interval, although no faunas were found in the richly glauconitic and limonitic cores 8 and 9. The fauna of this interval is similar to that of the Paaratte Formation in the other Port Campbell wells.

4400 to 4600 feet.

Arenaceous species occur at the top of the dark grey mudstone, but few calcareous and no planktonic forms were noted. This is in marked contrast to the top of the dark grey mudstone (Belfast Mudstone) in Port Campbell No. 1 and No. 2 wells. Core 10 (4580 to 4600 feet) contained an abundant arenaceous fauna indicative of Zonule A of Taylor (1964).

4600 to 4800 feet.

There is a marked change between the fauna of core 10 and that of core 11 (4600 to 4608 feet). In core 11 the fauna is still predominantly arenaceous, but includes 30% calcareous species. This gross faunal change is no doubt dictated by facies, but is by no means unusual within the Belfast Mudstone and has been fully discussed by Taylor (loc. cit.) However, the gross faunal change is accompanied by the presence of such forms as *Colomia austrotrochus* Taylor and *Gavelinopsis cenomanica* (Brotzen) which are characteristic species of Zonule B. The highest appearance of *Textularia trilobita* Taylor at 4700 feet confirms the determination of Zonule B. Well developed specimens of *T. trilobita* do not range as high as the other two species listed.

Cores 12 to 14 (4894 to 5005 feet).

No foraminifera were found in these cores although fish scales and bone accompanied a rich macroflora in Core 14. In the course of sample preparation, it was noted that the mudstone cores 12 and 14 did not have the same physical properties as Belfast Mudstone.

CORRELATION AND COMMENT

The nature of the Port Campbell No. 4 Upper Cretaceous sequence was predictable from previous work (Taylor, loc. cit.). Taylor proposed that the Upper Cretaceous sedimentation was transgressive onto a sloping surface, so that the lower part of the Belfast Mudstone is restricted to deeper sections. Also, he shows that the marginal-marine sediments of the Paaratte Formation developed from the north and west, gradually inundating Belfast Mudstone sedimentation.

Reiterating the Port Campbell No. 4 results, the lower part of the Belfast Mudstone (= Zonule B) is present, but is less than 300 feet thick, compared with well over 600 feet in Port Campbell No. 2. The upper part of the Belfast Mudstone does not appear to be fully developed in Port Campbell No. 4, as the characteristic calcareous and planktonic foraminifera are absent from it. Also, this upper part of the formation is only 200 feet thick compared with 1100 feet in Port Campbell No. 2. It would appear that the Belfast Mudstone sedimentation was terminated in Port Campbell No. 4 before it was in Port Campbell No. 2.

The nature and thickness of the Upper Cretaceous sections of Port Campbell No. 1 and No. 4 are closely comparable, except for the fact that the marginal-marine sediments of Port Campbell No. 4 do not contain tongues of Belfast Mudstone type sediment as in Port Campbell No. 1. These Belfast Mudstone tongues in Port Campbell No. 1 contain rich calcareous and planktonic foraminifera which indicate open ocean conditions. No such conditions are evident in any part of the Port Campbell No. 4 section. However, the rich glauconitic and limonitic cores 8 and 9 (4112 to 4132 feet and 4269 to 4289 feet) could represent close-shore lateral equivalents of the Belfast Mudstone tongues, and these cores could represent periods of slow deposition before the accelerated outwash of detrital material of the marginal-marine sediments. Therefore cores 8 and 9 are possibly the equivalents of the top of the Belfast Mudstone in Port Campbell No. 2.

It is noted that Zonule B has only been identified in Port Campbell No. 1, 2 and 4 and Flaxmans No. 1, although twenty-one Upper Cretaceous sections have been examined in western Victoria.

In conclusion, it would appear that Port Campbell No. 4 was closer to the Upper Cretaceous shoreline than Port Campbell No. 1 and certainly closer than Port Campbell No. 2. On the other hand, marine sedimentation commenced in this section before it did in Port Campbell No. 3, Timboon No. 5, Fergusons Hill No. 1, Sherbrook No. 1 and Latrobe No. 1.

July 1, 1964

DAVID J. TAYLOR

Reference:

- Taylor, D. J. 1964 Foraminifera and the stratigraphy of the western Victorian Cretaceous sediments.
Proc. Roy. Soc. Vict., 77 (2).