



✓ PALYNOLOGICAL REPORT ON F.B.H. FERGUSONS HILL NO. 1 AND

F.B.H. SHERBROOK NO. 1 WELLS

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Cores retrieved from F.B.H. Fergusons Hill No. 1 well between 1554 feet and 11,432 feet and from F.B.H. Sherbrook No. 1 well between 3365 feet and 5424 feet yielded microfloras of Lower and Upper Cretaceous age. These microfloras provide a means by which the two bore sequences may be correlated, both with each other and with Cretaceous sequences at other localities in the Otway Basin.

The Fergusons Hill No. 1 well core samples provided fair or good concentrations of plant microfossils, with the exception of cores 2, 4, 7, 8 and 28-31 which are either barren or yielded extremely sparse microfloras. Microfossils extracted from the lower part of the well (core 22 and below) are poorly preserved, especially in the lowest cores (27-31) in which strongly compressed and often broken spore walls are present. The Sherbrook microfloras are not in general as well preserved or as varied as those from corresponding depths in Fergusons Hill No. 1 well. Moreover, cores 14, 19 and 20 from the former well yielded extremely low concentrations of microfossils.

The microfloral succession in the Fergusons Hill and Sherbrook wells is conformable with that recorded previously from other sequences in the Upper Mesozoic of the Otway Basin. The assemblages identified in the present investigation include, from oldest to youngest, the Speciosus (older and younger categories) and Paradoxa Assemblages of Dettmann (1963a) and Assemblages II and III first recognised in the Port Campbell wells (Dettmann 1964a). The presence of the older category of the Speciosus Assemblage in the lower horizons of Fergusons Hill No. 1 well indicates that these sediments are older (Valanginian-Aptian) than those of Upper Mesozoic age that have been investigated palynologically from the eastern portion of the Otway Basin. Further comments on the occurrences of the Cretaceous microfloral assemblages are documented below, and their distribution in Fergusons Hill No. 1 and Sherbrook No. 1 wells is tabulated in Tables 1 and 2.

The Speciosus Assemblage

(a) The older (Valanginian-Aptian) category, diagnosed by Cyclosporites hughesi (Cookson & Dettmann) together with Dictyotosporites speciosus Cookson & Dettmann, of the Speciosus Assemblage is recorded from between 7818 and 11,432 feet in Fergusons Hill No. 1 well. Thus, on microfloral evidence, these horizons are older than those Upper Mesozoic sediments previously investigated from the eastern portion of the Otway Basin. However, they are younger than the lowermost Cretaceous (Valanginian or older, on the basis of the Stylosus Assemblage) sediments that occur in Penola No. 1 well at 4766-76 feet, in the western portion of the basin. At least part of the succeeding Penola No. 1 sequence (3363-4618 feet) that contained D. speciosus in association with C. hughesi and equivalents of this sequence (Eumeralla No. 1, 7225-10,308 feet, etc. - see Dettmann 1963b) are probable correlatives of sediments in Fergusons Hill No. 1 well between 7818 and 11,432 feet. Within this interval in Fergusons Hill No. 1 well, cores 25 and 26 yielded Cooksonites variabilis Pocock, a spore species that possesses restricted vertical distribution in eastern Australia and western Canada. Its presence suggests correlation of cores 25 and 26 (9195-9631 feet) in Fergusons Hill No. 1 well with the following horizons in the western portion of the basin: Eumeralla No. 1 between 8459 and 8924 feet; Pretty Hill No. 1 between 5935 and 5947 feet; Penola No. 1 between 3715 and 3721 feet; and Robe No. 1 at 3860 feet.

REFERENCES

- Cookson, I. C. and Eisenack, A. 1958. Microplankton from Australian and New Guinea Upper Mesozoic sediments. Proc. Roy. Soc. Vict., 70: 19-79.
- Cookson, I. C. and Eisenack, A. 1960. Microplankton from Australian Cretaceous sediments. Micropalaeontology 6: 1-18.
- Cookson, I. C. and Eisenack, A. 1961. Upper Cretaceous microplankton from the Belfast No. 4 bore, south-western Victoria. Proc. Roy. Soc. Vict. 74: 69-76.
- Cookson, I. C. and Eisenack, A. 1962. Additional microplankton from Australian Cretaceous sediments. Micropalaeontology 8: 485-507.
- Dettmann, M. E. 1963a. Upper Mesozoic microfloras from south-eastern Australia. Proc. Roy. Soc. Vict. 77: 1-148.
- Dettmann, M. E. 1963b. Palynological report on non-marine Lower Cretaceous sediments intersected in F.B.H. Eumeralla No. 1 and F.B.H. Pretty Hill No. 1 wells. Unpublished report submitted to Frome-Broken Hill Co. Pty. Ltd., 14/11/63.
- Dettmann, M. E. 1964a. Palynological report on Mesozoic core samples from the lower horizons intersected in F.B.H. Port Campbell No. 1, No. 2, and No. 3 wells. Unpublished report submitted to Frome-Broken Hill Co. Pty. Ltd. 3/3/64.
- Dettmann, M. E. 1964b. Palynological report on Cretaceous core samples from F.B.H. Flaxmans No. 1 well. Unpublished report submitted to Frome-Broken Hill Co. Pty. Ltd. 7/4/64.
- Dettmann, M. E. 1964c. Palynological report on core samples from Timboon No. 5 bore. Unpublished report submitted to Frome-Broken Hill Co. Pty. Ltd. 24/4/64.

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(b) Microfloras that conform with the younger (Aptian) category of the Speciosus Assemblage in containing Dictyotosporites speciosus and Crybelosporites striatus (Cookson & Dettmann) occur in cores 20 and 21 of Fergusons Hill No. 1 well. Equivalent microfloras are known (Dettmann 1963a, 1964b) from Flaxmans No. 1 well between 10,801 and 11,528 feet and in an outcrop sample from the Barrabool Hills in the eastern portion of the basin. These horizons have already been correlated on microfloral evidence with numerous deposits in the western portion of the basin (Dettmann 1964b).

Paradoxa Assemblage

Core 18 in Fergusons Hill No. 1 well contained the diagnostic species, D. speciosus and Coptospora paradoxa (Cookson & Dettmann), of both the Speciosus and Paradoxa Assemblages together with Dictyotosporites filiosus Dettmann. A similar occurrence of these three species is in Penola No. 1 well at 2790-98 feet. On the basis of D. filiosus core 18 in Fergusons Hill No. 1 well is correlated also with Flaxmans No. 1 at 10,492-502, Robe No. 1 at 3150 feet, Beachport No. 1 at 3946 feet, and Eumeralla No. 1 at 6242-52 feet.

Coptospora paradoxa was encountered in succeeding cores (9-17) in Fergusons Hill No. 1 well. Horizons represented by cores 7 and 8 in the same well contain impoverished microfloras not certainly identifiable with either the Paradoxa Assemblage or Assemblage II. In Sherbrook No. 1 well the Paradoxa Assemblage occurs in horizons between cores 13 and 25. Core 26 in this well is not certainly identifiable with either the Speciosus or Paradoxa Assemblages. However, the presence of Laevigatosporites ovatus Wilson & Webster which is known hitherto only from horizons containing the Paradoxa or younger assemblages suggests conformity with the Paradoxa Assemblage.

Thus, sediments between 4049 and 5424 feet in Sherbrook No. 1 well may be correlated with horizons between 3105 and 6423 feet in Fergusons Hill No. 1 well, between 7473 and 9135 feet in Flaxmans No. 1 well, and with equivalents of the latter sequence (Dettmann 1964b, c). The suggested age of these deposits is Aptian-Albian.

Assemblage II

Diagnostic components of this assemblage first appear in core 6 and continue into core 3 in Fergusons Hill No. 1 well. Microplankton also make their first appearance in core 6 and include Gonyaulax edwardsi Cookson & Eisenack and Odontochitina operculata Deflandre both of which range from the Albian to the Lower Turonian (Cookson and Eisenack 1958). Core 3 yielded Cyclonophelium clathromarginatum Cookson & Eisenack 1962 (?Upper Albian-Cenomanian) and Chlamydochorella nyei Cookson & Eisenack 1958 (?Aptian-Lower Turonian).

Core 11 in Sherbrook No. 1 well contains an impoverished microflora referable to Assemblage II. Microplankton make their first appearance at this level and include the Upper Cretaceous and Lower Tertiary species Hystichosphaeridium heteracanthum Deflandre & Cookson (see Cookson and Eisenack 1961). Other strata containing the Upper Albian-Cenomanian/Turonian Assemblage II have been recorded from the Port Campbell, Flaxmans, and Timboon sequences (see Dettmann 1964c).

Assemblage III

The presence of cf. Gleicheniidites sp. indicates that Assemblage III is represented in core 1 of Fergusons Hill No. 1 well and cores 9 and 10 of Sherbrook No. 1 well. Associated microplankton obtained from the Sherbrook samples include Odontochitina cribropoda Deflandre & Cookson, Deflandrea cretacea Cookson, and Hexagonifera glabra Cookson & Eisenack indicating a Turonian-Senonian age. This microplankton suite may be compared with those occurring in Flaxmans No. 1 well at 5950-70 feet, Port Campbell No. 1 well at 5223-33 feet, Port Campbell No. 2 well at 7403-09 feet, and Port Campbell No. 3 well at 4400-10 feet. Horizons containing this microplankton suite either are absent or were not sampled in Fergusons Hill No. 1 well. However, Odontochitina porifera Cookson was identified in core 1; this species indicates an Upper Turonian-Senonian age (Cookson and Eisenack 1960).

REMANINE FOSSILS

Spores and pollen grains of Permian and Triassic age were observed in the following samples: Fergusons Hill No. 1 well, cores 1, 3, 5, 6, 9, 10, 15, 17, 18 and 22; Sherbrook No. 1 well, cores 11, 24, 25 and 26. Reworked specimens of lowermost Cretaceous (Aptian and older) microspore species were recovered from several samples (cores 1, 3, 6 and 9) in Fergusons Hill No. 1 well. These occurrences may indicate that lowermost Cretaceous strata provided some of the source material for horizons in the upper part of Fergusons Hill No. 1 well.

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	Microspores	Mega-spore	Pollen	Micro-plankton	
	1. <i>Cicatricosporites australiensis</i> 2. <i>Aequitriradites spinulosus</i> 3. <i>Rouseisporites reticulatus</i> 4. <i>Foraminisporis wonthaggiensis</i> 5. <i>Foraminisporis asymmetricus</i> 6. <i>Crybelosporites striatus</i> 7. <i>Rouseisporites radiatus</i> 8. <i>Coptospora paradoxa</i> 9. <i>Krauselisporites majus</i> 10. <i>Trilobosporites trioreticulosus</i> 11. <i>Trilites</i> cf. <i>T. tuberculiformis</i> 12. <i>Cicatricosporites hughesi</i> 13. <i>Pilososporites grandis</i> 14. <i>Laevigatosporites ovatus</i> 15. cf. <i>Gleicheniidites</i> sp. 16. <i>Balmeisporites holodictyus</i>		17. <i>Amosopollis cruciformis</i> 18. <i>Tricolpites</i> sp. 19. <i>triporate</i> sp. A 20. <i>triporate</i> sp. B	21. <i>Hystriosphæridium heteracanthum</i> 22. <i>Deflandrea</i> cf. <i>D. belfastensis</i> 23. <i>Deflandrea cretacea</i> 24. <i>Odontochitina cribrropoda</i> 25. <i>Hexagonifera glabra</i>	
c.9 3565-78'					III
c.10 3596-3601'					
c.11 3825-26'					II
c.13 4049-51'	+				Paradoxa
c.14 4064-69'	+				
c.17 4316-18'	+				
c.18 4321-27'	+				
c.19 4598-4601'	+				
c.20 4865-77'	+				
c.23 4896-4904'	+				
c.24 4913-29'	+				
c.25 5216-36'	+				
c.26 5414-24'	+				

Table 2. Distribution of selected spore, pollen, and microplankton species in core samples from the lower part of Sherbrook No.1 well. + - species present; cf - specimens similar to, but not identical with, a particular species.

