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1963/53

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SUMMARY

The microflora from Lower Cretaceous horizons in F.B.H. Pretty Hill No.1 and F.B.H. Eumeralla No.1 are recorded and used to correlate these sections with others in South Australia and western Victoria. A tentative subdivision of the Lower Cretaceous, modified from that initially suggested by Cookson & Dettmann (1958) is employed. A tendency towards brackish, if not marine conditions of sedimentation is recognized in late Lower Cretaceous times.

INTRODUCTION

F.B.H. Pretty Hill No.1 Well was drilled by Frome-Broken Hill Co. Pty Ltd into the Tyrendarra Embayment of the Otway Basin at Long. 142° 07' 30" E; Lat. 38° 13' 30" S. to a total depth of 8124 feet during the period September - October 1962 (Bain, 1962). The well entered (?) Cambrian diabase at 7874 feet after penetrating a Tertiary and Cretaceous section. It entered a "basal sandstone" at 5964 feet with porosity and permeability values such as to warrant consideration of the formation as a potential reservoir. The company then drilled F.B.H. Eumeralla No.1 about 10 miles to the west of the Pretty Hill No.1 to test the extend of the "basal sandstone". Eumeralla No.1 was sited at Long. 141° 56' 01" E; Lat. 38° 12' 43" S. and was drilled to a total depth of 10,308 feet without encountering basement.

Palynological observations were made in the Bureau of Mineral Resources on Pretty Hill No.1 in November 1962, initially to determine the age of the "basal sandstone". Observations were later made on cores from the Tertiary and Upper Cretaceous horizons of the well. The results of this examination appear in Appendix 2 of Bain (1962).

Samples of thirteen cores from Eumeralla No.1 were examined in March 1963 to compare the Eumeralla section with that encountered in Pretty Hill No.1. Results of that examination will appear in the Eumeralla No.1 Well Completion Report.

The object of this paper is to compile the data on the Lower Cretaceous sections of these wells and to compare them with ones obtained from the Lower Cretaceous of other sections in the Otway Basin. Comments on the Upper Cretaceous of Pretty Hill No.1 are not included. The author's conclusions on that horizon presented in Bain (1962) should be considered in the light of evidence recorded by Douglas in the same report.

MATERIAL EXAMINED

Pretty Hill No.1

Merino Group.	Core 16,	5954 - 5957	feet.
"Basal sandstone".	*Core 19,	6696 - 6697½	feet.
" "	*Core 20,	7200 - 7214	feet.

Cores 17 (6070 - 6080 feet) to 21 (7585 - 7597 feet) were cut from the "basal sandstone". Only samples from cores 19 and 20 were processed as the available cuts from the other three cores were of porous sandstone that probably contains a very low spore content and that in any case might have been invaded by contaminating drilling mud. The sample taken from core 19 included a thin lamination of coaly matter. That from core 20 consisted of a very thin lamination of grey silty sandstone.

Eumeralla No.1

The company's subdivision of the well section into formations is not yet available.*

Core samples were taken from the following depths.

Core	5,	3313 - 3315 feet.
Core	6,	3806 - 3808 feet.
Core	8,	4812 - 4814 feet.
Core	10,	5803 - 5805 feet.
Core	13,	6254 - 6257 feet.
Core	15,	6716 - 6718 feet.
Core	18,	7712 - 7714 feet.
Core	19,	8151 - 8152½ feet.
Core	20,	8458 - 8461 feet.
Core	21,	8916 - 8918 feet.
Core	22,	9397 - 9381 feet.
Core	23,	9767 - 9769 feet.
Core	25,	10302 -10305 feet.

OBSERVATIONS

The microspores, pollens and microplankton encountered in Eumeralla No.1 are listed in Table I: those from Pretty Hill No.1 are in Table II.

The fossils were generally well preserved even to total depth in Eumeralla No.1.

Neither of the samples from Pretty Hill contained microplankton. Likewise the samples below core 10 in Eumeralla No.1 lacked these fossils. However, the hystrichosphere Micrhystridium sp. and the pterospermopsid Cymatiosphaera sp. between cores 5 and 10 in Eumeralla No.1 indicate possible marine or brackish water conditions of deposition over the interval 3313 - 5805 feet in the well.

AGE DETERMINATIONS

Observed forms such as Cyathidites australis, Sphagnumsporites spp., Baculatisporites comaumensis, Leptolepidites verrucatus, Cicatricosisporites cooksonii, Lycopodiumsporites austroclavatidites, "Ginkocycadophytus" nitidus, and Vitreisporites pallidus commenced their life ranges in Jurassic or earlier times and they have no bearing on stratigraphical sub-divisions of Eumeralla No.1. The presence of Cicatricosisporites dorogensis (al. australiensis) and Aequitriradites verrucosus at total depth in that well indicates that it finished in beds of Lower Cretaceous age.

The association of Dictyosporites speciosus and Lycopodiumsporites circolumenus with C. dorogensis (in Eumeralla No.1, c.19 and below) may be taken to indicate the Aptian.

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* [illegible]

Porotrilites striatus, Balmeisporites holodictyus and Cingulatisporites euskirchensoides in core 8 of Eumeralla No.1 signify an Albian age for the core. The species observed between core 8 and core 19 have no meaning in terms of the accepted stage divisions of the Lower Cretaceous, partly because the Eumeralla section modifies knowledge of the ranges of certain species, and partly because there are variations in assemblage from one sample to another that have no stratigraphic significance when the ranges of their component species elsewhere are considered. Core 19 of Eumeralla, for example, contains an assemblage that was not repeated elsewhere in the well but which is composed of species that range through thick sections at Robe and Penola. Until more work is done on the palynological meaning of the Aptian and the Albian any use of these terms will bear little precision. However, at least certain locally recognizable units are becoming apparent within the Lower Cretaceous, indications of which are demonstrated in the following discussion.

CORRELATION OF LOWER CRETACEOUS SECTIONS IN THE OTWAY BASIN WITH THE PRETTY HILL AND EUMERALLA WELLS

F.B.H. Pretty Hill No.1 is the nearest deep well to Eumeralla No.1. Pretty Hill No.1 core 20 contained fairly common Cythathiids and L. circolumenus, D. speciosus and Cyclosporites hughesi (Table II). L. circolumenus was also present in core 19. These species imply a correlation of the Pretty Hill samples with horizons somewhere between core 19 and core 21 of Eumeralla No.1 (see figure 1). However, all these species occur as low as the base of the marine Cretaceous of the Great Artesian Basin (Cookson & Dettmann, 1958), i.e. very close to the level at which C. dorogensis first appears. Thus it is feasible, on the basis of comparable points of first appearance, that Pretty Hill No.1 core 20 could be as old or older than the bottom of Eumeralla No.1. Palynological data from the wells is insufficient for a determination of which of these alternatives is correct.

F.B.H. Flaxman's No.1 Well, drilled into the eastern part of the Otway Basin, penetrated an horizon (core 41 (10801 - 10817 feet)) that contains relatively abundant C. dorogensis (Evans, 1962). As this epibole was not repeated at any other horizon in Flaxman's No.1 and as it appeared at only one horizon in Eumeralla No.1, in core 13 (6254 - 6257 feet), it is possible that these horizons may be correlated. A similar abundance of C. dorogensis was observed in outcrop sample W - 37 from the Merino Group at Merino (Evans, 1961b).

O.D.N.L. Penola No.1 was drilled to the west of the outcropping Merino Group through a sequence that is directly comparable with that in Eumeralla No.1. A twofold division of the Lower Cretaceous of Penola was possible (Evans, 1961a), based on the change occurring between core 8 (2586 - 2596 feet) and core 12 (3363 - 3373 feet). Unfortunately inconclusive results from the intervening cores (9 - 11) prevented any attempt at refining the limits of this change. The same change occurs between core 8 and core 18 (4814 - 7712 feet) of Eumeralla No.1 if the range of D. speciosus is taken as a common denominator in the lower division.

Correlation between Penola and Eumeralla may also be expressed in terms of the observed limits of ranges of species as in figure 1. It is perhaps significant that this correlation places Eumeralla No.1 core 5 and core 8 and Penola No 1, core 8 that all contained hystrichospheres into the same unit. It also links Eumeralla No.1 core 10 and Penola No.1 core 9 - 11, none of which yielded spores in abundance. The significance of the hystrichospheres may be heightened by their presence in Flaxman's No.1, core 34 (8470 - 8484 feet), appropriately above the epibole of C. dorogensis.

REFERENCES

BAIN, J.S., 1962 - Well completion report, Pretty Hill No.1, South West Victoria. Frome-Broken Hill Co.Pty Ltd Rep.No. 7200-G-94 (unpubl.).

COOKSON, I.C., & DETTMANN, M.E., 1958 - Some trilete spores from Upper Mesozoic deposits in the eastern Australian region. Proc.Roy.Soc. Vic. 70(2), 95-128.

EVANS, P.R., 1961a - A palynological report on Oil Development N.L. Penola No.1 Well, South Australia. Bur.Min.Resour.Aust.Rec. 1961/76 (unpubl.).

EVANS, P.R., 1961b - A palynological examination of samples from the Merino Group, Victoria. Ibid. 1961/155 (unpubl.).

EVANS, P.R., 1962 - Palynological observations on F.B.H. Flaxman's Hill No.1 Well. Ibid. 1962/57 (unpubl.).

ADDENDUM

The well completion report for Eumeralla No.1 (Bain, 1963) was received after the preceding notes had been compiled. Bain divided the section as follows:

0 - 1268 feet	Glenelg Group (= Heytesbury Group)
1268 - 2740 feet	Knight Group (= Wangerrip Group)
2740 - 2960 feet	Paaratte Formation
2960 - 3108 feet	Belfast Mudstone
3108 -10308 feet	Merino Group.

Below 9100 feet it contains sandstones similar to the basal sandstone of Pretty Hill No.1.

Reference

BAIN, J.S., 1963 - Well completion report, Eumeralla No.1, South West Victoria. Frome-Broken Hill Co. Pty Ltd Rep. No. 7200-W-21 (unpubl.).

TABLE I: DISTRIBUTION OF SELECTED MICROFLORAL SPECIES IN F.B.H. EUKERALLA NO.1

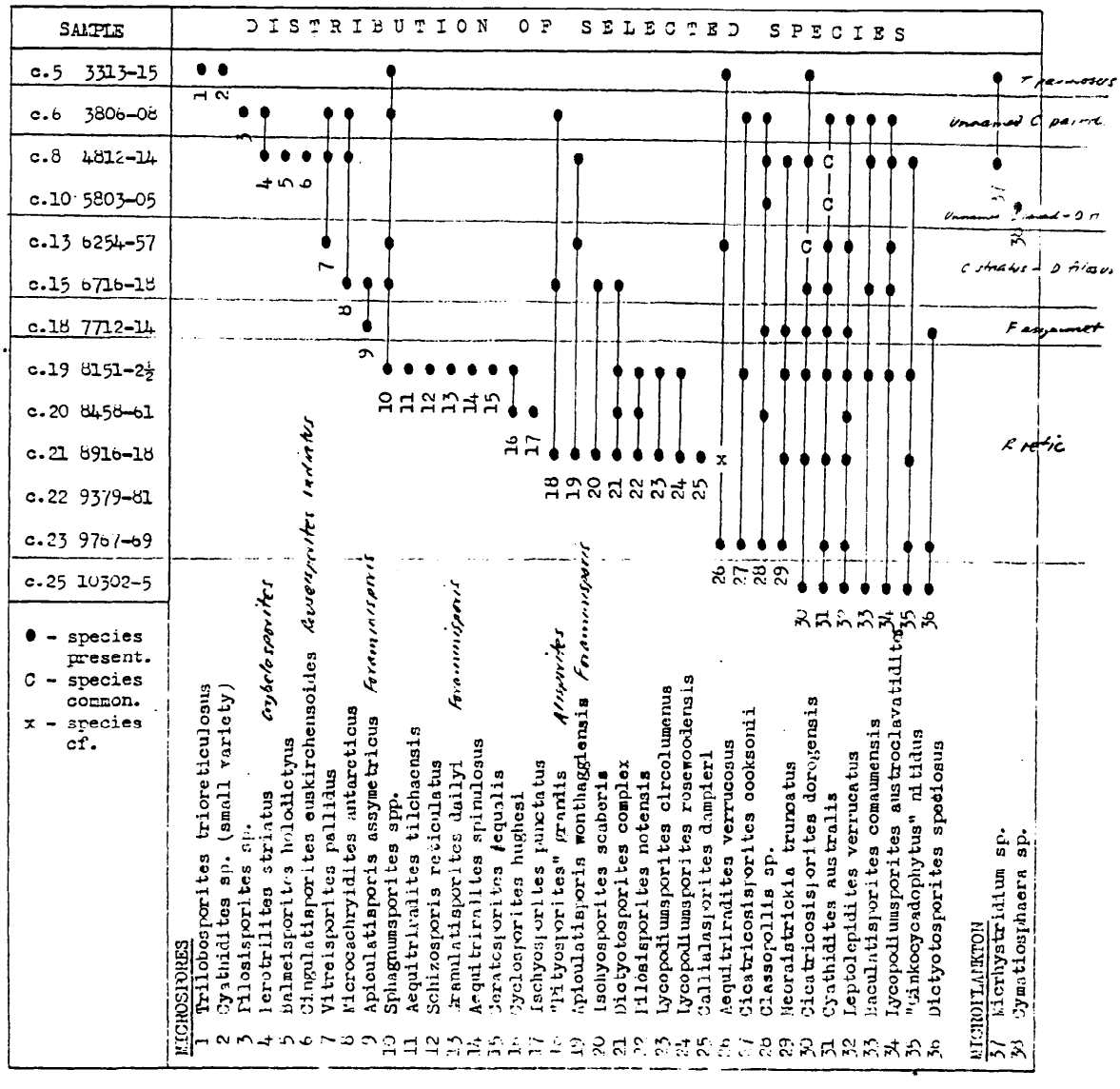


TABLE II THE MICROFLORA OF CORES 19, 20 FROM F.B.H. PRETTY HILL NO.1

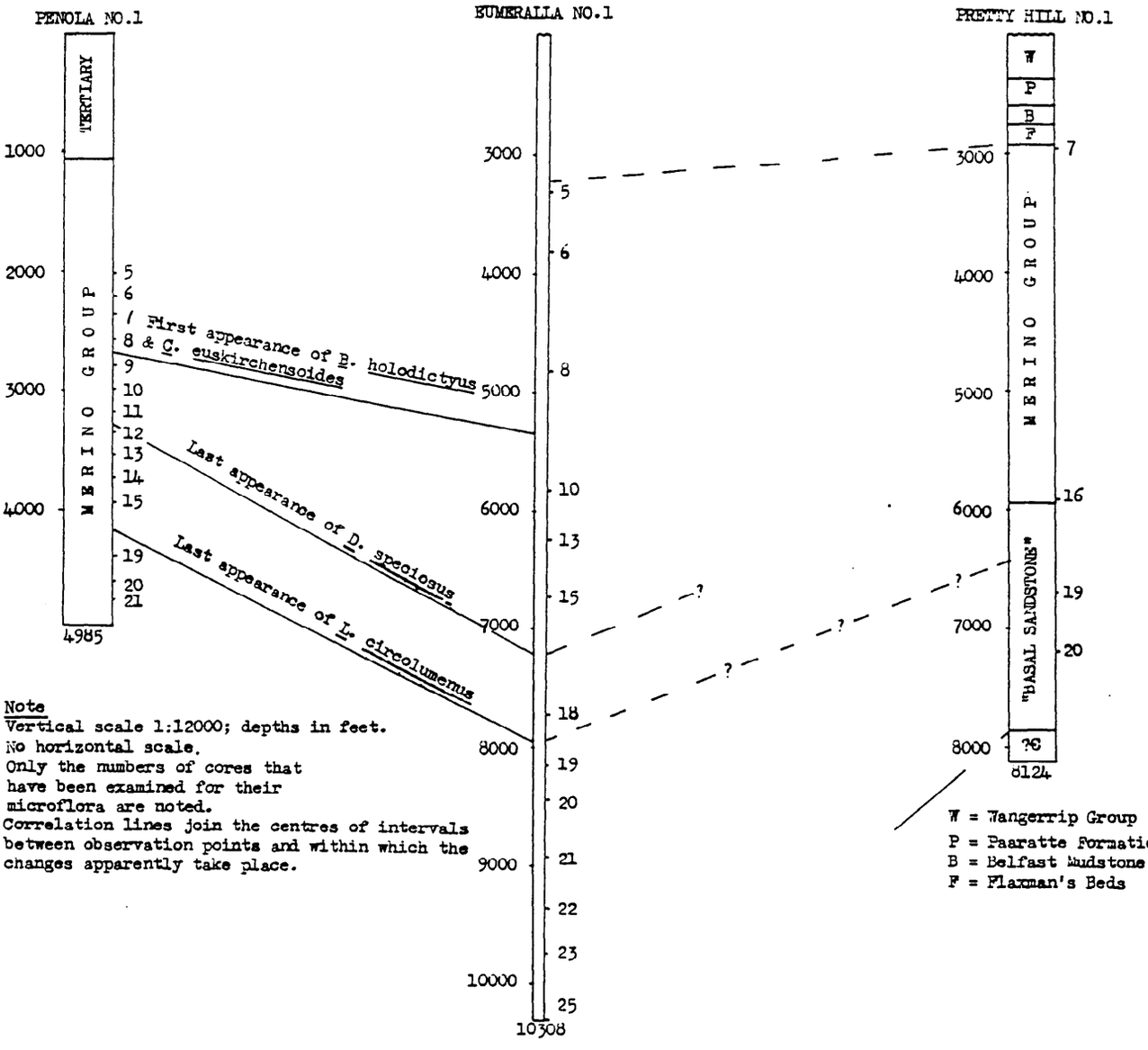
Core 19 (6696 - 6697 ft. 6 in.) included a thin (¼ inch) lamination of coaly matter. Maceration of this material yielded vegetable tissue and extremely few spores. Lycopodiumsporites circolumenus and Leptolepidites verrucatus were recognized among them.

Core 20 (7200 - 7214 feet: precise interval not determinable) was also of sandstone, but included a very thin lamination of grey silty sandstone. This lamination yielded a moderate number of well preserved spores. They included:

Cyathidites spp. incl. C. australis rimalis
Dictyotosporites speciosus) 1
Lycopodiumsporites circolumenus) specimen
Cyclosporites hughesi) of
Aequitriradites tilchaensis) each
Disaccites spp. (common)
"Inaperturopollenites" spp. (fairly common).

TENTATIVE MICROFLORAL CORRELATION OF THREE SECTIONS THROUGH THE MERINO GROUP OF THE OTWAY BASIN.

FIGURE 1.



Note
Vertical scale 1:12000; depths in feet.
No horizontal scale.
Only the numbers of cores that have been examined for their microflora are noted.
Correlation lines join the centres of intervals between observation points and within which the changes apparently take place.

W = Wangerrip Group
P = Paaratte Formation
B = Belfast Mudstone
F = Flaxman's Beds