

✓ 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

DE 1

INTRODUCTION

The present report incorporates preliminary results of microfloral analyses of cores from F.B.H. Eumeralla No.1 Well between 5311 and 10,308 ft. and from F.B.H. Pretty Hill No.1 Well between 2928 and 7597 ft. The Lower Cretaceous microfloras obtained from these non-marine horizons provide a means by which the sequences may be subdivided and correlated with other bore sections and outcrops in the Otway Basin. Correlation of the sediments is based entirely on the presence of certain microfloral species possessing restricted vertical distribution. The stratigraphical use of quantitative changes in the microfloras will be evaluated at a later date.

Microfloras contained in samples from Eumeralla No.1 Well between 941 and 2849 ft. and from Pretty Hill No.1 Well between 1282 and 2739 ft. are of post-Lower Cretaceous age and will be considered in a subsequent report.

GENERAL OBSERVATIONS

With the exception of those obtained from cores 17, 21, and 22, the microfloras from Eumeralla No.1 Well are diverse and well-preserved. Cores 18, 20, and 21 in Pretty Hill No.1 Well yielded well-preserved spores and pollen in extremely low concentrations, whereas the more abundant microfloras contained in cores 10-14, 16, 17, and 19 from the same well are poorly preserved. The other cores (7-10 and 15) examined from Pretty Hill No.1 Well contain diverse and well-preserved microfloras.

Organisms of definite marine origin have not been observed in any of the residues. Remanié microspores and pollen grains of Permian and Triassic age were obtained from many of the samples, and were more commonly found in the upper interval (3311-5309 ft.) of Eumeralla No.1 Well.

It is relevant to add that sediment from the inner part only of each core sample was processed for microfloral examination. This procedure was adopted to minimize the risk of incorporating drilling mud in the preparations.

MICROFLORAL ASSEMBLAGES AND CORRELATIONS

The microfloras occurring in the non-marine horizons between 3311 and 10,308 ft. in Eumeralla No.1 Well and between 2928 and 7597 ft. in Pretty Hill No.1 Well are comparable to the Lower Cretaceous microfloral assemblages that were described by Cookson and Dettmann (1958a,b) and Dettmann (1963) from south-eastern Australia. Two of the three assemblages delineated by Dettmann occur successively in both the Eumeralla and Pretty Hill sequences (see Table 1). On this basis the non-marine bore sections are subdivided and correlated with sediments of equivalent age in ODNL Penola No.1 Well and South Aust. Oil Wells Robe Bore No.1 (Table 2). The microfloral evidence recorded below indicates that the lowest Mesozoic horizons examined from Eumeralla No.1 Well and the sediments at and above 7214 ft. in Pretty Hill No.1 Well are younger in age than core 21 (4766-76 ft.) in Penola No.1 Well. The basal sample (at 7585-97 ft.) from Pretty Hill No.1 Well contains a sparse microflora and cannot be precisely correlated on microfloral evidence with the Penola and Eumeralla sequences.

An outline of the stratigraphical occurrence of the three, distinct, Lower Cretaceous microfloral assemblages (the Stylosus, Speciosus, and Paradoxa

Assemblages) in Eumeralla No.1 and Pretty Hill No.1 Wells and in other Otway Basin sediments is presented below.

The Stylosus Assemblage: This assemblage, which is of lowermost Cretaceous (Valanginian or older) age has been recorded from Penola No.1 Well at 4766-76 ft. Strata immediately succeeding this interval contain the Speciosus Assemblage of Valanginian-Aptian age.

The Speciosus Assemblage: Microfloras recognizably conformable with the Speciosus Assemblage occur in Eumeralla No.1 Well between 6034 and 10,308 ft., Pretty Hill No.1 Well between 5420 and 7214 ft., Penola No.1 Well between 2990 and 4619 ft., Robe Bore No.1 between 3150 and 4500 ft., Comaum Bore No.2 between 781 and 651 ft., and in an outcrop sample from the Barrabool Sandstone (for locality, see Dettmann 1963). Pretty Hill No.1 Well, core 21 (7585-97 ft.) contains a sparse microflora not definitely assignable to either the Stylosus or Speciosus Assemblage.

Two, distinct microfloral categories of the Speciosus Assemblage have been recognized. The older category is characterized by the association of Dictyosporites speciosus Cookson & Dettmann and Cyclosporites hughesi (Cookson & Dettmann), and the younger category is diagnosed by the combined occurrence of D. speciosus and Crybelosporites striatus (Cookson & Dettmann):

1) Assemblages in which D. speciosus and C. hughesi are present have been extracted from the following deposits: Eumeralla No.1 Well between 7225 and 10,308 ft., Penola No.1 Well between 3363 and 4619 ft., and Robe Bore No.1 between 3860 and 4500 ft. Comparable microfloras were recovered from cores 19 and 20 (6690-7214 ft.) in Pretty Hill No.1 Well. The succeeding cores (16-18) in this well contain poorly preserved ^{or sparse} microfloras in which C. hughesi and/or D. speciosus were not recognized.

Certain horizons which contain the older microfloral category of the

Speciosus Assemblage have also yielded Cooksonites variabilis Pocock which is of considerable stratigraphical value both in south-eastern Australia (Dettmann 1963) and Canada (Pocock 1962). The presence of C. variabilis in Eumeralla No.1 Well between 8459 and 8924 ft., Pretty Hill No.1 Well between 5935 and 5947 ft., Penola No.1 Well between 3715 and 3721 ft., and Robe Bore No.1 at 3860 ft. indicates that these deposits are correlatives.

2) The younger microfloral category containing D. speciosus and C. striatus has been identified in the following strata which are considered to be of contemporaneous age: Eumeralla No.1 Well between 6034 and 6720 ft., Penola No.1 Well between 2790 and 3000 ft., Robe Bore No.1 between 3150 and 3500 ft., Comaum Bore No.2 at 651 ft., and in the outcrop sample from the Barrabool Hills (see above). It should be noted that Cyclosporites hughesi is entirely absent or only doubtfully represented in these horizons. The only Otway Basin deposit from which undoubted examples of D. speciosus, C. hughesi, and C. striatus occur together is from Comaum Bore No.2 from 781 ft; this horizon underlies strata (at 651 ft.) which contain D. speciosus and C. striatus and apparently lack C. hughesi. D. speciosus and C. striatus have not been found in association in microfloras recovered from Pretty Hill No.1 Well.

The Paradoxa Assemblage: Microfloras conformable with the Aptian-Albian Paradoxa Assemblage occur in the following bore deposits: Eumeralla No.1 Well between 3311 and 5816 ft., Pretty Hill No.1 Well between 3340 and 4960 ft., Penola No.1 Well between 1200 and 2790 ft., Robe Bore No.1 between 1400 and 2630 ft., Dergholm Bore No.1 at 532 ft., and Birregurra Bore No.1 between 1079 and 1102 ft. The Paradoxa Assemblage has also been identified in outcrop samples from Barongarook Creek (west branch); Devil's Kitchen, Gellibrand River; and on the Bellarine Peninsula (see Dettmann 1963).

Core 7 (2928-40 ft.) from Pretty Hill No.1 Well contains a microflora which apparently lacks diagnostic components of the Paradoxa Assemblage and in which angiosperm grains (Tricolpites sp.) make their first appearance. Identical grains first appear in Eumeralla No.1 Well in the 3311-21 ft. interval which is probably similar in age to core 7 in Pretty Hill No.1 Well. The age of these horizons is estimated to be Upper Albian-?Cenomanian since, in the Great Artesian Basin (South Australia), identical grains first appear in Upper Albian horizons of the Tambo Formation and extend into the ?Cenomanian Winton Formation. Angiosperm grains have not been encountered by the writer in other non-marine Mesozoic samples from the Otway Basin.

RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

An examination of cuttings (taken at 30-40 ft. intervals) from the following depths in Eumeralla No.1 Well and Pretty Hill No.1 Well may provide information concerning the precise vertical distribution of the microfloral assemblages in these wells:

Eumeralla No.1 Well between cores 10 and 11 (5799-6054 ft.)

" " " " " 4 and 5 (2835-3321 ft.)

Pretty Hill No.1 Well below core 21 (7597 ft.).

" " " " between cores 13 and 15 (4960-5420 ft.)

" " " 6 and 7 (2739-2940 ft.)

The envelope containing core 8, Eumeralla No.1 Well is incorrectly (?) labelled 4296-4814 ft. instead of 4812-14 ft.

REFERENCES

- Cookson, I.C. and Dettmann, M.E. 1958a. Cretaceous "megaspores" and a closely associated microspore from the Australian region. Micropaleontology, 4, 39-49.

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Pocock, S.J. 1962. Microfloral analysis and age determination of strata at the Jurassic-Cretaceous boundary in the western Canada plains. Palaeontographica, B111, 1-95.

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Pretty Hill No.1	SPECIOSUS ASSEMBLAGE																																			
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	
c.9 3810-30'							+		+	+				+			+										+									
c.10 4315-28'										+	+							+	+								+									+
c.11 4625-40'											+																									
c.12 4640-55'											+																									
c.13 4940-60'											+						+																			
c.14 5400-20'																																				
c.15 5420-24'																																				
c.16 5935-47'																																				
c.17 6070-80'																																				
c.18 6376-88'																																				
c.19 6690-6702'*																																				
c.20 7200-14' *																																				
.21 7585-97'																																				

TABLE 1. Distribution of selected spore and pollen species in non-marine Lower Cretaceous sequences in F.B.H. Eumeralla No.1 and F.B.H. Pretty Hill No.1 Wells.

+ - species present
 cf - specimens similar to, but not identical with, a particular species
 ? - doubtful representatives of a species

EUMERALLIA No. 1

- c.5 3311-21'
- c.6 3800-12'
- c.7 4285-4300'
- c.8 4812-14'
- c.9 5297-5309'
- c.10 5799-5816'
- c.11 6034-54'
- c.12 6242-52'
- c.13 6252-57'
- c.15 6704-20'
- c.16 7225-40'
- *c.17 7697-7712'
- c.18 7712-17'
- c.19 8143-56'
- c.20 8459-65'
- *c.21 8914-24'
- *c.22 9373-85'
- c.23 9767-74'
- c.24 9881-90'

- Microspores**
1. *Coronatispora perforata*
 2. *Contignisporites cooksonii*
 3. *Biretisporites spectabilis*
 4. *Kraeuselisporites linearis*
 5. *Cyclosporites hughesi*
 6. *Dictyotosporites speciosus*
 7. *Cicatricosporites ludbrookii*
 8. *Ischyosporites punctatus*
 9. *Couperisporites tabulatus*
 10. *Cicatricosporites australiensis*
 11. *Aequitriadites spinulosus*
 12. *Pilosisorites notensis*
 13. *Januasporites spinulosus*
 14. *Rouseisporites reticulatus*
 15. *Cooksonites variabilis*
 16. *Pilosisorites parvispinosus*
 17. *Foraminisporis asymetricus*
 18. *Rouseisporites radiatus*
 19. *Rouseisporites simplex*
 20. *Crybelosporites striatus*
 21. *Dictyotosporites filiosus*
 22. *Coptospora paradoxa*
 23. *Trilites* cf. *T. tuberculiformis*
 24. *Coptospora striata*
 25. *Cicatricosporites hughesi*
 26. *Kraeuselisporites majus*
 27. *Trilobosporites trioreticulosus*
 28. *Pilosisorites grandis*
 29. *Concavissimisporites penolaensis*
 30. *Cicatricosporites pseudotripartitus*
 31. cf. *Gleicheniidites* sp.

	Microspores	Macrospores	Colpites
32. <i>Balmeisporites holodictyus</i>			
33. <i>Balmeisporites tridictyus</i>			
34. <i>Pyrobolospira reticulata</i>			
35. <i>Tricolpites</i> sp.			

SPECIOSUS

ASSEMBLAGE

EUMERALLIA

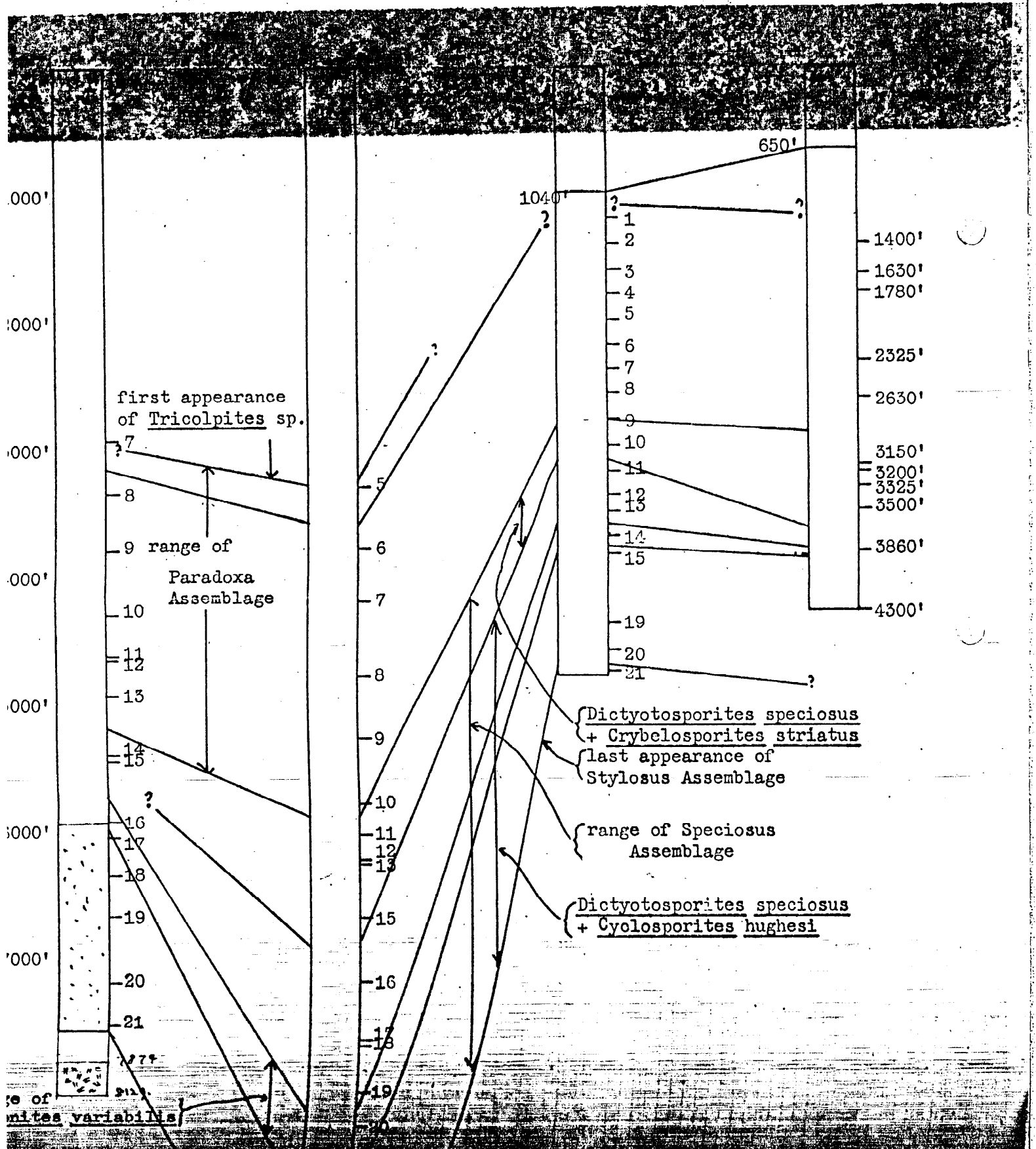
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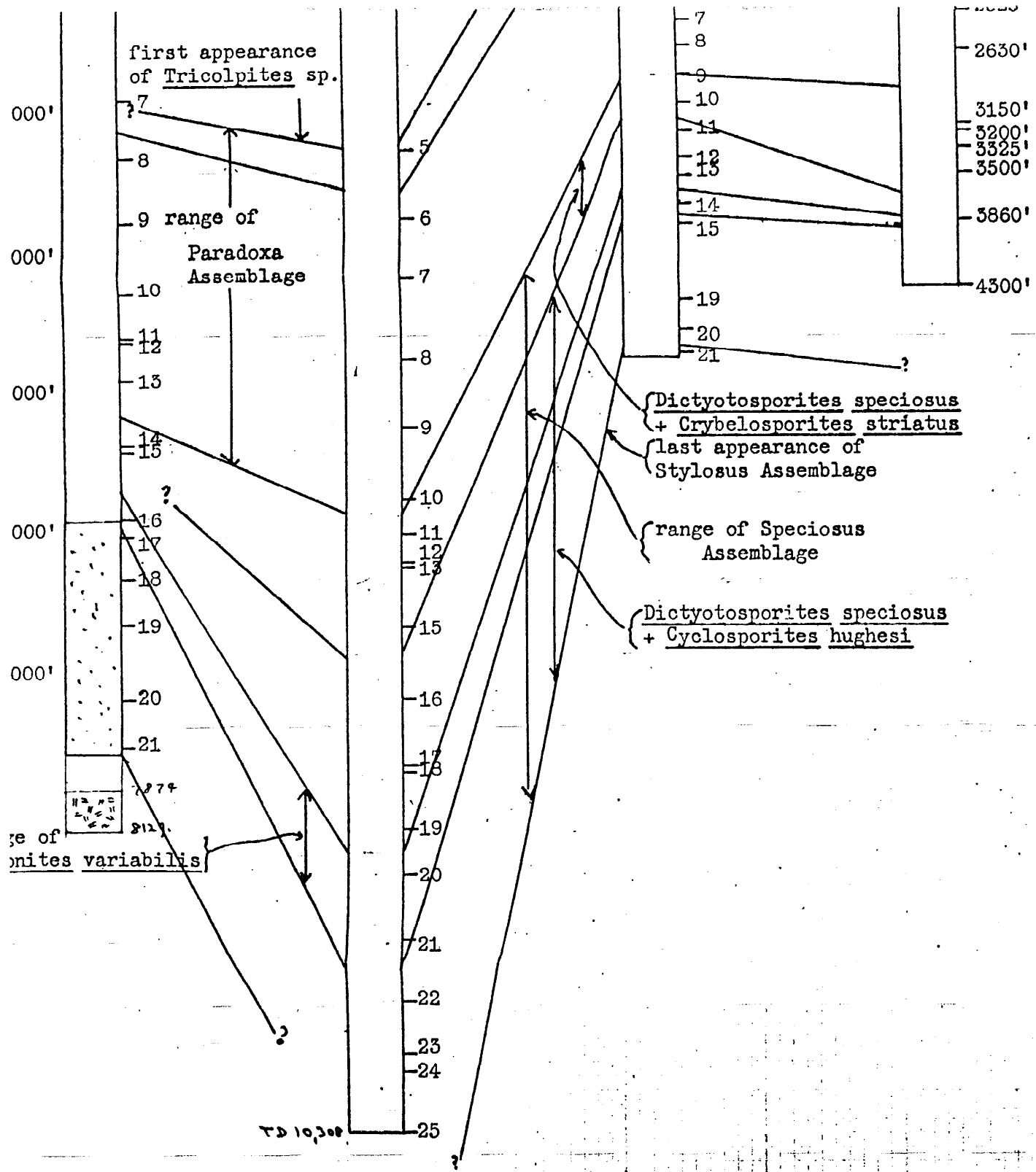
retty Hill No.1
Well

Eumeralla No.1
Well

Penola No.1
Well

Robe Bore No.1





core number or palynological sampling depth.

vertical scale 1" = 1000'
horizontal scale.

correlation lines join the centres of intervals which microfossil changes apparently take place.

TABLE 2. Microfloral correlation of non-marine Lower Cretaceous sequences in wells at Pretty Hill, Eumeralla, Penola, and Robe in the Otway Basin.