


PE990426

A PALYNOLOGICAL ANALYSIS OF
FORTESCUE-4, GIPPSLAND BASIN.

by

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Paleontology Report 1979/14

May 10, 1979.

INTRODUCTION:

Twenty-one sidewall cores and seventeen samples from conventional cores were processed and examined for palynology. Palynomorph yield ranged from good to very poor, with eight samples so poor that stratigraphic determinations could not be made. Reprocessing of several of the poor yield samples did not improve the recovery enough that, in any case, additional stratigraphic information was obtained.

Zones and lithological/facies subdivisions of the basal Lakes Entrance Formation and Latrobe Group is summarized below. All samples examined are summarized in Table 1 and individual species occurrence is noted on the accompanying distribution sheets.

SUMMARY:

<u>UNIT/FACIES</u>	<u>ZONE</u>	<u>DEPTH (in metres)</u>
LAKES ENTRANCE Marl	<u>P. tuberculatus</u>	2411.6 - 2416.65
	UNCONFORMITY	
GURNARD FORMATION Glauconitic Sandstone	<u>Lower N. asperus</u>	2417.2 - 2417.75
	UNCONFORMITY	
LATROBE GROUP Coarse Clastics	<u>Lower M. diversus</u>	2422 - 2498.8
	<u>Upper L. balmei</u>	2501 - 2598
		2602m T.D.

GEOLOGICAL COMMENTS:

1. This well is similar in stratigraphic sections and stratigraphic thickness to Fortescue-2.
2. A thin layer of Gurnard of less than 5 metres thickness is present between the Oligocene Lakes Entrance and the Lower Eocene Latrobe. Of this amount, only one-half a metre can be confirmed by palynology (the presence of Areosphaeridium dictyoplokus). Other samples from this interval (2418 to 2420 metres) did not yield stratigraphically restricted species.

3. Based on the presence of Deflandria dartmoria and Tetraclporites multistrius from near the top of the M. diversus interval and the lack of any species believed to be restricted to Middle M. diversus sediments or younger, the Latrobe section is not believed to extend stratigraphically above the Lower part of the Malvacipollis diversus Zone.
4. Apectodinium hyperacantha was found in the basal M. diversus sample and in the uppermost L. balmei assemblage (2501m) and again in the sample from 2573.5 metres. Although A. hyperacantha was not found in the samples between 2500m and 2573.5m, other dinoflagellates were present in many of them, therefore, the A. hyperacantha Zone is considered to extend from 2498.8 to 2573.5 metres.
5. Cyathidites gigantus was found in the bottom sample (2598m), therefore it is believed that this well did not penetrate below the Upper part of the L. balmei section.

DISCUSSION OF ZONES:

Upper Lygistepollenites balmei Zone: 2501m - 2598m

The presence of Lygistepollenites balmei, Australopollis obscurus and Gambierina rudata all demonstrate that the enclosing sediments are stratigraphically below the Malvacipollis diversus Zone. The scattered occurrence of Cyathidites gigantis, Apectodinium homomorpha, Proteacidites grandis, and P. incurvatus are considered proof that these beds are no older than Upper L. balmei zone.

Lower Malvacipollis diversus Zone: 2422m to 2498.8m

The lack of stratigraphically older species, such as Lygistepollenites balmei, Australopollis obscurus and Gambierina rudata, as well as the presence of Proteacidites lapis, P. grandis, Malvacapollis diversus and Tricolpites gilli place these sediments in the Lower Eocene M. diversus zone. The presence of Deflandria dartmooria and Tetraclporites multistrius indicate that only the lower part of the M. diversus zone is represented in this well section.

Lower Nothofagidites asperus Zone: 2417.2m to 2417.75m

The three samples attributed to this zone did not yield very large floras, but in each case, a number of specimens of Areosphaeridium dictyoplokus, the dinoflagellate marker for this zone, was found. The four samples between the lowest occurrence of definite Lower N. asperus markers (2417.75m) and the top of a recognizable M. diversus assemblage (2422m) are barren of diagnostic fossils, and this section cannot be assigned to any stratigraphic interval with confidence.

Proteacidites tuberculatus Zone: 2411.6m to 2416.65m

There is no doubt that the section between 2411.6m and 2414m is in the P. tuberculatus zone. Cyathidites annulatus, Protoellipsodinium simplex, Pyxidinopsis pontus and other post Eocene species are found in these samples. Below 2414 metres, however, the delineation is not as good. Recovery was very poor, even from reprocessed samples and fossils consisted mostly of long ranging, stratigraphically undiagnostic species. The assemblage obtained from the core sample at 2416.65 metres contained both Cyathidites annulatus and Protoellipsodinium simplex, markers for the P. tuberculatus zone, and specimens of Areosphaeridium dictyoplokus, the index of the Lower N. asperus zone. The sample is carried as from the P. tuberculatus zone (with a 2 rating), making the assumption that the presence of A. dictyoplokus is the result of reworking. Out of place fossils, also considered reworked was found in several of the shallower, P. tuberculatus, samples. Proteacidites pseudomoides, P. pachypolus and Areosphaeridium dictyoplokus were encountered in the flora from 2413.4m and Cyathidites splendens, Proteacidites recavus and P. crassus were present in the assemblage from the top sample at 2411.6m.

REFERENCES

Stacy, H.E. 1979, Paleontological Analysis of Fortescue-2, Gippsland Basin, ESOA Paleo. Rept. 1979/4.

P A L Y N O L O G Y D A T A S H E E T

B A S I N : GIPPSLAND

ELEVATION: KB: 25m GL: 68m

WELL NAME: FORTESCUE-4

TOTAL DEPTH: 2602m

AGE	PALYNOLOGICAL ZONES	H I G H E S T D A T A					L O W E S T D A T A				
		Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	<i>T. pleistocenicus</i>										
	<i>M. lipsis</i>										
	<i>C. bifurcatus</i>										
	<i>T. bellus</i>										
	<i>P. tuberculatus</i>	2411.6	1				2416.65	2	2414	1	
	Upper <i>N. asperus</i>										
	Mid <i>N. asperus</i>										
	Lower <i>N. asperus</i>	2417.2	1				2417.75	1			
	<i>P. asperopolus</i>										
	Upper <i>M. diversus</i>										
PALEOGENE	Mid <i>M. diversus</i>										
	Lower <i>M. diversus</i>	2422	2	2425.2	1		2498.8	1			
	Upper <i>L. balmei</i>	2501	1				2598	1			
	Lower <i>L. balmei</i>										
	<i>T. longus</i>										
	<i>T. lilliei</i>										
	<i>N. senectus</i>										
	U. <i>T. pachyexinus</i>										
	L. <i>T. pachyexinus</i>										
	<i>C. triplex</i>										
EARLY CRET.	<i>A. distocarinatus</i>										
	<i>C. paradoxus</i>										
	<i>C. striatus</i>										
	<i>F. asymmetricus</i>										
	<i>F. wonthaggiensis</i>										
	<i>C. australiensis</i>										
	PRE-CRETACEOUS										

COMMENTS: A. hyperacantha zone extends from 2498.8 to 2573.5m.

CONFIDENCE 0: SWC or Core, Excellent Confidence, assemblage with zone species of spores, pollen and microplankton.

RATING: 1: SWC or Core, Good Confidence, assemblage with zone species of spores and pollen or microplankton.

2: SWC or Core, Poor Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

3: Cuttings, Fair Confidence, assemblage with zone species of either spores and pollen or microplankton, or both.

4: Cuttings, No Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: HOWARD STACY DATE: MAY 8, 1979

DATA REVISED BY: DATE:

TABLE 1

SUMMARY OF PALEONTOLOGICAL ANALYSES, FORTESCUE-4, GIPPSLAND BASIN

SAMPLE	DEPTH (m)	DEPTH (ft)	ZONE	AGE	CONFIDENCE RATING	YIELD	DIVERSITY	COMMENTS
Core 3	2411.6	7912	<u>P. tuberculatus</u>	Oligocene	1	Low	Moderate	
SWC 38	2412*	7913.4	<u>P. tuberculatus</u>	Oligocene	0	Low	Moderate	
Core 3	2412.6	7915.4	<u>P. tuberculatus</u>	Oligocene	0	Fair	Moderate	
Core 3	2413.4*	7918	<u>P. tuberculatus</u>	Oligocene	2	Low	Moderate	
SWC 37	2414	7920	<u>P. tuberculatus</u>	Oligocene	1	Low	Poor	
Core 3	2414.45*	7921.4	Indeterminate	-	-	Very Low	Very Poor	Almost barren
Core 3	2415.5*	7925	<u>P. tuberculatus</u>	Oligocene	2	Low	Moderate	
SWC 36	2416	7926.5	Indeterminate	-	-	Very Low	Very Poor	
Core 3	2416.65*	7928.6	<u>P. tuberculatus</u>	Oligocene	-	Low	Moderate	<u>C. annulatus</u> , <u>P. simplex</u> , <u>A. dictyoplodus</u>
Core 3	2417.2*	7930.4	Lower <u>N. asperus</u>	Middle Eocene	1	Low	Moderate	<u>A. dictyoplodus</u>
Core 3	2417.5	7931.4	Lower <u>N. asperus</u>	Middle Eocene	1	Low	Poor	<u>A. dictyoplodus</u>
Core 3	2417.75	7932.3	Lower <u>N. asperus</u>	Middle Eocene	1	Low	Moderate	Mostly plant fragments, <u>A. dictyoplodus</u>
Core 3	2418*	7933	Indeterminate	-	-	Barren	-	Barren
SWC 35	2418	7933	Indeterminate	-	p	Very Low	Very Poor	Almost barren.
Core 3	2419.6	7938.3	Indeterminate	-	-	Very Low	Poor	
SWC 34	2420*	7939.6	Indeterminate	-	-	Low	Poor	
SWC 30	2422	7946	Lower <u>M. diversus</u>	Early Eocene	2	Fair	Moderate	
Core 4	2425.2	7956.7	Lower <u>M. diversus</u>	Early Eocene	1	Fair	High	<u>D. dartmooria</u> , <u>D. flounderensis</u>
Core 4	2431	7975.7	Lower <u>M. diversus</u>	Early Eocene	2	Fair	Poor	
Core 5	2444.4	8019.7	Lower <u>M. diversus</u>	Early Eocene	1	Good	High	<u>D. dartmooria</u> , <u>D. flounderensis</u>
Core 5	2449.7	8037	Indeterminate	-	-	Low	Very Poor	Almost barren.
Core 6	2451.5	8043	Lower <u>M. diversus</u>	Early Eocene	1	Good	Moderate	
Core 6	2460.1	8070.2	Lower <u>M. diversus</u>	Early Eocene	1	Good	Moderate	
SWC 24	2465.3	8088.3	Lower <u>M. diversus</u>	Early Eocene	1	Good	Moderate	
SWC 23	2470.5	8105.3	Lower <u>M. diversus</u>	Early Eocene	1	Good	High	
SWC 22	2474	8116.8	Lower <u>M. diversus</u>	Early Eocene	1	Good	Moderate	
SWC 21	2478.7	8132.2	Lower <u>M. diversus</u>	Early Eocene	1	Good	High	
SWC 16	2498.8	8198.2	Lower <u>M. diversus</u>	Early Eocene	1	Good	High	<u>A. hyperacantha</u>
SWC 15	2501	8205.4	Upper <u>L. balmei</u>	Paleocene	1	Fair	Moderate	<u>A. hyperacantha</u>
SWC 13	2520	8267.7	Indeterminate	-	-	Very Low	Very Poor	Almost barren
SWC 12	2525.6	8286	Upper <u>L. balmei</u>	Paleocene	1	Good	High	
SWC 11	2531.5	8305.4	Upper <u>L. balmei</u>	Paleocene	1	Fair	Moderate	
SWC 10	2544.2	8347	Upper <u>L. balmei</u>	Paleocene	1	Low	Poor	
SWC 5	2573.5	8443.2	Upper <u>L. balmei</u>	Paleocene	2	Good	High	<u>A. hyperacantha</u>
SWC 4	2581	8467.8	Upper <u>L. balmei</u>	Paleocene	2	Good	High	
SWC 3	2585.5	8492.5	Upper <u>L. balmei</u>	Paleocene	1	Good	Moderate	
SWC 2	2593	8507.2	Upper <u>L. balmei</u>	Paleocene	2	Fair	Moderate	
SWC 1	2598	8523.6	Upper <u>L. balmei</u>	Paleocene	1	Poor	Low	

* Reprocessed Samples.

Well Name FORTESCUE-4 Basin GIPPSLAND Sheet No. 4 of 8

SAMPLE TYPE *	DEPTH	2411.6 C	2412 S	2412.6 C	2413.4 C	2414 S	2414.45 C	2415.5 C	2416 S	2416.65 C	2417.2 C	2417.5 C	2417.75 C	2418 C	2418 S	2419.6 C	2420 S	2422 S	2425.2 C	2431 C	2444.4 C	2449.7 C	2451.5 C	2460.1 C	2465.3 S	2470.5 S	2474 S	2481.7 S	2498.8 S
PALYNOMORPHS																													
<i>Cleistosphaeridium</i> sp.																													
<i>H'kolpoma rigaudae</i>																													
<i>Aptedinium australiense</i>																													
<i>N'sphaeropsis divirgens</i>																													
<i>Protoellip. simplex</i>																													
<i>Spiniferites ramosus</i>																													
<i>Impagidinium</i> sp.																													
<i>Operc. centrocarpum</i>																													
<i>Dinosphaere</i> sp.																													
<i>Areosphaeridium arcuatum</i>																													
<i>Dyphes colligerum</i>																													
<i>System. placacantha</i>																													
<i>Cordosphaeridium inodes</i>																													
<i>N'sphaeropsis balcombiana</i>																													
<i>Areosp. diktyoplodus</i>		RW																											
<i>Deflandria</i> sp.																													
<i>Impag. maculatum</i>																													
<i>Impag. victorianum</i>																													
<i>Lingul. machaerophorum</i>																													
<i>Pixid. pontus</i>																													
<i>Tect. scabroellipticus</i>																													
<i>Tect. pellitum</i>																													
<i>Defl. flounderensis</i>																													
<i>Tect. ovatum</i>																													
<i>Thalas. peligica</i>																													
<i>Apectod. homomorpha</i> (s.sp.)																													
<i>Paral. indentata</i>																													
<i>Apectod. homomorpha</i> (l.sp)																													
<i>Apectod. hyperacantha</i>																													
<i>Deflandrea dartmooria</i>																													
<i>Deflandrea obliquipes</i>																													
<i>Aireiana verrucosa</i>																													
<i>Tubiosph. filosa</i>																													
<i>Lejenunia</i> sp.																													
<i>Spinidinium</i> sp.																													

*C=core; S=sidewall core; T=cuttings.

SAMPLE TYPE *	DEPTH	2501	S	2520	S	2525.6	S	2531.5	S	2544.2	S	2573.5	S	2581	S	2585.5	S	2593	S	2598	S
PALYNOMORPHS																					
<i>A. qualumis</i>																					
<i>A. acutullus</i>																					
<i>A. luteoides</i>																					
<i>A. oculatus</i>																					
<i>A. sectus</i>																					
<i>A. triplaxis</i>																					
<i>A. obscurus</i>																					
<i>B. disconformis</i>																					
<i>B. arcuatus</i>																					
<i>B. elongatus</i>																					
<i>B. mutabilis</i>																					
<i>B. otwayensis</i>																					
<i>B. elegansiformis</i>																					
<i>B. trigonalis</i>																					
<i>B. verrucosus</i>																					
<i>B. bombaxoides</i>																					
<i>B. emaciatus</i>																					
<i>C. bullatus</i>																					
<i>C. heskermensis</i>																					
<i>C. horrendus</i>																					
<i>C. meleosus</i>																					
<i>C. apiculatus</i>																					
<i>C. leptos</i>																					
<i>C. striatus</i>																					
<i>C. vanraadshooverii</i>																					
<i>C. orthoteichus/major</i>																					
<i>C. annulatus</i>																					
<i>C. gigantis</i>																					
<i>C. splendens</i>																					
<i>D. australiensis</i>																					
<i>D. granulatus</i>																					
<i>D. tuberculatus</i>																					
<i>D. delicatus</i>																					
<i>D. semilunatus</i>																					
<i>E. notensis</i>																					
<i>E. crassicrinus</i>																					
<i>F. balteus</i>																					
<i>F. crater</i>																					
<i>F. lucenosus</i>																					
<i>F. palaequetrus</i>																					
<i>G. edwardsii</i>																					
<i>G. radata</i>																					
<i>G. divaricatus</i>																					
<i>G. gestus</i>																					
<i>G. catathus</i>																					
<i>G. cranwellae</i>																					
<i>G. wahooensis</i>																					
<i>G. bassensis</i>																					
<i>G. nebulosus</i>																					
<i>H. harrisii</i>																					
<i>H. astrus</i>																					
<i>H. ellottii</i>																					
<i>I. anguloclavatus</i>																					
<i>I. antipodus</i>																					
<i>I. notabilis</i>																					
<i>I. gremius</i>																					
<i>I. irregularis</i>																					
<i>J. peiratus</i>																					
<i>K. waterbolkii</i>																					
<i>L. amplus</i>																					
<i>L. crassus</i>																					
<i>L. ohaiensis</i>																					
<i>L. bainii</i>																					
<i>L. lanceolatus</i>																					
<i>L. balmei</i>																					
<i>L. florinii</i>																					
<i>M. diversus</i>																					
<i>M. duratus</i>																					
<i>M. grandis</i>																					
<i>M. perimagnus</i>																					

*C=core; S=sidewall core; T=cuttings.

Well Name

FORTESCUE-4

Basin

GIPPSLAND

Sheet No. 6 of 8

SAMPLE TYPE *	2501	2520	2525.6	2531.5	2544.2	2573.5	2581	2585.5	2593	2598
DEPTHS										
PALYNOMORPHS										
<i>M. subtilis</i>										
<i>M. ornamentalis</i>										
<i>M. hypolaenoides</i>										
<i>M. homeopunctatus</i>										
<i>M. parvus/mesonesus</i>										
<i>M. tenuis</i>										
<i>M. verrucosus</i>										
<i>M. australis</i>										
<i>N. asperus</i>										
<i>N. asperoides</i>										
<i>N. brachyspinulosus</i>										
<i>N. deminutus</i>										
<i>N. emarcidus/heterus</i>										
<i>N. endurus</i>										
<i>N. falcatus</i>										
<i>N. flemingii</i>										
<i>N. goniatus</i>										
<i>N. senectus</i>										
<i>N. vansteenisii</i>										
<i>O. sentosa</i>										
<i>P. ochesis</i>										
<i>P. catastus</i>										
<i>P. demarcatus</i>										
<i>P. magnus</i>										
<i>P. polyoratus</i>										
<i>P. vesicus</i>										
<i>P. densus</i>										
<i>P. velosus</i>										
<i>P. morganii/jubatus</i>										
<i>P. mawsonii</i>										
<i>P. reticulosacculus</i>										
<i>P. verrucosus</i>										
<i>P. crescentis</i>										
<i>P. esobalteus</i>										
<i>P. langstonii</i>										
<i>P. reticulatus</i>										
<i>P. simplex</i>										
<i>P. varus</i>										
<i>P. adenanthoides</i> (Prot.)										
<i>P. alveolatus</i>										
<i>P. amoloseinxus</i>										
<i>P. angulatus</i>										
<i>P. annularis</i>										
<i>P. asperopolus</i>										
<i>P. biornatus</i>										
<i>P. clarus</i>										
<i>P. cleinei</i>										
<i>P. confragosus</i>										
<i>P. crassis</i>										
<i>P. delicatus</i>										
<i>P. formosus</i>										
<i>P. grandis</i>										
<i>P. grevilleensis</i>										
<i>P. incurvatus</i>										
<i>P. intricatus</i>										
<i>P. kopiensis</i>										
<i>P. lapis</i>										
<i>P. latrobensis</i>										
<i>P. leightonii</i>										
<i>P. obesolabrus</i>										
<i>P. obscurus</i>										
<i>P. ornatus</i>										
<i>P. otwayensis</i>										
<i>P. pachypolus</i>										
<i>P. palisadus</i>										
<i>P. parvus</i>										
<i>P. plemmelus</i>										
<i>P. prodigus</i>										
<i>P. pseudomoides</i>										
<i>P. recavus</i>										

*C=core; S=sidewall core; T=cuttings.

Well Name FORTESCUE-4 Basin GIPPSLAND Sheet No. 8 of 8

SAMPLE TYPE *	DEPTH	2501	2520	2525.6	2531.5	2544.2	2573.5	2581	2585.5	2593	2598		
PALYNOmorphs													
<i>Cleistosphaeridium</i> sp.													
<i>H'kolpoma rigaudae</i>													
<i>Apteodinium australiense</i>													
<i>N'sphaeropsis divirgens</i>													
<i>Protoellip simplex</i>													
<i>Spiniferites ramosus</i>													
<i>Impagidinium</i> sp.													
<i>Operc. centrocarpum</i>													
<i>Dincsphaere</i> sp.													
<i>Areosphaeridium arcuatum</i>													
<i>Dyphes colligerum</i>													
<i>System. placacantha</i>													
<i>Cordosphaeridium inodes</i>													
<i>N'sphaeropsis balcombiana</i>													
<i>Areosph. diktypolokus</i>													
<i>Deflandria</i> sp.													
<i>Impaq. maculatum</i>													
<i>Impaq. victorianum</i>													
<i>Lingul. machaeophorum</i>													
<i>Pyxid. pontus</i>													
<i>Tect. scabroellipticus</i>													
<i>Tect. pellitum</i>													
<i>Defl. flounderensis</i>													
<i>Tect. ovatum</i>													
<i>Thalas. peligica</i>													
<i>Apectod. homomorpha</i> (s.sp.)													
<i>Paral. indentata</i>													
<i>Apectod. homomorpha</i> (l.sp)													
<i>Apectod. hyperacantha</i>													
<i>Deflandrea dartmooria</i>													
<i>Deflandrea obliquipes</i>													
<i>Aireiana verrucosa</i>													
<i>Tubiosph. filosa</i>													
<i>Lejununia</i> sp.													
<i>Spinidinium</i> sp.													

*C=core; S=sidewall core; T=cuttings.