APPENDIX-2

PALYNOLOGICAL ANALYSIS
SNAPPER-5, GIPPSLAND BASIN

by

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INTERPRETATIVE DATA

INTRODUCTION

Fifty-two sidewall core samples were processed and examined for spore-pollen and dinoflagellates. Organic residue yields were moderate to high in siltstones and shales but low in sandstones. Preservation is poor in the Late Cretaceous and early Paleocene but improves to become generally fair to good in the younger, shallower Paleocene and Eocene. Recorded spore-pollen diversity is generally low to moderate in the poorly preserved samples, but is moderate to high in those that are better preserved. Dinoflagellate diversity is generally low and they only give limited support to the ages determined from the spore-pollen assemblages.

Lithological units and palynological zones from the base of the Lakes Entrance Formation to T.D. are summarised below. Interpretative data with zone identifications and confidence ratings are recorded in Table-1 and basic data on residue yield, preservation and diversity are recorded in Table-2. Counts of key species or species groups from selected samples are given in Table-3. The occurrence of spore-pollen and dinoflagellate species are tabulated on the accompanying range chart.

SUMMARY

AGE	UNIT/FACIES	ZONE	DEPTH(m)
Early Miocene	Lakes Entrance Fm.	*P. tuberculatus*	1285.0-1290.0
UNCONFORMITY	1292.9 m		
Late Eocene	Gurnard Fm. "upper unit"	Middle *N. asperus*	1293.9-1297.9
	1299.0 m		
Middle Eocene	Gurnard Fm. "lower unit"	Lower *N. asperus*	1309.0-1329.1
	1329.5 m		
Middle Eocene		Lower *N. asperus*	1332.0-1430.0
Early Eocene		*P. asperopolus*	1495.9
Early Eocene		Upper *M. diversus*	1507.9-1566.9
Early Eocene	Latrobe Group	Middle *M. diversus*	1669.9
Early Eocene	"coarse clastics"	Lower *M. diversus*	1685.3-1848.6
Paleocene		Upper *L. balmei*	1854.1-2049.9
Paleocene		Lower *L. balmei*	2073.5-2597.5
Maastrichtian		Upper *T. longus*	2653.0-2757.0
Maastrichtian		Lower *T. longus*	2871.4-2960.0
	T.D. 2990.0 m		

GEOLOGICAL COMMENTS

1. Attention is drawn to igneous rocks identified within the Lower L. balmei Zone in Whiting-1 (approx. 2640-60 m), Whiting-2 (approx. 2810-2890 m), and the Snapper field wells Snapper-1 (approx. 2080-2180 m) and Snapper A-21 (approx. 1970-90 m). It is suggested, that, because of their equivalent stratigraphic position within the lower part of the Lower L. balmei Zone these igneous rocks represent basic volcanic flows of Paleocene age rather than younger intrusions. They may be present in Snapper-5 even though they have not been recognised in the cuttings or on the electric logs. It is noted that palynomorphs between 2458.4 m and T.D. are consistently poorly preserved and partially carbonised.

2. Sidewall cores 67 and 63, at 1803.0 m and 1848.6 m respectively may have been accidently swapped, as the sequence appears "out-of-order". See discussion under Lower M. diversus Zone for further detail.

3. The P. asperopolus and Upper M. diversus Zones occupy a particularly sandy interval of the Latrobe Group between the distinctive, thick coals at 1396.5-1405.0 m and 1606.0-1621.5 m. No samples from either coal were analysed. In contrast the Lower M. diversus Zone is characterised by relatively thinly interbedded sands, shales and coals.

4. The Gurnard Formation between 1292.0 m to 1329.5 m can be divided into an upper glauconitic unit (1292.0 to 1299.0 m) of Late Eocene (Middle N. asperus Zone) age, and a lower siltstone unit, with only accessory glauconite (1299.0 to 1329.5 m) of Middle Eocene (Lower N. asperus Zone) age.

5. Palynological age dating of the base of the Lakes Entrance Formation as the Middle (or younger) subdivision of the P. tuberculatus Zone supports the evidence of the foraminiferal age dating for a substantial time break at the top of the Latrobe Group. The complete Oligocene is likely to be missing at the unconformity between the Lakes Entrance and Gurnard Formation at Snapper-5.

BIOSTRATIGRAPHY

The zone boundaries have been established using the criteria of Stover & Evans (1973), and subsequent proprietary revisions.

Lower Tricolpites longus Zone: 2871.4-2960.0 metres.

The three samples from this interval are poorly preserved and non-diagnostic. They are assigned to the Lower T. longus Zone with low confidence ratings mainly on the lack of any noticable increase in abundance of Nothofagidites spp. which is diagnostic of the underlying T. lilliei Zone. This is supported by stratigraphical considerations of the limited section penetrated below confident Upper T. longus Zone samples, and by comparison with the adjacent Snapper-3 and Whiting-1 wells.

Upper Tricolpites longus Zone: 2653.0-2757.0 metres.

The base of this zone is picked at the oldest sample with Stereisporites (Tripunctisporis) punctatus, and the top of the zone at the youngest occurrence of the species Tricolpites longus and Quadraplanus brossus. Preservation is poor and diversity is mostly low. A single dinoflagellate identified at 2710.0 m is the only suggestion of marine influence in this interval.

Lower Lygistepollenites balmei Zone: 2073.5-2597.5 metres.

Although moderate amounts of organic residue were obtained from samples over this interval, palynomorph diversity was generally low and preservation consistently poor. As is usually the case the zone is recognised by the absence of indicator species for the underlying or overlying zones, rather than by forms restricted to the zone. A marine sample occurs at the base of the zone and is dominated by Areoligera senonensis. It is a low diversity assemblage and cannot be referred to any of the dinoflagellate zones recognised within the Latrobe Group even though its stratigraphical position suggests a correlation to the Trithyrodinum evittii Zone. Occurrences at 2248.1 m and 2099.0 m of Malvacipollis subtilis are anomalously old.

Upper Lygistepollenites balmei Zone: 1854.1 to 2049.9 metres.

The zone is recognised with poor confidence from the oldest occurrence of Malvacipollis diversus at 2049.9 m, and with good confidence from the oldest occurrence of Proteacidites grandis in the highest sample at 1854.1 m. A low diversity dinoflagellate suite at 2049.9 m referable to the Apectodinium homomorphum Zone supports this age assignment.

Lower Malvacepollis diversus Zone: 1685.3-1848.6 metres.

The base of the zone is taken at 1848.6 m in a sample containing frequent M. diversus without associated L. balmei Zone indicator species. The overlying sample at 1834.5 m contains a high diversity spore pollen assemblage which is assigned to the zone with high confidence, associated with a moderately diverse dinoflagellate assemblage referable to the Apectodinium hyperacanthum Zone. The sample immediately above at 1803.0 m, is anomalous as it contains frequent Lugistepollenites balmei and Australopollis obscurus and no typical M. diversus Zone indicator species. Samples with infrequent L. balmei are known from the Lower M. diversus Zone from other wells in the Gippsland Basin (e.g. Nannaygai-1). However, in this case it is possible that the samples at 1848.6 m and 1803.0 m have been swapped, either when taken out of the sidewall core gun or later when being prepared in the laboratory. This interpretation must be considered as normally the A. hyperacanthum Zone occurs in the basal sample of the Lower M. diversus Zone. The spore-pollen assemblage at 1834.5 m is typical of assemblages from the A. hyperacanthum Zone as it contains Protecidites pachypolus (the oldest and selective occurrence of it disjunct range), Spinozonocolpites prominatus of mangrove affinities (see Partridge, 1976) and the normally rare species at this level; Anacolosidites acutullus, Myrtaceoipollenites australis and Schizocolpus marlinensis. Samples higher in the zone samples are of lower diversity, and marine influence is restricted to samples at 1685.5 m (rare specimens of Deflandrea dartmooria) and 1740.9 m (a moderate diversity assemblage with frequent Glaphyrocysta retiintexta). Neither sample can be referred to named dinoflagellate zones.

Middle Malvacipollis diversus Zone: 1666.9 metres.

This zone is represented by a single sample which is dominated by spores. The species Crassiretitriletes vanraadshoovenii, Cyathidites splendens, Laevigatosporites ovatus and Polypodiaceoisporites varus ms are particularly common. Polycolpites esobalteus is the most frequent angiosperm pollen. The sample is assigned to the Middle M. diversus Zone based on the rare occurrence of Proteacidites tuberculiformis.

Upper Malvacipollis diversus Zone: 1507.9-1566.9 metres.

The oldest occurrence of Myrtaceidites tenuis at 1566.9 m is taken as the base of the Upper M. diversus Zone. This is supported by the oldest occurrence of Proteacidites pachypolus at 1546.0 m in the upper part of its disjunct range. P. pachypolus has a frequency of 2-3% in the upper two samples in the zone (see Table 3).

Proteacidites asperopolus Zone: 1495.9 metres.

The zone is represented by a single sample with a combined frequency of 5% for P. pachypolus plus P. asperopolus. The oldest occurrences of Conbaculites apiculatus, Santalumidites cainozoicus and the eponymous species also support this zone assignment. The sample also contains a limited dinoflagellate suite (13% of total palynomorph count) dominated by the species Homotryblium tasmaniense. The identified dinoflagellates do not allow correlation with any of the named dinoflagellate zones recognised in the Latrobe Group.

Lower Nothofagidites asperus Zone: 1309.0 to 1430.0 metres.

The highest occurrence of Myrtaceidites tenuis in the underlying P. asperopolus Zone and a significant increase in percentage of Nothofagidites spp. (from 4-12% to 17%) is the basis for selecting the base of the zone at 1430.0 m. The top of the zone is taken at the highest occurrence of P. pachypolus as this species occurs only sporadically in the overlying Middle subdivision in the Gippsland Basin. Dinoflagellates recorded in the upper part of the zone are of low diversity (1-5 species). Samples at 1325.9 m and 1332.0 m contain frequent Areospharidium diktyoplokus and are therefore tentatively referred to the Middle Eocene A. diktyoplokus Zone. In view of the low diversity these samples may overlap with the younger D. heterophycta Zone.

Middle Nothofagidites asperus Zone: 1293.9-1297.9 metres.

Two samples are assigned to this zone with low confidence. Residue and fossil yields were low and as a consequence diversity was low to moderate. The presence of Dryadopollis (al. Tricolporites) retequetrus at 1293.9 m suggests an age no older than the middle part of the zone. Unfortunately all spore-pollen recorded from this sample extend into younger zones, and this suggests a possible Upper N. asperus Zone assignment. A Middle N. asperus Zone age, however, is preferred on the basis of the associated dinoflagellates viz; Vozzhennikova extensa, Baltispheridium nudum, Corrudinium corrugatum ms and large specimens of Spiniferites ramosus, all of which are more characteristic of the Middle rather than the Upper subdivision. The lower sample at 1297.9 m is no younger than the Middle N. asperus Zone, based on the presence of Proteacidites adenanthoides and P. leightonii. The presence of an undescribed acritarch (code named LEOS or Fromea leos) suggests an age no older than the Middle subdivision.

Proteacidites tuberculatus Zone: 1285.0-1290.0 metres.

The two samples are assigned to the informal Middle or Upper subdivisions of the P. tuberculatus Zone on the presence of Foveotriletes lacunosus in both samples. Other indicator species are Foveotriletes crater in the lower sample and the grass pollen Monoporites media in the higher sample.

REFERENCES

PARTRIDGE, A.D., 1976. The geological expression of eustacy in the Early Tertiary of the Gippsland Basin. APEA J. 16, 73-79.

STOVER, L.E. & PARTRIDGE, A.D., 1973. Tertiary and Late Cretaceous spores and pollen from the Gippsland Basin, Southeastern Australia. Proc. R. Soc. Vict. 85, 237-86

TABLE I : SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA FOR SNAPPER-5

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	CONFIDENCE RATING	DINOFLAGELLATE ZONE (OR ASSOCIATION)	CONFIDENCE RATING	COMMENTS
SWC 102	1285.0m	P. tuberculatus	1			
SWC 101	1290.0m	P. tuberculatus	1			
SWC 100	1293.9m	Middle N. asperus	2	(V. extensa)		
SWC 99	1297.9m	Middle N. asperus	2			
SWC 98	1309.0m	Lower N. asperus	2			
SWC 97	1315.9m	Lower N. asperus	2			
SWC 96	1325.9m	Lower N. asperus	1	A. diktyoplokus	1	Anomalous P. rectomarginis
SWC 95	1329.1m	Lower N. asperus	1			
SWC 94	1332.0m	Lower N. asperus	1	A. diktyoplokus	1	
SWC 93	1341.0m	Lower N. asperus	2			
SWC 92	1358.5m	Lower N. asperus	1			P. recavus frequent
SWC 91	1380.0m	Lower N. asperus	1			
SWC 90	1430.0m	Lower N. asperus	2			
SWC 89	1468.5m	Indeterminate				
SWC 88	1495.9m	P. aspercpolus	1	(H. tasmaniense)		P. pachypolus/aspercpolus 5%
SWC 87	1507.9m	Upper M. diversus	1			P. pachypolus 2%
SWC 86	1546.0m	Upper M. diversus	1			P. pachypolus 3%
SWC 85	1566.9m	Upper M. diversus	1			Oldest M. tenuis
SWC 81	1666.9m	Middle M. diversus	1			Dominated by spores
SWC 80	1685.3m	Lower M. diversus	1	(D. dartmoorla)		
SWC 78	1701.9m	Lower M. diversus	1			
SWC 74	1740.9m	Lower M. diversus	1	(G. retiintexta)		
SWC 70	1770.8m	Lower M. diversus	1			Laevigatosporites spp. 39%
SWC 68	1781.0m	Lower M. diversus	2			
SWC 67	1803.0m	(L. balmei)	(2)			
SWC 65	1834.5m	Lower M. diversus	0	A. hyperacanthum	1	P. pachypolus present

TABLE 1 : SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA FOR SNAPPER-5 cont'd.

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	CONFIDENCE RATING	DINOFLAGELLATE ZONE (OR ASSOCIATION)	CONFIDENCE RATING	COMMENTS
SWC 63	1848.6m	Lower *M. diversus*	2			*M. diversus* frequent
SWC 62	1854.1m	Upper *L. balmei*	1			
SWC 61	1873.0m	*L. balmei*	2			
SWC 57	1939.5m	*L. balmei*	2			*Cyathidites splendens* dominant.
SWC 56	1969.0m	Upper *L. balmei*	2			
SWC 54	2024.0m	Upper *L. balmei*	2			*A. obscurus*, *L. balmei* common
SWC 52	2049.9m	Upper *L. balmei*	2	*A. homomorphum*	1	
SWC 51	2073.5m	Lower *L. balmei*	2			
SWC 49	2099.0m	Lower *L. balmei*	1			*Australopollis obscurus* common
SWC 47	2160.5m	Lower *L. balmei*	1			
SWC 45	2218.0m	*L. balmei*	2			
SWC 44	2248.1m	Lower *L. balmei*	2			
SWC 32	2458.4m	*L. balmei*	2			Highest noticable palyno. carbonisation
SWC 31	2462.0m	Lower *L. balmei*	2			*Proteacidites* spp. dominant
SWC 27	2524.0m	Barren				
SWC 25	2559.9m	Lower *L. balmei*	1			
SWC 24	2597.5m	Lower *L. balmei*	1	(*A. senonensis*)		
SWC 19	2653.0m	Upper *T. longus*	1			
SWC 16	2689.0m	Upper *T. longus*	1			
SWC 13	2710.0m	Indeterminate				
SWC 12	2723.6m	Upper *T. longus*	2			
SWC 11	2753.4m	Indeterminate				
SWC 10	2757.0m	Upper *T. longus*	1			
SWC 6	2871.4m	Lower *T. longus*	2			*Phyllocladidites mawsonii* frequent
SWC 3	2926.4m	Indeterminate				
SWC 1	2960.0m	Lower *T. longus*	2			

PALYNOLOGY DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: 21.0m GL: -56.0m

WELL NAME: SNAPPER-5 TOTAL DEPTH: 2990.0m

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA					LOWEST DATA				
		Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	*T. pleistocenicus*										
	M. lipsis										
	C. bifurcatus										
	T. bellus										
PALEOGENE	*P. tuberculatus*	1285.0	1				1290.0	1			
	Upper *N. asperus*										
	Mid *N. asperus*	1293.9	2				1297.9	2			
	Lower *N. asperus*	1309.0	2	1325.9	1		1430.0	2	1380.0	1	
	P. asperopolus	1495.9	0				1495.9	0			
	Upper *M. diversus*	1507.9	1				1566.9	1			
	Mid *M. diversus*	1666.9	1				1666.9	1			
	Lower *M. diversus*	1685.3	1				1848.6	2	1834.5	0	
	Upper *L. balmei*	1854.1	1				2049.9	1			
	Lower *L. balmei*	2073.5	2	2099.0	1		2597.5	1			
LATE CRETACEOUS	Upper *T. longus*	2653.0	1				2757.0	1			
	Lower *T. longus*	2871.4	2				2960.0	2			
	T. lilliei										
	N. senectus										
	T. apoxyexinus										
	P. mawsonii										
	A. distocarinatus										
EARLY CRET.	*P. pannosus*										
	C. paradoxa										
	C. striatus										
	C. hughesi										
	F. wonthaggiensis										
	C. australiensis										

COMMENTS: DINOFLAGELLATE ZONES

A. diktyoplokus 1329.0m (1) to 1341.0m (1)

A. hyperacanthum 1834.5m (0)

A. homomorphum 2073.5m (1)

CONFIDENCE RATING:
- 0: SWC or Core, Excellent Confidence, assemblage with zone species of spores, pollen and microplankton.
- 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: ALAN D. PARTRIDGE DATE: February 20, 1986

DATA REVISED BY: _____ DATE: _____

BASIC DATA

TABLE - 2: BASIC DATAS

TABLE - 3: COUNTS OF KEY ELEMENTS OF POLLEN SUM

TABLE 2 : SUMMARY OF BASIC PALYNOLOGICAL DATA FOR SNAPPER-5

SAMPLE NO.	DEPTH (m)	LITHOLOGY	RESIDUE YIELD	PRESERVATION	SPORE-POLLEN DIVERSITY	DINOFLAGELLATES YIELD	DINOFLAGELLATES NO. SPECIES
SWC 102	1285.0m	Calc. clayst	High	Fair-good	Moderate	Low	5
SWC 101	1290.0m	Calc. clayst	Very low	Fair	Moderate	Moderate	3
SWC 100	1293.9m	Siltstone	Low	Poor-fair	Moderate	Moderate	11
SWC 99	1297.9m	Glauc. siltst.	Low	Fair	Moderate	Low	4
SWC 98	1309.0m	Siltstone	Poor	Low			
SWC 97	1315.9m	Siltstone	Low	Fair	Low	Low	2
SWC 96	1325.9m	Siltstone	High	Poor-good	Moderate	Moderate	4
SWC 95	1329.1m	Carb. sandst.	Moderate	Fair	High	Very low	1
SWC 94	1332.0m	Carb. sandst.	Moderate	Fair-good	Moderate	Moderate	5
SWC 93	1341.0m	Siltstone	Low	Fair	Low		
SWC 92	1358.5m	Siltstone	High	Good	High		
SWC 91	1380.0m	Siltstone	High	Poor-fair	High		
SWC 90	1430.0m	Carb. sandst.	High	Fair-good	High	Very low	2
SWC 89	1468.5m	Siltstone	Very low	Very poor	Barren		
SWC 88	1495.9m	Siltstone	High	Fair-good	High	Moderate	5
SWC 87	1507.9m	Claystone	High	Good	Moderate		
SWC 86	1546.0m	Shale	High	Good	High		
SWC 85	1566.9m	Siltstone	High	Poor-good	High		
SWC 81	1666.9m	Claystone	Moderate	Fair	Moderate		
SWC 80	1685.3m	Carb. sandst.	Low	Poor-fair	Moderate	Very low	1
SWC 78	1701.9m	Coally siltst.	Moderate	Fair	Moderate		
SWC 74	1740.9m	Siltstone	High	Fair	Moderate	Low	5
SWC 70	1770.8m	Claystone	High	Fair	Moderate		
SWC 68	1781.0m	Claystone	Low	Fair	Low		
SWC 67	1803.0m	Claystone	Low	Fair	Low		
SWC 65	1834.5m	Siltstone	High	Poor-fair	High	Moderate	6

TABLE 2 : SUMMARY OF BASIC PALYNOLOGICAL DATA FOR SNAPPER-5 (cont'd

SAMPLE NO.	DEPTH (m)	LITHOLOGY	RESIDUE YIELD	PRESERVATION	SPORE-POLLEN DIVERSITY	DINOFLAGELLATES YIELD	DINOFLAGELLATES NO. SPECIES
SWC 63	1848.6m	Carb. shale	High	Fair	Moderate		
SWC 62	1854.1m	Sandstone	Low	Fair-good	Low	(Contaminated?)	
SWC 61	1873.0m	Siltstone	Moderate	Fair	Low		
SWC 57	1939.5m	Siltstone	Moderate	Fair	Low		
SWC 56	1969.0m	Siltstone	Moderate	Fair-good	Moderate		
SWC 54	2024.0m	Siltstone	Moderate	Fair-good	Moderate		
SWC 52	2049.9m	Carb. shale	Moderate	Poor	Moderate	Moderate	2
SWC 51	2073.5m	Shale	Moderate	Fair	Moderate		
SWC 49	2099.0m	Siltstone	High	Fair-good	High		
SWC 47	2160.5m	Siltstone	Moderate	Fair	Moderate		
SWC 45	2218.0m	Claystone	Moderate	Poor	Low	Very low	1
SWC 44	2248.1m	Siltstone	High	Good	Moderate		
SWC 32	2458.4m	Siltstone	Moderate	Poor	Low		
SWC 31	2462.0m	Siltstone	Low	Poor	Low		
SWC 27	2524.0m	Sandstone	Moderate	Very poor	Barren		
SWC 25	2559.9m	Siltstone	Low	Poor	Low		
SWC 24	2597.5m	Siltstone	Moderate	Poor	Low	Low	2
SWC 19	2653.0m	Siltstone	Moderate	Poor	Low		
SWC 16	2689.0m	Carb. shale	Moderate	Poor	Low		
SWC 13	2710.0m	Siltstone	Moderate	Poor	Very low	Very low	1
SWC 12	2723.6m	Shale	Moderate	Poor	Moderate		
SWC 11	2753.4m	Siltstone	Moderate	Poor	Low		
SWC 10	2757.0m	Carb. shale	Moderate	Poor	Moderate		
SWC 6	2871.4m	Carb. shale	Moderate	Very poor	Low		
SWC 3	2926.4m	Siltstone	Low	Very poor	Very low		
SWC 1	2960.0m	Siltstone	Moderate	Very poor	Low		

TABLE-3

Counts of Key elements of pollen sum
from selected samples in Snapper-5

DEPTH	MP%	S	G	P	1	2	3	4	5	6	7
1430.0m		13	23	64	4	1	2	21	17	1	12
1495.9m	13	11	8	81	3	3	1	20	12	5	19
1507.9m		25	41	34	2	16	X	10	7	2	2
1546.0m		6	54	40	X	4	40	4	4	3	9
1770.8m		46	33	21	39	3	X	1	3	-	2
2689.0m		40	28	32	19	-	-	-	-	-	18

MP% = Percentage of dinoflagellates relative to spore-pollen

S = Total spores %
G = Total gymnosperm %
A = Total angiosperm %

1 = % *Laevigatosporites* spp.
2 = % *Gleicheniidites* spp.
3 = % *Dilwynites* spp. & *Araucariacites australis*
4 = % *H. harrisii* (= *Casuarina* pollen)
5 = % *Nothofagidites* spp.
6 = % *P. pachypolus* & *P. asperopolus*
7 = % all *Proteacidites* spp.

X = less than 1%

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