Petroleum

PALYNOLOGY OF BORE SAMPLES N of HAMILTON - VIC.
OTWAY 65/4 June

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DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

PALAEONTOLOGY SECTION

PALYNOLOGY OF SOME BORE SAMPLES NORTH OF HAMILTON, VICTORIA, AND THEIR RELATIONSHIPS TO THE GRANGE BURN - MUDDY CREEK MARINE SEQUENCE

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Wayne K. Harris
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ABSTRACT

Two distinct palynological biostratigraphic units are recognised in lignitic and carbonaceous sediments from north of Hamilton, Victoria. The younger assemblage characterised by a very low frequency of Nothofagus spp. and high podocarpaceous frequency is of Pliocene age and equivalent to the Grange Burn Coquina. The older assemblage with abundant Nothofagus spp. probably pre-dates the deposition of the Bochara Limestone.

An even younger microflora is described from the basalt - tuff contact on Grange Burn.

INTRODUCTION

Palynological investigation of non-marine sediments from the Hamilton area was requested by the Victorian Department of Mines with a view to elucidating the stratigraphy and age relationships of these to the type marine sequences in Grange Burn and Muddy Creek.

The location of boreholes is indicated on Plan 65-450. This plan and the following relevant geological information has been supplied by Dr. D. Spencer Jones.

Ligneous clays, sands and brown coals fill bedrock depressions in Devonian porphyritic rhyolite and Ordovician slates between Hamilton and the Grampians. The carbonaceous series is in turn overlain by sands, clays, laterites and in some cases by Quaternary basalt which form a thin veneer over most of the area. Bedrock outcrops are limited to the porphyritic rhyolite at Mt. Cavendish and U. Devonian - L. Carboniferous sandstone at Victoria Point and in the Parish of Bullawin.

Previous palynological investigations are limited to the Tertiary sediments in the Grange Burn and Muddy Creek sections. Gill (1957, p. 157) lists several species identified by Dr. I. Cookson, Dr. S.L. Duigan, and Mrs. R. McWhae (nee Pike) as occurring in a carbonaceous clay beneath a basalt and a diatomite in Grange Burn. This list is in fact a summary of the species which had been described by these authors in several papers. No sporomorphs have been recovered from the Bochara Limestone or the Muddy Creek Marl and the distribution of spores and pollen is therefore limited to the Pliocene sediments of the marine sequence.

Many of the determinations presented in the following observations must be regarded as tentative, as very little taxonomic study has been made of the mid and upper Tertiary assemblages.

OBSERVATIONS ON THE MICROFLORAL ASSEMBLAGES

Bore Samples

For ease of comparison the samples are divided into two groups according to the assemblages present.

Most of the assemblages were diverse and well preserved. One sample, Mokanger Bore 4 80-85', was barren and another, Geerak No. 6 40-45', contained few pollens or spores but on account of the similarity of the residue it is placed in the older assemblage.

SPECIES		PLIOCENE					?LOWER-MID TERTIARY				
		75-80'	60-70'	70-80'	140-145'	35-40'	60-65'	40-45'	50-55'	65-70'	45-50'
		Moutajup No.1	Moutajup No.2	Karabeel No.2	Cavendish No.1	Geerak No.1	Geerak No.3	Geerak No.6	"	"	Mokanger No.4
Acacia octosporites	Restricted Upper Tertiary	x		x							
A. myriosporites			x		x						
Myrtaceidites eucalyptoides		x	x		x	x					
Compositae pollen			x		x	x					
"Bubbia" type pollen					x						
Chenopodiaceous pollen					x						
Gunnerites reticulatus					x						
Haloragacidites haloragoides		x	x	x	x	x					
Proteacidites sp. ("Grevillea" type)				x	x						
Nothofagus sp. indet.			x								
Beaupreaidites elegansiformis	Restricted to pre- Middle Miocene (in this area only)						x		x		x
B. verrucosus											x
Nothofagus falcata							x		x	x	x
N. emarcida							x		x	x	x
N. diminuta							x		x		
N. vansteenisi									x	x	x
Malvacipollis diversus							x			x	x
M. sp. nov.										x	
Podosporites microsaccatus										x	x
Cupanieidites sp.											x
Phyllocladidites mawsonii							x		x	x	x
Proteacidites rectomarginus							x				x
P. affin. P. incurvatus							x			x	x
P. annularis							x				x
"Sparganium" type pollen											x
Tetracolporites sp.							x			x	x
Banksieaeidites elongatus	Species not restricted or of doubtful value				x						
B. minimus			x		x	x					
Casuarinidites cainozoicus			x		x	x	x		x	x	x
Cyathidites sp.			x		x	x					x
Dacrycarpites australiensis			x	x	x	x	x				x

SPECIES		PLIOCENE					?LOWER-MID TERTIARY				
		75-80' Moutajup No.1	60-70' Moutajup No.2	70-80' Karabeel No.2	140-145' Cavendish No.1	35-40' Geerak No.1	60-65' Geerak No.3	40-45' Geerak No.6	50-55' "	65-70' "	45-50' Mokanger No.4
Dacrydiumites florinii	Species not restricted or of doubtful value				x		x		x	x	x
Ericipites sp.			x			x	x		x	x	x
Gleicheniidites circinidites			x		x	x				x	x
Graminidites sp.			x		x	x	x				x
Laevigatosporites ovatus					x		x				
L. major					x						x
Liliacidites sp.											x
Myrtaceidites eugeniioides											x
M. mesonesus			x			x	x	x			x
Monosulcites sp.					x						
Osmundacidites sp.											x
Perotriletes sp.			x			x					
Polyporina sp.											x
Podocarpidites ellipticus			x		x	x	x		x	x	x
Restionaceae		x	x	x	x	x				x	x
Tricolpites spp.									x		x
Tricolporites spp.			x			x	x	x	x	x	x
Triorites harrisii		x	x	x	x	x	x	x	x	x	x
Verrucatosporites sp.					x		x				

Grange Burn - Muddy Creek Sequence

Several outcrop samples collected from Grange Burn and Muddy Creek contain diverse and well preserved assemblages allowing direct correlation with the bore material as presented herein. The relevant stratigraphic information on the samples is as follows:

Sample No.	Locality	Lithology	Stratigraphic Unit
S 822	Waterfall on Grange Burn	Dark brown lignitic tuff	Basalt-Tuff contact.
S 829	Approx. at loc. 10 of Gill on Grange Burn	Blue grey calcareous clay with leaf fragments.	?Grange Burn Coquina
S 845	as above	Blue-grey bryozoal marl	?Grange Burn Coquina
S 846	McDonalds Bank, Muddy Creek	Green grey calcareous siltstone.	Grange Burn Coquina.

The distribution of spores and pollen is as follows:

SPECIES	S 822	S 829	S 845	S 84
"Bubbia" type pollen		x	x	x
?Blechnum sp.			x	
Casuarinidites cainozoicus		x	x	x
Cyathidites sp.	x	x	x	x
C. annulata			x	x
Chenopodiaceae		x	x	x
Acacia octosporites			x	
Dacrycarpites australiensis		x	x	x
Dacrydiumites florinii				x
Gleicheniidites circinidites		x	x	x
Graminidites sp.			x	x
Haloragacidites haloragoides		x	x	
Hepaticae			x	x
Laevigatosporites sp.	x	x		x
Lycopodiumsporites sp.			x	x
Malvacipollis sp.		x		
Myrtaceidites sp.	x		x	
Nothofagus cf. N. aspera				x
N. cf. N. emarcida				x
Osmundacidites sp.				x
Podocarpidites ellipticus		x	x	x
Polypodiaceaeoisporites sp.		x	x	x

SPECIES	S 822	S 829	S 845	S 846
Proteacidites sp. ("Grevillea" type)		x	x	x
Restionaceae		x	x	x
Stereisporites antiquasporites	x			
Triorites harrisii	x	x	x	x
Verrucatosporites sp.	x	x		
Microplankton		x	x	x

CORRELATIONS AND AGE OF THE MICROFLORAS

The younger flora characterized by the absence or very rare occurrence of Nothofagus spp. and the presence of species such as H. haloregoides and "Grevillea" type pollen can be reliably correlated with the Grange Burn Coquina and the bryozoal marl from Grange Burn. These are of Kalimnan age although an older (?Cheltenhamian) age may be possible for the bryozoal marl. There appear to be no significant microfloral differences between the two marine units.

The sample from the basalt-tuff contact is most probably post-Pliocene and is devoid of Nothofagus spp. and coniferous elements.

The older assemblage from the bore samples is somewhat more difficult to correlate or date. It would certainly be pre-middle Miocene and possibly post-Eocene. The presence of abundant Nothofagus spp. and several proteaceous species support a pre-middle Miocene age. It is however closely comparable with many Upper Eocene microfloras throughout southern Australia but the presence of "Sparganium" type pollen and other monocotyledonous species and the absence of some characteristic Eocene Proteacidites spp. would suggest a slightly younger age. A pre-Bochara Limestone age is suggested (Janjukian-Longfordian) on this rather meagre evidence. Similar phenomenom such as the equivalence of non-marine lignites to major marine transgressions in terrestrial environments are becoming more apparent and in many cases non-marine sediments immediately pre-date these transgressions. The precise dating of this assemblage must await further analyses of mid-Tertiary non-marine

and marine sediments.

CONCLUSIONS

Two distinct microfloras, one of Pliocene age, the other mid-Tertiary occur in the area north of Hamilton and are readily distinguished from each other. The younger assemblages appear to be more widespread whilst the other assemblage is apparently confined to the deeper bed-rock depressions and against or adjacent to fault scarps.

REFERENCE

Gill, E.D. 1957 - The stratigraphic occurrence and Palaeoecology of some Australian Tertiary marsupials. Mem. Nat. Mus. Vict. 21: 135-203.

W. K. Harris
Palynologist

N

To Horsham

GEERAK

Bore 6
95

Bore 3
134'

BULLAWIN

Bore 1
69'

Warrnon River

Cavendish

Bore 4
115'

CAVENDISH

Bore 1
221'

MOKANGER

Mt. Cavendish

KANAWALLA

KARABEAL

Bore 2
117'

MOUTAJUP

Bore 1
145'

Bore 2
138'

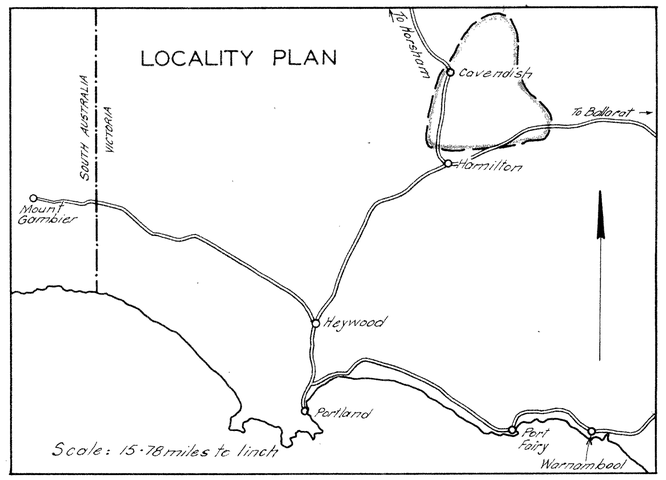
To Hamilton

NORTH HAMILTON

SCALE

Miles 1 1/2 0 1 2 3 4 5 Miles

LOCALITY PLAN



Scale: 15·78 miles to 1 inch

To accompany report by W. Harris.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

BOREHOLE LOCALITY PLAN NORTH OF HAMILTON VICTORIA

		Drn.	SCALE: As shown
		Tcd. B.L.S.	65—450
		Ckd.	224/5
Director of Mines		Exd.	DATE: 26-5-65