Incomplete

FOR

SHELL DEVELOPMENT (AUSTRALIA) PTY. LTD.

S.D.A. FILING NO. R1815

PALYNOLOGICAL REPORT ON VICTORIAN MINES DEPARTMENT BRANXHOLME-1 BORE, OTWAY BASIN - VICTORIA

BY

M. E. DETTMANN

MELBOURNE,
SEPTEMBER, 1969.

CONTENTS

TEXTFIGURES

PALYNOLOGICAL REPORT ON V.D.M. BRANXHOLME -1 BORE, OTWAY BASIN, VICTORIA

1 INTRODUCTION

The present account includes detailed palynological data obtained from seven core samples from between 370 feet and 1496 feet 6 ins in V.D.M. Branxholme -1 bore in the Otway Basin. The report thus reiterates the results expressed in a preliminary account on the well (Dettmann 1969b) and additionally includes details of the preservation quality and specific content of the microfloras extracted from the samples studied.

The samples were processed for palynological investigation according to a method outlined by Dettmann (1969a). Preservation quality of the enclosed plant microfossils was ascertained on residues subjected only to cold hydrofluoric acid, zinc bromide, and Darvan treatment; specific analysis of the microfloras was carried out on residues subjected to further treatment for three to five minutes with concentrated nitric acid.

2 OBSERVATIONS

2.1 Preservation Quality of Plant Microfossils

Plant microfossils were obtained from all samples. The two upper samples (from 370-75 feet 6 ins and 425-30 feet) yielded abundant carbonaceous material including fairly common and well preserved spores, pollen grains, and non-calcareous microplankton interspersed with plentiful wood and cuticular fragments and platy amorphous organic material (Table 1). Foraminifera represented by their inner skeletons arranged in whorls of five to eight chambers occur rarely in these samples.

Samples from between 602 feet and 1497 feet 6 ins yielded perceptibly less well preserved plant microfossils including spores, pollen, and fragments of wood and cuticle together with finely disseminated amorphous organic matter (see Table 1). Dinoflagellates and Foraminifera were not observed in the residues; however, forms that are attributable to Schizosporis and which may be classified within the Acritarcha occur in some of the samples. Moreover, the "pollen" species, Spheripollenites psilatus which may be more appropriately referred to the Acritarcha occurs sometimes abundantly in the samples.

	Microcachryidites antarcticus Cookson	C
	Podocarpidites cf. ellipticus Cookson	Ab
	Tsugaepollenites dampieri (Balme)	R

1492 - 97 feet 6 ins (core 17)

Plant material extracted from the sample includes a high proportion of wood and cuticular tissue and less frequent spores and pollen grains. Plant microfossil species identified include:

Spores:	Aequitriradites spinulosus (Cookson & Dettmann)	R
	Baculatisporites comaumensis (Cookson)	C
	Ceratosporites equalis Cookson & Dettmann	C
	Cicatricosisporites australiensis (Cookson)	R
	Cingutriletes clavus (Balme)	R
	Crybelosporites striatus (Cookson & Dettmann)	R
	Cyathidites australis Couper	Ab
	C. minor Couper	Ab
	Dictyotosporites speciosus Cookson & Dettmann	R
	Foraminisporis asymmetricus (Cookson & Dettmann)	R
	F. dailyi (Cookson & Dettmann)	R
	F. wonthaggiensis (Cookson & Dettmann)	C
	Laevigatosporites ovatus Wilson & Webster	R
	Lycopodiumsporites austroclavatidites (Cookson)	C
	Neoraistrickia truncata (Cookson)	C
	Pilosisporites parvispinosus Dettmann	R
	Reticulatisporites pudens Balme	R
	Rouseisporites reticulatus Pocock	R
	Stereisporites anticuasporites (Wilson & Webster)	Ab
	Velosporites triquetrus (Lantz)	R
Pollen:	Araucariacites australis Cookson	C
	Alisporites grandis (Cookson)	R
	A. similis (Balme)	R
	Microcachryidites antarcticus Cookson	Ab
	Cycadopites nitidus (Balme)	R
	Classopollis cf. classoides Pflug	R
	Podocarpidites cf. ellipticus Cookson	Ab
	Spheripollenites psilatus Couper	Ab
	Tsugaepollenites dampieri (Balme)	R
Incertae Sedis:	Schizosporis spriggi Cookson & Dettmann	R
Remanié:	Nuskoisporites sp. - Permian	R
	Specimen of Dictyotosporites speciosus (Neocomian - L. Albian) quoted above may also be reworked	

3 AGE OF SEDIMENTS

3.1 Lower Tertiary

The two upper samples studied from 370-75 feet 6 ins and 425-30 feet yielded diverse spore-pollen floras containing Dacrydiumites balmei, D. ellipticus, Phyllocladidites reticulosaccatus and Triorites edwardsii (370-75 feet 6 ins only).

The association of these species indicates that the sediments are of Paleocene age and are referable to Harris's (1965) Triorites edwardsii Zone. Microplankton occur in both samples. Species identified in the sample from 425-30 feet, although not necessarily confined to the Triorites edwardsii Zone, collectively support a Paleocene age. Deflandrea obliquipes occurs within and above the T. edwardsii Zone in western Victoria (Deflandre and Cookson 1955, Cookson and Eisenack 1967), and Svalbardella australina appears to be restricted to the base of the zone and in horizons immediately benath the zone (Cookson 1965; unpublished information). Epicephalopyxsis indentata is abundantly represented in both samples; this species ranges from uppermost Cretaceous (Senonian and later) to Eocene (Deflandre and Cookson 1955; unpublished information).

Reworked fossils occur in both samples. Forms detected are of Permian and Lower Cretaceous origin and constitute 1-2% of the microfloras.

The presence of foraminiferal remains in both samples suggests that the sediments were deposited in a marine environment. The abundance and diversity of land derived forms including large pteridophytic derivatives may indicate a situation close to the shoreline.

3.2 Lower Cretaceous

The sample from 602-05 feet yielded a sparse assemblage that is clearly of Lower Cretaceous age in that it contains Foraminisporis asymmetricus and lacks angiospermous grains. On this basis the deposit is referred to the Coptospora paradoxa Zone of Middle-Upper Albian age (see Dettmann and Playford 1969; Evans and Hawkins 1967). Samples from between 785 feet and 1287 feet 6 ins provided more abundant assemblages in which species diagnostic of the Coptospora paradoxa Zone (unnamed unit of Dettmann 1969c) were identified. The sample from 1492-97 feet 6 ins is also from within the Coptospora paradoxa Zone because of its content of Laevigatosporites ovatus. Moreover, the presence of Dictyotosporites speciosus would suggest assignment to the Dictyotosporites filosus unit of this zone (Dettmann 1969c). However, the single example of D. speciosus

recovered from the sample is corroded and may possibly have been derived from older strata. Other indisputable reworked types occurring in the sample are of Permian origin and form less than 1% of total microflora.

Microfloras of the Lower Cretaceous samples are composed chiefly of bryophytic, hepatic, pteridophytic, and gymnospermous derivatives. Some of the hepatics and pteridophytes, for example Crybelosporites striatus, Arcellites, and Rouseisporites spp. possibly originated in aquatic habitats; these forms are abundant in samples from 785-90 feet and 820-85 feet 3 ins. The samples from the depths also yielded Schizosporis reticulatus of possible chlorophycean origin and abundant Spheripollenites psilatus which exhibits features consistent both with pollen morphology (Couper 1958) and with the polyphyletic Leiosphaeridia of the Acritarcha. S. psilatus is also abundantly represented in the sample from 602-05 feet and occurs infrequently at 1492-97 feet 6 ins. The enviornmental significance of S. psilatus is uncertain, but the possibility that it derived from an aquatic habitat must not be overlooked.

4 Conclusions

Palynological evidence indicates that Branxholme -1 bore penetrated a lower Cretaceous sequence beneath horizons of Paleocene age. The Lower Cretaceous sediments are referred to the Middle-Upper Albian Coptospora paradoxa Zone and are thus older than the youngest Otway Group horizons intersected in Pretty Hill No.1 and Eumeralla No.1 wells which are referred to the Tricolpites pannosus Zone (Dettmann 1969c). However, it should be noted that more than 150 feet of unsampled sediment exists between the highest Lower Cretaceous (602 feet) and lowest Paleocene (430 feet) identified in Branxholme -1 bore.

5 References

Cookson, I.C. 1965. Microplankton from the Paleocene Pebble Point Formation, south-western Victoria. Proc. Roy. Soc. Vict. 78, 137-141.

Couper, R.A. 1958. British Mesozoic microspores and pollen grains, a sytenatic and strstigraphic study. Palaeontographica B103, 75-179.

Cookson, I.C. and Eisenack, A. 1967. Some microplankton from the Paleocene Rivernook bed, Victoria. Proc. Roy. Soc. Vict., 80, 347-53.

Deflandre, G. and Cookson, I.C. 1955. Fossil microplankton from Australian late Mesozoic and Tertiary sediments. Aust. J. Mar. Freshwater Res. 6, 242-313.

Dettmann, M.E. 1969a. Palynological report on B.O.C. Dampier -1 well, 9527 - 13,573 feet. Unpubl. report submitted to Shell Development (Australia) Pty. Ltd. 11/7/69.

Dettmann, M.E. 1969b. Summary of palynological data obtained from V.D.M. Branxholme -1 bore, Otway Basin, Victoria. Unpubl. report submitted to Shell Development (Australia) Pty. Ltd. 28/8/69.

Dettmann, M.E. 1969c. Palynological zonation of Lower Cretaceous sediments of the Otway Basin, Victoria. Unpubl. report submitted to Shell Development (Australia) Pty. Ltd. 25/7/69.

Dettmann, M.E. and Playford, G. 1969. Palynology of the Australian Cretaceous - a review; in Stratigraphy and Palaeontology. Essays in Honour of Dorothy Hill (K.S.W. Campbell, Ed.); Chapter 9, 174-210. Aust. Nat. Univ. Press, Canberra.

Evans, P.R. and Hawkins, P.J. 1967, The Cretaceous below the Murray Basin. Bur. Min. Resourc. Aust. Rec. 1967/137 (unpubl.).

Harris, W.K. 1965. Basal Tertiary microfloras from the Princetown area, Victoria, Australia. Palaeontographica 115B, 75-106.

22nd September, 1969.

Mary E. Dettmann,
Department of Geology,
University of Alberta,
Edmonton, Alta,
CANADA.

TABLE 1

Depth	Yield	Spore-Pollen		Dinoflagellates		Wood		Cuticle		Spore-Pollen Zone
		Col.	Pres.	Col.	Pres.	Col.	Pres.	Col.	Pres.	
c.8, 3710-3715'6"	Ab	LY-Br	good	LY-Br	good	Br-Bl	good-fair	LY-Br	good-fair	Tricrites edwardsii
c.9, 4.25-430'	C	"	"	"	"	"	"	"	"	
c.11, 602-605'	Sp	"	good-fair	—	—	"	fair	—	—	Coptospora paradoxa
c.13, 785-790'	Ab	"	"	—	—	"	"	LY-Br	fair	
c.14, 880-885'3"	"	"	"	—	—	"	"	"	"	
c.16A, 1282'6"-1287'6"	C	"	"	—	—	"	"	"	"	
c.19, 1492-1497'6"	"	"	fair	—	—	"	"	—	—	

Preservation of plant microfossil assemblages and zonal attribution of sediments examined in V.D.M. Branxholme -1 bore, Otway Basin, Victoria.

Abbreviations:
Yield expresses the frequency of spores, pollen, and dinoflagellates present in the residues as follows:
Ab = abundant
C = common
Sp = sparse
Colour and preservation. Spores, pollen, dinoflagellates, wood, and cuticle present in the residues are denoted by their colour (col.) and quality of preservation (pres.) thus:-
LY = light yellow
Br = brown
Bl = black
good = well preserved
fair = fairly preserved

Spore-pollen zones are defined by Harris (1965) and Dettmann and Playford (1969).