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PALYNOLOGICAL EXAMINATION OF  
SAMPLES FROM OUTCROP IN THE  
VICINITY OF LAKE EYRE SOUTH

GEOLOGICAL SURVEY

by

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BIOSTRATIGRAPHY

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<u>CONTENTS</u>	<u>PAGE</u>
ABSTRACT	1
INTRODUCTION	1
PALYNOLOGY	2
ACKNOWLEDGEMENTS	4
REFERENCES	5
APPENDIX 1	

#### TABLES

1. Sample details	Page 1
-------------------	--------

#### FIGURES

1. Spore/pollen zones for the western Eromanga Basin.	<u>Plan No</u> S 18324
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DEPARTMENT OF MINES AND ENERGY  
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PALYNOLOGICAL EXAMINATION OF SAMPLES FROM  
OUTCROP IN THE VICINITY OF LAKE EYRE SOUTH

ABSTRACT

Sixteen grab samples from the vicinity of Lake Eyre South were examined for their palynological content. Only two samples (S 5992 and S 6003) contained palynomorphs. The palynomorph assemblages indicate that sample S 5992 may have come from the upper Oodnadatta Formation and S 6003 from either uppermost Oodnadatta Formation or Winton Formation.

INTRODUCTION

During the course of geological mapping (G. Krieg and B. Forbes) in CURDIMURKA and LAKE EYRE 1:250 000 map sheets, sixteen samples from outcropping Eromanga Basin sediments were selected for palynological examination. The details of these samples are:

TABLE 1  
SAMPLE DETAILS

PALYNOLOGICAL NO.	LOCATION	LATITUDE/ LONGITUDE	POSSIBLE LITHOSTRATIGRAPHIC UNIT
S 5990	Prominent Hill	29°00'43"/137°08'03"	?
S 5991	Finniss Springs	29°47'37"/137°33'07"	Bulldog Shale
S 5992	Lake Bowman	29°06'18"/137°15'45"	?
S 5993	Prominent Hill	28°59'51"/137°07'30"	?
S 5994	Morris Creek Bore	29°27'00"/137°36'00"	Oodnadatta Fm.
S 5995	Lake Lettie	29°25'00"/137°58'00"	Mackunda Fm.
S 5996	Lake Lettie	29°27'00"/137°57'00"	Oodnadatta Fm.
S 5997	Lake Lettie	29°27'00"/137°57'00"	Oodnadatta Fm.
S 5998	Cooranna Waterhole	29°29'00"/137°43'00"	Oodnadatta Fm.
S 5999	Eyre Lookout	29°23'18"/137°28'22"	Mackunda Fm.
S 6000	Crowsnest Bore	29°18'00"/137°45'00"	Winton Fm.
S 6001	Crowsnest Bore	29°23'00"/137°46'00"	Oodnadatta Fm.
S 6002	Crowsnest Bore	29°22'00"/137°46'00"	Oodnadatta Fm.
S 6003	Crowsnest Bore	29°21'00"/137°47'00"	Winton Fm.
S 6005	Glen Hill	29°40'50"/137°38'12"	Bulldog Shale
S 6006	Hermit Hill	29°33'57"/137°25'39"	Bulldog Shale

Thirteen of the samples are fine-grained clastics (mudstones, claystones, siltstones, very fine sand) characteristic of the Cretaceous Eromanga Basin sediments. Three other samples (S 5998, S 6002, S 6006) are argillaceous limestones, but were processed in the hope of recovering palynomorph assemblages of the kind recovered from marine Cretaceous limestone nodules (Alley, 1984). A slightly modified conventional laboratory procedure (Alley, 1985) was carried out on all of the samples.

#### PALYNOLOGY

Only two of the samples (S 5992 and S 6003) contained palynomorphs; the rest contained significant vitrinite and minor coarse plant fibres. Sample S 5992 gave a fair palynomorph recovery enabling a count to be made and relative pollen/spore frequencies of commonly occurring species to be calculated (Appendix 1). The assemblage from sample S 6003 was sparse and a count was not made.

##### Sample S 5992 (Lake Bowman:G. Krieg)

Preservation and yield of palynomorphs from this sample is fair, but species diversity is relatively low. The assemblage is dominated by pollen from gymnosperms:

*Microcachryidites antarcticus* (32%), *Podocarpidites ellipticus* (32%), *Alisporites grandis* (11%), *Alisporites similis* (3%) and *Trisaccites microsaccatus* (3%). Other commonly occurring taxa are the spores *Cyathidites minor* (5%), *Gleicheniidites circinidites* (3%), *Osmundacidites wellmanii* (2%) and *Stereisporites antiquasporites* (2%). A minor component (less than one per cent of dinoflagellates occurs, in which species diversity is very low (Appendix 1).

Only one zonal species, *Crybelosporites striatus* is present indicating that the assemblage can be no older than the *C. striatus* spore/pollen zone (Fig. 1). The presence of three other palynomorphs indicates a maximum age range for the assemblage:

- . *Appendicisporites distocarinatus*, which has its first occurrence in the early/middle *Coptospora paradoxa* spore/pollen zone, or at the base of the *Pseudoceratium turneri* dinoflagellate subzone w c (Morgan, 1980).

- *Clavifera triplex* which, in its northern Australian occurrences, appears first at the base of the *Phimopollenites pannosus* spore/pollen zone, or within approximately the middle *Endoceratium ludbrookiae* dinoflagellate subzone a (Morgan, 1980).
- *Heterosphaeridium conjunctum*, a dinoflagellate which first appears at the base of the *Endoceratium ludbrookiae* dinoflagellate zone (Morgan, 1980).

The ranges of the above species and the absence of angiosperm pollen, in particular *Phimopollenites pannosus*, suggests that the assemblage is assignable to the uppermost *Coptospora paradoxa* spore/pollen zone. However, the absence of angiosperm pollen in a restricted assemblage such as this may not be significant because even the zonal species *Coptospora paradoxa* is absent from the assemblage.

Thus, the assemblage in sample S 5992 may be as old as the uppermost *Coptospora paradoxa* spore/pollen zone or as young as the two succeeding zones (Fig. 1). This implies that the sample could have come from upper Oodnadatta Formation or from Winton Formation. Since the latter is a nonmarine deposit and dinoflagellates are present in the assemblage then the sample probably came from upper Oodnadatta Formation (Fig. 1).

#### Sample S 6003 (Crowsnest Bore:B. Forbes)

Preservation and yield of palynomorphs is very poor and the most commonly occurring taxa are *Podocarpidites ellipticus* and *Alisporites grandis*. Rare dinoflagellates are also present. An interesting feature of the assemblage is the presence of a number of megaspores including *Balmeisporites glenelgensis*, *Minerisporites marginatus*, *Pyrobolospora hexapartita* and *Pyrobolospora reticulata*. Although the stratigraphic distribution of megaspores is not well known, the first occurrence of *Balmeisporites glenelgensis* may be in the early part of the *Appendicisporites distocarinatus* spore/pollen zone (Dettmann and Playford, 1969). The presence of dinoflagellates may be interpreted in two ways:

- (1) The assemblage is from a marine deposit and the sample may be from uppermost Oodnadatta Formation.
- (2) If the dinoflagellates were reworked from older marine Cretaceous formations then the sample could also have come from Winton Formation (Fig. 1).

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APPENDIX 1  
LIST AND FREQUENCY OF PALYNOMORPHS

Species name	Sample S 5992	Number S 6003
<u>POLLEN AND SPORES</u>		
<i>Alisporites grandis</i> (Cookson) Dettmann 1963	11	X
<i>Alisporites similis</i> (Balme) Dettmann 1963	3	
<i>Anapiculatisporites pristidentatus</i> Reiser & Williams 1969	X	
<i>Appendicisporites distocarinatus</i> Dettmann & Playford 1968	X	
<i>Araucariacites australis</i> Cookson 1947	X	X
<i>Baculatisporites comaumensis</i> (Cookson) Potonié 1956	X	
<i>Balmeisporites glenelgensis</i> Cookson & Dettmann 1958		X
<i>Balmeisporites holodictyus</i> Cookson & Dettmann 1958	X	
<i>Biretisporites spectabilis</i> Dettmann 1963	X	
<i>Callialasporites dampierii</i> (Balme) Sukh Dev 1961	X	
<i>Ceratosporites equalis</i> Cookson & Dettmann 1958	X	
<i>Cicatricosisporites australiensis</i> (Cookson) Potonié 1956	X	
<i>Cicatricosisporites cuneiformis</i> Pocock 1965	X	
<i>Cicatricosisporites ludbrookiae</i> Dettmann 1963	X	
<i>Classopolis chateaunovi</i> Ryre 1953	X	
<i>Clavifera triplex</i> (Bolkhovitina) Bolkhovitina 1966	X	
<i>Crybelosporites striatus</i> (Cookson & Dettmann) Dettmann 1963	X	X
<i>Cyathidites asper</i> (Bolkhovitina) Dettmann 1963	X	
<i>Cyathidites australis</i> Couper 1953	X	X
<i>Cyathidites minor</i> Couper 1953	5	X
<i>Cycadopites nitidus</i> (Balme) de Jersey 1964	X	X
<i>Dictyotosporites speciosus</i> Cookson & Dettmann 1958	X	
<i>Foraminisporis dailyi</i> (Cookson & Dettmann) Dettmann 1963	X	
<i>Foveosporites canalis</i> Balme 1957	X	
<i>Foveotriletes parviretus</i> (Balme) Dettmann 1963	X	X
<i>Gleicheniidites circinidites</i> (Cookson) Dettmann 1963	3	X
<i>Gleicheniidites senonicus</i> Ross emend. Skarby 1964	X	
<i>Klukisporites scaberis</i> (Cookson & Dettmann) Dettmann 1963	X	
<i>Laevigatosporites ovatus</i> Wilson & Webster 1946	X	X
<i>Leptolepidites major</i> Couper 1958	X	
<i>Lycopodiacidites asperatus</i> Dettmann 1963	X	
<i>Microcachryidites antarcticus</i> Cookson 1947	32	X
<i>Microfoveolatosporis</i> sp.	X	




<i>Minerisporites marginatus</i> (Dijkstra) Potonié 1956		X
<i>Neoraistrickia taylorii</i> Playford & Dettmann 1965	X	
<i>Neoraistrickia truncatus</i> (Cookson) Potonié 1956	X	
<i>Osmundacidites wellmanii</i> Couper 1953	2	
<i>Podocarpidites ellipticus</i> Cookson 1947	32	X
<i>Punctatosporites scabratus</i> (Couper) Norris 1965	X	
<i>Pyrobolospora hexapartita</i> (Dijkstra) Cookson & Dettmann 1958		X
<i>Pyrobolospora reticulata</i> Cookson & Dettmann 1958		X
<i>Reticulatisporites pudens</i> Balme 1957	X	
<i>Retitritiles circolumenus</i> Cookson & Dettmann 1958		X
<i>Retitritiles nodosus</i> (Dettmann) Srivastava 1977	X	
<i>Stereisporites antiquasporites</i> (Wilson & Webster) Dettmann 1963	2	X
<i>Trilites tuberculiformis</i> Cookson 1947	X	
<i>Trilobosporites trioreticulosus</i> Cookson & Dettmann 1958	X	
<i>Trisaccites microsaccatus</i> (Couper) Couper 1960	3	X
<i>Velosporites triquetrus</i> (Lanz) Dettmann 1963	X	

#### DINOFLAGELLATES

<i>Aptea</i> sp.	X	
<i>Cassiculosphaeridia magna</i> Davey 1974	X	
<i>Cribroperidinium muderongense</i> (Cookson & Eisenack) Davey 1969	X	X
<i>Cribroperidinium</i> sp.		X
<i>Gonyaulacysta</i> sp.	X	X
<i>Heterosphaeridium conjunctum</i> Cookson & Eisenack 1964	X	
<i>Schizosporis reticulatus</i> Cookson & Dettmann 1959	X	
<i>Schizosporis spriggii</i> Cookson & Dettmann 1969		X

EARLY NEOCOMIAN		LATE NEOCOMIAN	APTIAN				ALBIAN				CENOMANIAN	AGE			
							Early	Middle	Late	Vraconian					
<i>C. stylosus</i>			<i>D. speciosus</i>				<i>C. paradoxa</i>				<i>P. pannosus</i>		<i>A. distocarinatus</i>		SPORE-POLLEN UNITS (after Dettmann and Playford , 1969)
<i>C. australiensis</i>		<i>F. wonthaggiensis</i>	<i>C. hughesii</i>				<i>C. striatus</i>								
			<i>O. operculata</i>		<i>P. turneri</i>		<i>E. ludbrookiae</i>						MICROPLANKTON UNITS (after Morgan , 1977, 80)		
			<i>a</i>	<i>b</i>	<i>c</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>a</i>	<i>b</i>	<i>c</i>	WINTON FM.			
CADNA-OWIE FORMATION			BULLDOG SHALE				COORIKIANA SANDSTONE MEMBER				OODNADATTA FM.		STRATIGRAPHY (after Dettmann and Playford, 1969)		

Fig. 1

 DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA  <b>LAKE EYRE SOUTH AREA</b>  <b>PALYNOLOGICAL ZONES</b>	COMPILED N.F.A.	<i>[Signature]</i> 11/10/85 C.D.O. DATE
	DRAWN N.R.S.	SCALE —
	DATE 24-4-85	PLAN NUMBER
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