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Preliminary Report on the Micro-palaeontological Examination of Samples from Bores in the Great Artesian Basin of Northern and North-eastern South Australia and Southern Northern Territory.

by

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DEPARTMENT OF SUPPLY AND SHIPPING.

MINERAL RESOURCES SURVEY.

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In 1945 samples from23 bores, which had been drilled for water in the Great Artesian Basin in northern and northeastern South Australia andinsouthern Northern Territory, were selected by Messrs Sullivan and Gardiner of the Mineral Resources Survey, from the store of the Department of Engineering and Water Supply in Adelaide, for micro-palaeontological examination by the writer. It was hoped to find a microfaunal assemblage in the sediments which would be of value in zoning the beds. This examination is now completed, 43,871 feet of samples being studied, and a short account of the results is given below.

A similar examination is being carried out on bores being sunk by the Water Conservation and Irrigation Commission of New South Wales in their boring campaign in the Great Artesian Basin in northern New South Wales. Up to the present 23 bores have been investigated. It is hoped that the investigation may be extended into Queensland.

The bores examined from South Australia and Northern Territory together with the depth of each are as follows:

Bore	Depth in feet
Northern Territory	
a. Anacoora	880
b. Charlotte Waters	1,472
South Australia	
c. Appatinna	350
d. Breaden	947
e. Coonana	3,030
f. Coward	685
g. Goyder's Lagoon	4,850
h. Imbitcha	345
i. Junction	1,448
j. Kalladeina	3,984
k. Lake Phillipson	3,101
l. Marree	380
m. Mirra Mitta	3,572
n. Mungeranie	3,370
o. Oodnadatta	1,571
p. Patchawarra	5,408
q. Peachawarrina	2,789
r. Raspberry Creek	380
s. Sinclair	1,808
t. Stevenson's Creek	1,193
u. William Creek	212
v. Wintinnia	583
w. Yandama Creek	1,513
Total footage	43,871

The fossils recorded from these bores include microfossils such as foraminifera, radiolaria and ostracoda, fragments of pelecypoda, especially prisms of the shell Inoceramus and a few fish fragments.

An assemblage of foraminifera typical of the Lower Cretaceous has been proved in all the bores. This assemblage is similar to that found in bore samples examined from northern New South Wales from which several species were described and figured by the writer in 1944. Further remarks on the micro fauna of the Great Artesian Basin were given by the writer in a departmental mimeographed report in 1945.

Except in the Marree and Anacoora bores, the microfossils were poorly prserved, the majority of specimens of the arenaceous species being crushed. A list of foraminifera recorded and their distribution in the bores is appended below. The letter designations refer to the bores as listed above.

FORAMINIFERA	BORES																					
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w
Ammobaculites australe (Howchin)	x											x											
Ammobaculites sp.	x	x		x	x			x			x	x	x		x	x	x	x	x		x	x	
Ammodiscus sp.	x											x						x				x	x
A. cf. cretacea (d'Orb.)				x																x			
Anomalina rubiginosa Cushman	x					x					x												
Anomalina sp.	x																						
cf. Anomalina	x																						
Arenobulimina puschi (Reuss)	x																		x				
A. cf. puschi (Reuss)																	x		x				
A. sp.	x			x				x															
Bathysiphon sp.	x										x												
Bigenerina sp.	x			x													x						
Bolivinopsis sp.				x																			
Bulimina obtusa Reuss	x																						
B. cf. quadrata Plummer											x												
B. reussi Morrow											x												
Cibicides sp.										x					x	x		x					
Crithionina sp.	x																						
cf. Discorbis															x								
Epistomina sp.																x		x					
cf. Flabellammina	x									x													
cf. Frondicularia															x								
cf. Gaudryinella	x																						
Globigerinella cretacea d'Orb	x								x						x								
Globulina exserta (Berthlin)											x												
G. lacrima Reuss											x				x								
G. sp.														x									
Gyroidina sp.															x								
Haplophragmoides chapmani Crespin	x		x	x				x			x												x
H. cf. chapmani Crespin					x			x	x							x			x				x
H. sp.	x	x		x	x	x		x		x	x		x	x	x	x	x	x	x	x			x
Hyperammina sp.				x	x	x			x							x			x				x
Lagena apiculata Reuss	x																						
L. apiculata var. elliptica Reuss												x											
L. laevis (Montf.)												x											
Lenticulina crepidula (Lam.)												x											
L. cf. discrepans (Reuss)												x											
L. gibba (d'Orb.)												x											
L. grata (Reuss)												x											
L. gunderbookaensis Crespin	x		x	x					x		x		x										

FORAMINIFERA	BORES																							
	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.	s.	t.	u.	v.	w.
L. cf. nuda (Reuss)	.	.	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.
L. cf. scitula (Reuss)	x	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
L. cf. truncata (Reuss)	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.
L. warregoensis Crespin ...	.	.	.	.	.	.	.	.	.	.	.	x	.	x	.	.	.	.	.	.	.	.	.
L. sp.	.	.	.	.	.	x	.	x	.	.	.	x	x	x	.	.	.	.	.	.	.	.	x
Marginulina austiniana Cush. var. directa C.	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.
M. bullata Reuss	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	x
M. cf. texana Cush	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.
M. sp.	.	.	.	.	.	.	x	.	.	.	.	x	x	.	.	.	.	.	.	.	.	.	.
Marssonella oxycona (Reuss)	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.
Nodosaria limbata d'Orb ...	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.
N. cf. radicula (Linne)	.	.	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.
N. sp.	x	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.
Nonion sp.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Patellina jonesi Howch.	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.
Planulina cretacea Cres ...	x	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	x	.	.	.	.
cf. P. cretacea Crespin	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	x
Planulina sp.	x	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	x	.	.	.	x
cf. Pelosina	x	.	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.
Pseudoglandulina lagenoides (Olsez)	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.
Pyrulina cylindroides (Roemer)	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.
Quinqueloculina sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.
Reophax cf. texana Cush. ...	x	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Reophax sp.	x	.	.	.	.	.	.	.	.	.	x	x	.	.	x	.	.	.	.	.	.	.	.
Spiroplectammina cushmani Crespin	x	x	x	x	.	.	.	x	.	.	x	x	.	.	x	.	.	x	x	x	x	x	.
S. cf. cushmani Crespin	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.	.	.
Spiroplectammina sp.	x	.	.	.	x	.	x	x	.	.	x	x	x	.	.	.	x	x	.	.	x	x	x
Spiroplectoides sp.	x	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Textularia sp.	x	.	.	.	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.	x
Trochammina parvula Crespin	.	x	x	x	x	.	.	.	.	.	.	.	.	x	x	.	.	x	x	.	.	.	.
Trochammina raggatti Crespin	.	.	.	x	.	.	.	x	.	.	.	x	.	.	.	.	.	x	x	.	.	.	.
Trochammina sp.	x	x	x	x	.	x	.	.	x	x	x	x	.	x	x	x	.	.	x	.	.	.	.
Verneuilina polystropha Reuss	x	.	x	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.	.	x
Verneuilina tricarinata d'Orb	x	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Verneuilina sp.	x	x	.	x	.	x	.	.	.	x	.	x	.	x	x	.	x	.	.	.	.	.	x

The majority of the foraminifera were found at shallow to moderately shallow depths in the bores but in the Patchawarra Bore which is in the northeasterly portion of the Great Artesian Basin in South Australia, they did not appear until 4,850 feet and were present down to 5,100 feet. In Goyder's Lagoon Bore to the north, the first foraminifera were recorded at 4,300 feet and the last at 4,500 feet. In this bore prisms of the pelecypod Inoceramus were first met with at 2,329 feet, indicating marine conditions of sedimentation, and they were present fairly consistently below that depth down to 3,630 feet. It is interesting to note that Inoceramus, when present in bore samples, usually occurs above the first occurrence of foraminifera.

The general downwards stratigraphic sequence revealed by the micro-examination of the bore samples is:

? Tertiary - Ochreous sandstones, cream to pinkish clays

Lower Cretaceous - Carbonaceous shales and sandstone, fossiliferous

Jurassic - Unconsolidated sands.

The sediments which concern this report are those referred to the Lower Cretaceous. The lithology is consistently alternating grey carbonaceous shales and sandstone, sometimes with some glauconite. The thickness of the Lower Cretaceous sediments varies according to the position of the bores in the Great Artesian Basin. In those bores that are situated along the western margin of the Basin, such as Lake Phillipson, Raspberry Creek, Imbitcha, Breaden, Appatinna, Stevenson's Creek and Charlotte Waters, which are located along a south-north line and those along a west-east line such as Lake Phillipson, Coward, Marree the Lower Cretaceous sediments are comparatively thin, but in the Patchawarra Bore which is in the northeast portion of the basin in South Australia, at least 4,000 feet of carbonaceous shales and sandstones were passed through, while in Goyder's Lagoon Bore to the north of Patchawarra, 2,300 feet of sediments were proved to be fossiliferous.

The micro-palaeontological examination of samples from the 23 bores listed above reveals three main points.

1. The presence of an assemblage of micro-fossils which is characteristic of the Lower Cretaceous sediments in bore sections in northern New South Wales and South Queensland.

2. The uniformity of conditions of sedimentation throughout Lower Cretaceous times in the Great Artesian Basin of northern and northeastern South Australia and southern Northern Territory.

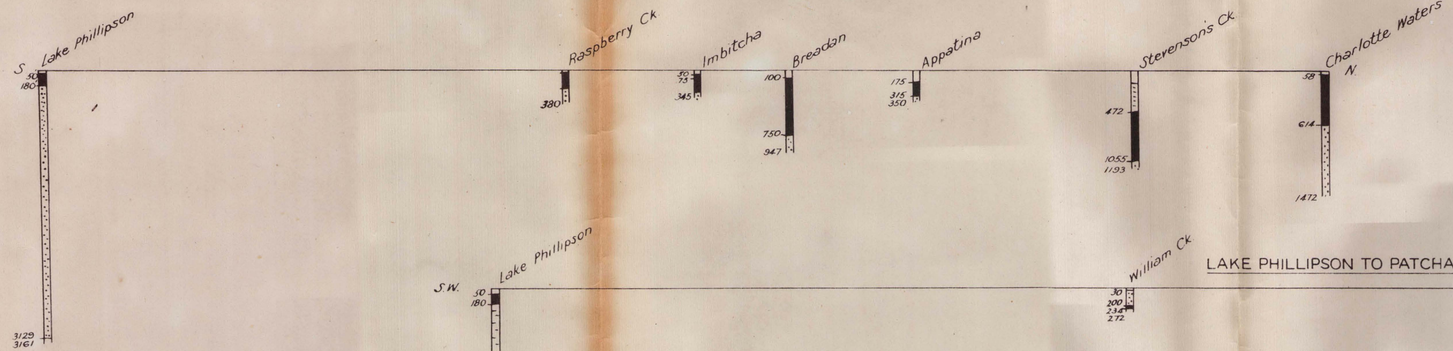
3. The deepening of the Basin in a northeasterly direction into Queensland.

Evidence for No.3 is illustrated in the diagrammatic sections of the bores which accompany this report. The map of South Australia in Bulletin No.14 of the Geological Survey of South Australia has been used as a basis for these sections.

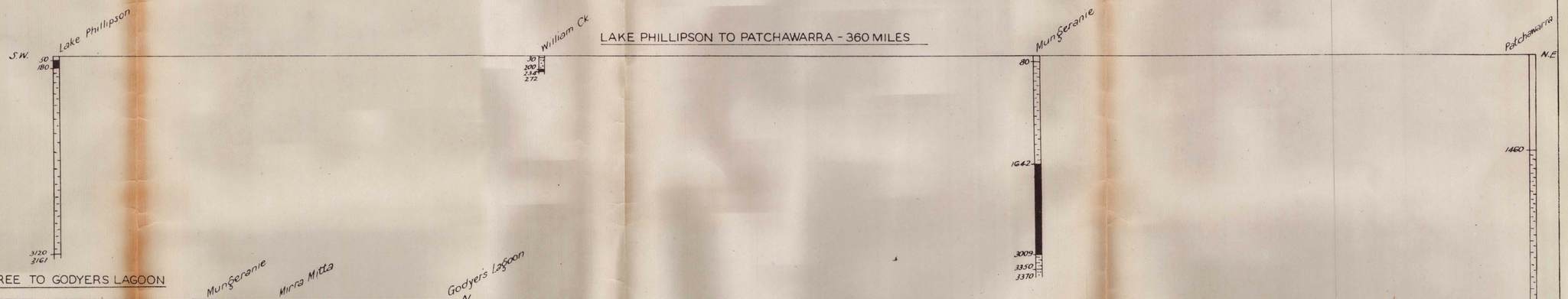
I. Crespin.

CANBERRA 30th May, 1946. Commonwealth Palaeontologist.

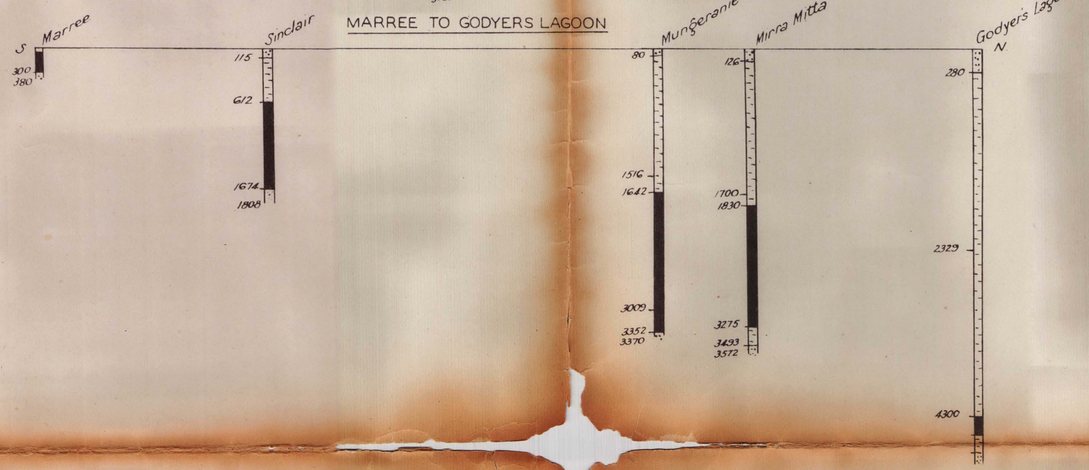
LAKE PHILLIPSON TO CHARLOTTE WATERS - 240 MILES



LAKE PHILLIPSON TO PATCHAWARRA - 360 MILES



MARREE TO GODYERS LAGOON



MICRO-FAUNA IN BORES IN THE ARTESIAN BASIN

SCALE HOR. 1" = 16 MILES
VERT. 1" = 1000 FT.

APPATINA TO COONANA - 410 MILES