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SOUTH AUSTRALIA

GEOLOGICAL SURVEY

PALAEONTOLOGY OF THE ANDAMOOKA OPAL FIELD

by

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Palaeontologist

Rept. Bk. No. 47/86
G.S. No. 1155
Pal. No. 13/58
D.M. 1002/58

19th September, 1958.

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ABSTRACT

Four faunal assemblages are present in the Lower Cretaceous shales and sandstones at Andamooka. Abundant Aptian foraminifera occur in the "toe dirt" immediately below the opal horizon. A notable discovery from recent sampling is that of late Pleistocene or early Recent estuarine sediments in several of the shafts confirming the belief that during the late Pleistocene high sea levels extended Spencer Gulf northwards towards Lake Eyre.

1. INTRODUCTION

The present report is based on micropalaeontological examination of 57 samples collected over a wide area of Andamooka Opal Field by L.G. Nixon and M.B. Langsford in July and August, 1958. All the material is heavily kaolinized, a feature of insignificant stratigraphic value in the arid parts of South Australia where kaolinization is commonly produced by weathering. As most of the Lower Cretaceous foraminifera are arenaceous forms they survive the process of kaolinization but are generally preserved as flattened deflated tests not always easy to identify. Their distribution is shown in the table at the end of the report.

2. BEDROCK

The only pre-Cretaceous material examined was sample (3) of F 195/58 from a bore near Bickford Ridge which apparently entered chocolate shale and brown sandstone at 80 feet.

3. LOWER CRETACEOUS

(1) Below "toe dirt".

The lowest part of the sequence consists of a fine grey white kaolinitic and sericitic sandstone with a poor foraminiferal assemblage. Most of the samples appear to be unfossiliferous but a few examples of Trochammina sp., Haplophragmoides chapmani and Textularia anaeoerensis were recovered from samples F 159/58 and F 160/58 from the lower part of Opal No. 1.

This horizon is probably represented in samples F 162/58 to F 166/58 from the White Dam area, F 167/58 to F 168/58 from Schulton's Shaft and F 170/58 from Opal Creek.

(2) "Tee dirt" of Aptian age.

Opal miners apply this name to a mottled partially ferruginized clay or shale immediately below the opal horizon. Most of the clay disappears on washing leaving a residue rich in arenaceous foraminifera, mainly Haplophragmoides chapmani with Textularia anacoorensis and 2 other species apparently undescribed. Most of the foraminiferal tests are heavily ferruginized and brick red in colour. Samples F 139/58, F 145/58, F 146/58 F 148/58, F 153/58, F 158/58, F 169/58, F 177/58, F 180/58, F 183/58, F 185/58, F 187/58, F 189/58, F 190/58 and F 192/58 were taken from this horizon.

The foraminiferal assemblage is typical of the Roma Formation, of Aptian age.

(3) Opal horizon.

The conglomerate band in which the opal commonly occurs is represented by sample F 140/58 from W. Cronin's shaft, and is distinguished by the presence of Ammobaculites australis which is very rarely present below this level. Thereis no positive evidence however that the horizon is younger than Aptian.

(4) Above opal.

The sediments above the opal horizon are heavily kaolinized sandstone and gypseous shale, with a rather sparse microfauna in which several species are generally represented in small numbers. Textularia anacoorensis and Trochammina sp. are usually present and an unidentified genus "A" occurred in 4 samples.

The horizon is represented in samples F 141/58, F 144/58, F 149/58, F 152/58, F 155-F 157/58, F 161/58, F 176/58, F 178/58, F 181/58, F 182/58, F 184/58, F 188/58, F 191/58, F 193/58, F 194/58.

In the absence of positive evidence of the presence of Albian sediments (Tambo Formation) this horizon is concluded also to be of Aptian age equivalent to part of the Roma Formation.

4. PLEISTOCENE

The detection of living foraminifera and molluscs in Kevin's Shaft, German Gully, and in M. Cronin's shaft is unexpected and important as providing the first positive evidence for the existence of a late Pleistocene or early Recent estuary extending from the top of Spencer Gulf by way of Lake Torrens towards Lake Eyre where brackish water or estuarine foraminifera were recovered from shallow clays in shallow boreholes.

Several other samples in the Gunn's Gully - Lunatic Hill area contained sporadic examples of Elphidium, Cibicides refulgens and bryozoa but as they appeared to be fortuitous no conclusions are drawn for their occurrence.

Fresh water ostracoda and Chara oogonia were present in F 166/58 from White Dam and F 195/58 in red clayey sand from the bore near Bickford Ridge. These are considered to be recently deposited.

5. DESCRIPTION OF THE SAMPLES

(1) M. Cronin's shaft, The Saddle

F 139/58. Floor of shaft.

Ironstained red and grey clay, washed residues consisting of ferruginized clay, fine angular quartz grains, ferruginized foraminifera.

The sample contains a mixture of Cretaceous and Pleistocene species. The Cretaceous species are dominated by Haplophragmoides chapmani and Textularia anacoorensis. The Pleistocene species are Discorbis mira Cushman, Elphidium cf. cratriculatum (F. & M.), Pseudoeponides planatus (F. & M.) and Marginopora vertebralis Blainville. It would appear that Pleistocene assumed to occur at the top of the shaft has fallen in and contaminated the toe dirt forming the bulk of the sample.

F 140/58. Immediately above toe dirt - opal horizon.

White kaolinitic sandstone with Ammobaculites australis. Washings consist of medium angular quartz grains, kaolin, gypsum and some muscovite.

F 141/58. 5 feet above F 140/58. Kaolinitic sandstone with fine to medium angular to subrounded quartz grains with pitted surfaces, some hematite. No microfossils observed.

(2) Bill's Shaft, Hard Hill near German Gully

F 142/58. At 2' depth kaolinized clayey sandstone with medium fine subrounded quartz grains and a good deal of iron staining. No microfossils observed.

F 143/58. At 10 feet depth. Hard resilicified kaolinitic sandstone.

F 144/58. At 20 feet. White kaolinitic sandstone with a few foraminifera.

F 174/58. At 25 feet. Ironstained mottled siltstone - toe dirt - with abundant foraminifera dominated by Haplophragmoides chapmani.

(3) Terry Moore's Shaft, Blackboy

F 145/58. 27-28'6". Mottled red and grey clay (toe dirt), washings consisting of kaolin, fine angular quartz grains, abundant partly ferruginized foraminifera dominated by Haplophragmoides chapmani and Textularia anacoorensis, and an unidentified species of Textularia.

F 173/58. 28-29' Hard kaolinitic grit with quartzite pebbles.

F 146/58. At 29 feet. Lower toe dirt horizon. Most of the sample is clay and the residue consists almost entirely of foraminifera, with Textularia anacoorensis in abundance.

(4) Yarloo Extension

F 147/58. White gypseous kaolinitic rock, the washings consisting mostly of kaolin and gypsum, with a fragment of precious opal. Two doubtful foraminifera only were observed.

(5) Jubilee

F 148/58. No. 1. 19'6". Toe dirt with abundant ferruginized foraminifera, mostly Haplophragmoides chapmani.

F 149/58. No. 2. 15'. White kaolinized sandstone, with fine angular quartz grains, muscovite, very abundant Textularia anacoorensis, and abundant Trochammina sp.

(6) Kevin's Shaft, German Gully

F 150/58. Red surface sandy clay with medium subangular to subrounded quartz grains and grains of silicified sandstone. Abundant iron oxide staining.

F 151/58. At 14 feet. Mottled red and white soft gypseous sandy clay with fine quartz grains and some iron oxide. The sample contains well preserved foraminifera and molluscs living in shallow estuaries at the present time.

Foraminifera

Cribrebulimina polystoma (Parker & Jones)

Nubeculeria lucifuga Defrance

Penereplis planatus (F. & M.) (abundant)

Discorbis mira Cushman

Elphidium cf. craticulatum (Fichtel & Moll)

Mollusca

Macoma deltoidalis (Lamarck)

Diala lamta (Adams)

Salinator fragilis (Lamarck)

Batillaria (Zeacumantus) diemenensis (Q. & G.)

The material is probably of late Pleistocene or early Recent age.

There is in addition a test of Trochammina sp. which may be of Cretaceous age.

F 152/58. At 28 feet. Channel sample over 5 to 6 feet.

White kaolinized shale with fine angular quartz grains, sericite and one specimen each of two species of Textularia.

F 153/58. At 30 feet. Toe dirt Mottled reddish and grey-green clay with abundant Haplophragmoides chapmani.

(7) Garvie's Shaft, Hallion Hill.

F 154/58. At 6 feet. Hard white kaolinized and silicified sandy shale.

No foraminifera were detected.

F 155/58. At 13 feet. White kaolinized sandy shale, with fine to medium angular to subrounded quartz grains, limonite and abundant foraminifera dominated by Textularia anaceorensis.

F 156/58. At 17'9". White kaolinized sandy shale with fine to medium angular quartz grains and foraminifera dominated by Textularia anaceorensis.

(8) Shaft, Horse Paddock.

F 157/58. Above opal horizon. White kaolinized sandstone with fine angular quartz grains and a foraminiferal assemblage dominated by Textularia anaceorensis and Trochammina sp.

F 158/58. Toe dirt. Ferruginized clay with subrounded to angular quartz grains and abundant foraminifera dominated by Haplophragmoides chapmani.

(9) Opal No. 1, north west of Hallion Hill

F 171/58. 0-1 feet. Hard kaolinized sandy clay. No fossils observed.

F 172/58. 4'7"-5'6". Hard kaolinitic sandstone and conglomerate with occasional faceted pebbles.

F 159/58. 7'3"- 10'2". White ironstained sandy clay with Haplophragmoides chapmani. One fragment of precious opal noted.

F 160/58. 10'3" - 11'. Mostly pinkish white kaolinized sandstone with a few impoverished foraminifera.

(10) Stevens Gully

F 161/58. Adit. Grey-white kaolinitic fine sandstone with fine angular quartz grains, abundant sericite and foraminifera dominated by Trochammina sp.

(11) White Dam area

F 162/58. East end, working 1½ miles from White Dam.

3 feet. Partly ferruginized kaolinitic sandy shale with fine angular quartz grains, hematite and limonite staining.

F 163/58. 1½ miles from White Dam; soil profile as at Andamooka.

3 feet. Ironstained kaolinitic sandy shale with fine to medium angular iron-stained quartz grains.

F 164/58. 1½ miles northwest of White Dam.

3 feet. Kaolinized shale with some ironstaining and abundant sericite.

F 165/58. Central workings, bearing 020° from White Dam 300 yds.

Ironstained kaolinized sandy shale.

F 166/58. White Dam. Brownish-white kaolinitic sandstone. Washings consist of light brown fine to medium angular to subrounded quartz grains with much limonite staining. A shell fragment and an oogonium of Chara are present, but it is uncertain whether these are of Pleistocene age or of recent introduction.

(12) Schulten's Shaft, Treloar Hill

F 167/58. Below toe rock. White kaolinized shale with some rounded and subangular quartz grains, sericite, a piece of precious opal and a test of Trochammina sp. with opaline quartz grains.

F 168/58. At 40 feet. Grey kaolinitic sandstone with sericite.

F 169/58. Toe dirt. Purplish ferruginized shale with abundant ferruginized arenaceous foraminifera dominated by Haplophragmoides chapmani.

(13) Opal Creek

F 170/58. Dirty white kaolinitic sandstone with fine even-grained angular quartz grains. No foraminifera were observed.

F 175/58. Hard dark ferruginized sandstone (a) R.L. 945
(b) R.L. 941

(14) Lunatic Hill

F 177/58, Locality 81 (1). Toe dirt. Mottled ferruginized shale with abundant foraminifera dominated by Haplophragmoides chapmani.

F 178/58. 81 (2). 5' above 81 (1). White kaolinized sandy clay. Washings consist mainly of kaolinitic material with fine angular quartz grains and sericite. Cretaceous foraminifera are present, together with Cibicides refulgens and bryozoal fragments. The sample therefore seems to be a mixture of Cretaceous and Pleistocene material.

F 179/58. 81 (3). 5' above 81 (2). Powdery white kaolinitic sand, with iron-stained rounded to subrounded and polished quartz grains.

F 180/58. 82 (1). Toe dirt. Red brown ferruginous shale with Haplophragmoides chapmani.

F 181/58. 82 (2). 5' above 81 (1). White sandy kaolinized rock.

F 182/58. 82 (3). 5' above 82 (2). White kaolinized shale with Haplophragmoides chapmani

F 183/58. 83 (1). Kaolinitic rock with fine angular quartz grains and Haplophragmoides chapmani.

F 184/58. 83 (2). 5' above 83 (1). Kaolinized shale with medium subrounded quartz and sericite.

F 185/58. 84 (1). Red and white mottled kaolinitic sandy shale with subrounded quartz grains and Haplophragmoides chapmani.

F 186/58. 84 (2). 5' above 84 (1). Hard white kaolinized sandstone.

(15) Gunn's Gully

F 187/58. 85 (1). Toe dirt. Pink and white mottled ferruginized shale with abundant Haplophragmoides chapmani. There is also one specimen of Quinqueloculina vulgaris presumably contaminating from the overlying Pleistocene.

F 188/58. 85 (2). 5' above 85 (1). Somewhat ferruginized soft gypseous sandy clay with Globigerina bulloides, Discorbis sp. and bryozoa, indicating a Pleistocene or early Recent age.

F 189/58. 86 (1). Toe dirt. Mottled ferruginized shale with Haplophragmoides chapmani, Textularia anacoorensis.

F 176/58. 86 (2). 5' above 86 (1). Gypseous clay.

(16) Boundary Rider's Hill.

F 190/58. 88 (1). Mottled red and grey ferruginized shale with Haplophragmoides chapmani and Textularia anacoorensis.

F 191/58. 88 (2). 5' above 88 (1). Kaolinized sandstone with, rarely, Haplophragmoides chapmani and Textularia anacoorensis.

F 192/58. 89 (1). Toe dirt. Pinkish sandy shale with Haplophragmoides chapmani and other species in relative abundance.

F 193/58. 89 (2). 5' above 89 (1). White kaolinitic sandstone with abundant foraminifera, including Ammobaculites australis and Textularia anacoorensis.

F 194/58. 89 (3). 5' above 89 (2). Soft powdery clayey sand and kunkar with mostly subrounded ironstained quartz grains. A sponge spicule and one specimen of Textularia were the only organic remains recovered. The sample may be of Pleistocene age.

(17) Near Bickford Ridge.

F 195/58. Three samples from here, collected from spoil.

(1) Reddish and buff clayey sand with medium subangular to subrounded quartz grains with both clear and ironstained quartz grains. Organic remains consist of ostracode fragments, Chara and molluscan shell fragments, the age of which is probably Recent.

(2) Sandstone and chocolate shale, containing a small Trochammina and 2 small shell fragments of diverse origin.

(3) Chocolate brown sandstone - presumably bedrock.

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DISTRIBUTION TABLE

LOWER CRETACEOUS FORAMINIFERA - ANDAMOOKA OPALFIELD

		Hyperammina sp.	Paleolina sp.	Involutina sp.	Haplophragmoides chapmani	Haplophragmoides dickinsoni	Ammobaculites australis	Ammobaculoides kingscotensis	Textularia anacoracensis	Textularia sp. 1	Textularia sp. 2	Textularia spp.	Spiroplectammina cushmani	Spiroplectammina sp.	Trochammina sp.	Genus A.	Gaudryina sp.
F 139/58	W. Cronin's Shaft - floor	r.	r.	-	a.	-	-	f.	C.	C.	f.	-	r.	-	-	-	-
F 140/58	" " " - above tee dirt	-	-	-	-	-	C.	v.r.	f.	r.	-	-	r.	-	-	-	r.
F 144/58	Bill's Shaft - 20' above tee dirt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	v.r.	-
F 174/58	" " tee dirt	C.	-	-	a.	-	-	-	-	r.	a.	f.	r.	-	v.r.	-	-
F 145/58	Terry Moore's Shaft - tee dirt 27'-28'6"	r.	-	-	a.	r.	-	v.r.	C.	a.	f.	r.	-	r.	-	-	-
F 146/58	Terry Moore's Shaft - tee dirt 29'	-	-	-	C.	-	-	-	a.	C.	C.	-	-	-	v.r.	-	-
F 148/58	Jubilee No. 1. 19'6"	-	-	-	a.	-	-	-	v.r.	v.r.	v.r.	-	-	-	-	-	-
F 149/58	Jubilee No. 2. 15'	-	-	-	-	-	r.	-	a.	v.r.	-	r.	-	-	a.	v.r.	-
F 152/58	Kevin's Shaft 28'	-	-	-	-	-	-	-	-	-	v.r.	v.r.	-	-	-	-	-
F 153/58	" " tee dirt 30'	-	-	-	a.	-	-	-	-	-	f.	-	-	-	-	-	-
F 155/58	Garvie's Shaft 13'	-	-	-	-	-	v.r.	-	a.	r.	-	r.	-	-	C.	v.r.	-
F 156/58	" " 17'9"	-	-	v.r.	-	-	-	-	f.	-	r.	f.	-	-	r.	-	v.r.
F 157/58	Horse paddock No. 1	-	-	-	-	-	v.r.	-	C.	-	v.r.	f.	-	-	r.	-	-
F 158/58	" " No. 2 (tee dirt)	C.	f.	-	a.	-	v.r.	-	C.	r.	f.	-	-	-	r.	v.r.	-
F 159/58	Opal No. 1 7'3" - 10'2"	-	-	-	f.	-	-	-	v.r.	-	-	-	-	-	-	-	-
F 160/58	Opal No. 1 10'3" - 11'	-	-	-	-	-	-	-	-	-	-	-	-	-	r.	-	v.r.
F 161/58	Stevens Gully - Adit	-	-	-	-	-	f.	-	f.	-	-	f.	-	-	a.	v.r.	-
F 162/58	White Dam	-	-	-	-	-	-	-	-	-	-	-	-	-	?	-	-
F 167/58	Schulten's Shaft	-	-	-	-	-	-	-	-	-	-	-	-	-	v.r.	-	-
F 169/58	" " tee dirt	-	-	-	a.	-	-	-	C.	v.r.	f.	-	-	-	-	-	-
F 177/58	81 (1) Lunatic Hill	f.	-	-	a.	-	-	-	r.	f.	v.r.	v.r.	-	-	-	-	-
F 178/58	81 (2) "	-	-	-	-	-	-	-	v.r.	-	-	-	-	-	r.	-	-
F 180/58	82 (1) "	-	-	-	f.	-	-	-	v.r.	f.	-	v.r.	-	-	-	-	-
F 182/58	82 (3) "	-	-	-	v.r.	-	-	-	-	-	-	-	-	-	-	-	-
F 183/58	83 (1) "	-	-	-	r.	-	-	-	-	-	-	-	-	-	-	-	-
F 185/58	84 (1) "	-	-	-	f.	-	-	-	-	-	-	-	-	-	-	-	-
F 187/58	85 (1) Gunn's Gully	-	-	-	C.	-	-	-	-	-	-	v.r.	-	-	-	-	-
F 189/58	86 (1) "	-	r.	-	f.	-	-	-	r.	v.r.	v.r.	-	-	-	v.r.	-	-
F 190/58	88 (1) "	-	-	-	f.	-	-	-	v.r.	v.r.	v.r.	-	-	-	-	-	-
F 191/58	88 (2) Boundary Rider's Hill	-	-	-	v.r.	-	-	-	v.r.	-	-	-	-	-	-	-	-
F 192/58	89 (1) "	f.	v.r.	-	C.	-	-	-	r.	f.	C.	-	-	-	-	-	-
F 193/58	89 (2) "	-	-	r.	-	-	a.	-	a.	C.	-	-	-	-	-	-	-

v.r. = very rare (1-2); r = rare (3-5); f = frequent (6-10); C = common (11-25); a = abundant (> 25)