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STRATIGRAPHY AND MICROPALAEONTOLOGY OF AUSTRALIAN  
OIL AND GAS CORPORATION BORE NO. I LOXTON,  
SOUTH AUSTRALIA.

by

Irene Crespin.

August, 1956.

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Introduction

An excellent suite of cores and cuttings were submitted for micropalaeontological examination by Australian Oil and Gas Corporation Ltd. from their bore 10 miles south-south-east of Loxton, south-east South Australia. The first core was taken at 150-152 feet and after that at every fifty feet down to the depth of 600-604 feet (Core 9). The last core submitted (No.27) was taken at 1480-1481 feet, the cores from No.10 down to No.27 coming from varying intervals. As the bore is not yet completed, additional information may be available later on deeper formations. An interesting stratigraphical sequence of fossiliferous beds of Tertiary age is present from 65 feet down to 630 feet.

Stratigraphical Sequence

The table given below gives a summary of the stratigraphical sequence, together with age, stage equivalent in the Victorian Tertiary sequence, limiting depths of lithological units and characteristic foraminifera. The lithological boundaries coincide approximately with the faunal ones, these boundaries having been determined from cuttings where cores were not available.

Epoch	Stage	Limiting depths in feet	Lithology and foraminifera
Recent to Pleistocene	-	0-65	Ochreous micaceous sandstone
Upper Pliocene	?Werri-kooian	65-85	Ochreous shelly calcarenite
Lower Pliocene	Kalimnan	85-135	Grey shelly calcarenite <u>Foraminifera-Operculina bartschi</u> , <u>Marginopora vertebralis</u> , <u>Elphidium adelaidensis</u> , <u>Rotorbinella cyclocypeus</u> .
Miocene	Balcombian	135-570 (Core 1.)	Grey bryozoal limestone with <u>Operculina victorien-</u> <u>sis</u> and fragments of <u>Ditrupe</u>
	?Bairnsdale substage	135-350 (Cores 2,3,4)	
	Batesford substage	350-500 (Cores 5,6)	Grey bryozoal limestone with <u>A.victoriensis</u> (c), <u>Crespinella umbonifera</u> , <u>Calcarina verriculata</u> , <u>Gypsina howchini</u> .
	?Longford substage	500-570 (Cores 7,8)	Grey calcarenite with little bryozoa, large <u>Elphidium</u> and <u>Gyroidina</u>

Epoch	Stage	Limiting depths in feet	Lithology and foraminifera
Upper Eocene	Janjukian	580-630	Grey siltstone becoming very glauconitic towards base. Foraminifera- <u>Massilina torquayensis</u> , <u>Cibicides umbonifer</u> , <u>Bolivina crespinae</u> , <u>Angulogerina subangularis</u> , <u>Cyclamm-ina incisa</u> , <u>Ammodiscus parri</u>
?Middle Eocene	-	630-1251 (Cores 10 to 19)	Pyritic sandstone passing into brown lignitic sandstone and lignite
?Lower Eocene	-	1293-1300 (Core 20)	Grey sandstone
?Lower Cretaceous	-	1355-1481 (Cores 21 - 27)	Greenish grey micaceous sandy siltstone

#### Note on the foraminifera

No typical zonal foraminifera were met with until the depth of 85 feet where the bore passed into the shelly deposits character of the subsurface beds of the Adelaide Basin, which the writer considers to be the Indo-Pacific equivalent of the Kalimnan (Lower Pliocene) of the Victorian Tertiary Period. (Crespin, 1954). The samples from 85 feet down to 135 feet contain few foraminifera. The species recognised include Elphidium adelaidense (Howchin and Parr), Rotorbinella cycloclypeus (Howchin and Parr), Epistomaria polystomelloides (P. & J.) and Pseudopolymorphina doanei (Galloway and Wiessler).

The sample at 135-140 feet contained abundant large tests of Operculina bartschi Cushman and fragments of Marginopora vertebralis Quoy and Gaimard. The appearance of these two forms suggests warmer seas than those in which the later beds were laid down and the possibility of deposition close to a coral reef.

#### Miocene

A marked change in lithology was noted at 135-140 feet. The shelly deposits of the Kalimnan is succeeded by bryozoal limestone of Miocene age.

From 135 feet down to 180 feet, which included the first core taken at 150-152 feet, a limestone containing some bryozoa, and many fragments of the worm Ditrupea cornea var, wormbetiensis is present. Foraminifera are scarce, with only the fragments of a specimen of Operculina victoriensis Chapman and Parr being noted in the core at 150-152 feet. At 180 feet, the bore passed into a rich bryozoal limestone in which Operculina victoriensis is the most important foraminiferal species. It is considered that samples from 180 feet down to 350 feet are most probably the equivalent of the Bairnsdale substage of the Balcombian (Crespin, 1943).

At 350 feet down to 500 feet, the bryozoal limestone persists, but the foraminiferal assemblage indicated that the sediments belong to the Batesford substage. The foraminifera include O.victoriensis, Amphistegina lessonii, Calcarina verriculata, Crespinella umbonifera, Gypsina howchini, Sigmomorphina, subregularis

From 500 feet down 570 feet, the bryozoa suddenly disappear as well as O.victoriensis. The foraminifera are represented by large tests of Elphidium and Gyroldina. These beds may represent the Longford substage.

#### Upper Eocene

At 580 feet there is another sharp lithological change, from the limestones and calcarenites of the Miocene to grey-green siltstone of the Upper Eocene. The beds became increasingly glauconitic towards the base of the unit at 630 feet. The foraminiferal assemblage is characteristic of the Janjukian Stage (Raggatt and Crespin, 1955). Species included typical Upper Eocene forms such as Massilina torquayensis (abundant at 580 feet), Bolivinopsis crespinae, Cibicides umbonifer, Angulogerina subangularis, Buliminella westraliensis, Alabamina westraliensis. Ammodiscus parri, Cyclamina incisa and Bathysiphon cf. angleseensis are present in the glauconitic bed at 630 feet.

#### ?Middle Eocene

At 630 feet another sharp lithological change was noted. The samples at 630 feet down to 645 feet consist of pyritic sandstone. At 658 feet the bore passed into lignitic sandstone and lignite which continued down to 1251 feet. Cores Nos. 10 to 19 were taken in this footage. The deposits contain no microfossils and it is suggested that the lignites are the equivalent of similar deposits at Moorlands 40 miles south-west of Loxton.

#### ?Lower Eocene

Unfossiliferous sandstone is present in Core 20 from 1298-1300 feet. This is regarded tentatively as Lower Eocene.

#### ?Lower Cretaceous

Another lithological change is noted in Core 21 at 1355-1357'6". The bore passes into a greenish grey sandy siltstone which persists down to 1480-1481 feet (Core No. 27) the last sample received. This material was unfossiliferous but the lithology strongly resembles that found in many deposits of Lower Cretaceous age in the Great Artesian Basin.

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