

PERMIAN FORAMINIFERA IN THE ARCKARINGA BASIN,
AND THEIR ENVIRONMENTAL SIGNIFICANCE

by

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ABSTRACT

The environmental significance of the Lower Permian arenaceous foraminifera recovered from the Arckaringa Basin, South Australia, is interpreted qualitatively in comparison to Recent foraminiferal assemblages. The internal (faunal) comparative approach indicates variability in biofacies similar to that in Recent marginal-marine complexes. Indications of a more restricted environment are evident. The environment of deposition is envisaged as a glacial lake or series of lakes situated along earlier tectonically active troughs, with restricted access to the sea.

INTRODUCTION

Permian palaeontology of South Australia was initiated by Ludbrook in 1956 with the discovery of arenaceous foraminifera in the Minlaton No. 1 bore. On microfloral evidence, Balme (1957) recognised a thick sequence of Sakmarian-Artinskian sediments overlying a glaciogene sequence in the Lake Phillipson Bore, providing the first evidence of a fairly thick sequence of strata in what is now called the Lake Phillipson Trough, Arckaringa Basin. Subsequent drilling revealed a wider distribution of Lower Permian sediments throughout South Australia.

The Permian sequence of South Australia consists of basal glaciogene sediments overlain by marine shales that are underlying coal-bearing carbonaceous shales. Interest in the Permian sediments has been focussed on the basal glaciogene sediments which have been recorded in all the other Gondwanaland continents. Frakes and Crowell (1970) have studied these sediments in terms of a model for the global palaeoclimatic changes, resulting from the Late Palaeozoic drift of Gondwanaland. A close parallelism exists between the post-glacial Lower Permian sediments recorded from Australia, South Africa and Antarctica. The marine-nonmarine interval of South Australia matches well the marine-nonmarine interval in several basins in South Africa, described by McLachlan and Anderson (1973). Barrett *et. al.* (1972) reviewed the Beacon Supergroup of Antarctica which contains a (?) Carboniferous-Permian glacial sequence, overlain by lacustrine sediments, which is in turn, overlain by coal measures.

The change of emphasis on the Permian of South Australia is due to the discovery of the marine ingression by Ludbrook (1956) and also for economic reasons, that is the discovery of oil and natural gas in the post-glacial sequence in the Cooper Basin. The nature of the marine ingression into South Australia, and the palaeoecology of the entirely arenaceous foraminiferal assemblages, have been subject to very little detailed study. Previous workers, notably Ludbrook, have stressed the restricted nature of the foraminiferal fauna, suggesting low temperature deltaic and/or fiord environments to be responsible for the lack of good marine fossils.

The discovery of a relatively abundant and diverse arenaceous foraminiferal assemblage by the South Australian Department of Mines, during the stratigraphic drilling program in the Arckaringa Basin,

provides the best evidence for the Lower Permian marine ingression in South Australia.

The aim of this study is to examine the foraminiferal assemblages of the Wallira No. 1 and No. 2 bores (Arckaringa Basin) and to incorporate the results into a general palaeoenvironmental model of the whole basin.

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