

Rept. Bk. No. 63/133
G.S. 3605



**DEPARTMENT OF MINES
SOUTH AUSTRALIA**

**GEOLOGICAL SURVEY
REGIONAL SURVEYS DIVISION**

SUBDIVISION OF THE ADELAIDE SYSTEM

by

**B.P. Thomson
Supervising Geologist
REGIONAL SURVEYS DIVISION**

14th December, 1966

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(Precambrian Symposium Section C)

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LIST OF PLANS

Precambrian Time-Rock Diagram
for the Adelaide Geosyncline S5514/6

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GENERAL

A maximum thickness of about 80,000 feet of sediments, preserved in the Adelaide Geosyncline, constitutes the sedimentary record of the Adelaide System. The rock unit marking the base of the System has been provisionally taken as the transgressive Parana Quartzite(1) in the Mt. Painter area. It overlies unconformably an older Precambrian metamorphic basement. The basement is intruded by granitic rocks dated at about 1600m. yrs.(2). The intrusives are assigned to the proposed Carpentarian time-rock subdivision of North Australia ((4), and unpublished correlation chart of the Bureau of Mineral Resources). The Pound Quartzite, of Marinean age, marks the upper limit of the Adelaide System. The Adelaidean sediments can be divided into four major sequences (3). The accompanying figure summarizes the facies relationships between the geosynclinal sequences and their equivalents where present on the Gawler Platform to the west.

Areas of maximum sedimentation have migrated within the geosyncline during Adelaidean time. It is believed that, although complicated by local unconformities and diapirism, a record of Adelaidean sedimentation is available in selected sections within the geosyncline and shelf region. The major rock subdivisions of the Adelaide System are as follows:-

Callanna Beds and River Wakefield Group

This is the oldest rock grouping in the Adelaidean succession. The Callanna Beds are defined in the Willeuran

Ranges (3) and Mt. Painter area (1). In the first locality, about 7,000 feet of sandstone, shale and minor dolomite is exposed in sequence below the Burra Group. The lowest beds pass into a diapirically disturbed zone including altered carbonates and volcanics. A similar succession, 18,000 feet thick, rests on metamorphic basement in the Nilpinna area (1). Traces of basal quartzite are probably equivalent to the Parana Quartzite. R.P. Coats has recently found that the Woeltana Volcanics, at Mt. Painter, are overlain with unconformity by a transgressive arkose. The arkose is representative of either the Burra Group or an upper unit of the Callanna Beds. At Depot Creek near Port Augusta, a volcanic sequence, correlated with the Woeltana Volcanics, is underlain by Callanna Beds, and overlain with unconformity by the Emeroe Quartzite (3). This unit has been subdivided by B.G. Forbes into the Welshby Sandstone, Wirrabara Formation and Rhynie Sandstone. To the east and south of this area the Callanna Beds pass laterally into carbonates and shales of the River Wakefield Group. The shallow water features of the Callanna Beds, e.g. red bed association, halite pseudomorphs and mud cracks, are not present in the River Wakefield Group. The basic volcanic suite represented by those at Woeltana and Depot Creek also occur in many diapiric areas of the geosyncline north of latitude 33°S and to the east in N.S. The suite represents a widespread volcanic event in Willeuran time (1). Local traces of acid volcanic rock have also been found near the top of the River Wakefield Group.

Burra Group

This group has many lithological similarities with the River Wakefield Group. In the central and western areas of the geosyncline, the basal unit, Rhynie Sandstone, appears to pass

downward without apparent break into the Wirrabara and Stradbroke Formations (3). In the southern and eastern areas the Aldgate Sandstone, (probable Rhynie Sandstone equivalent), is a transgressive unit onto older Precambrian basement which includes granites of late Carpentarian age. The Skillogallee Dolomite (3), associated with sedimentary magnesite, is a persistent marker unit above the Rhynie Sandstone. The overlying carbonates change eastwards into a shale-siltstone sequence, the Saddleworth Formation (3), which in the southern part of the geosyncline is overlain without apparent break by the Umberatana Group. Elsewhere in the geosyncline this group boundary is marked generally by an unconformity suggesting an important tectonic event in Late Terrensian or early Sturtian time in these regions.

Umberatana Group

This rock group embraces the record of Adelaidean glaciations. Two well defined glacial subdivisions are present. These are the Yudnamutana Sub-Group of the Sturtian Glaciation and the younger Yerelina Sub-Group of the Marinean Glaciation. These Sub-Groups are separated by an interglacial succession, the Farina Sub-Group. The base of this unit is sharply defined throughout the geosyncline by the Tindelpina Shale Member. The glaciations are major time markers in the Precambrian stratigraphy in Australia and overseas.

Wilpena Group

This sequence (3) marks a continuation of the shelf-type sedimentation commenced earlier in the Marinean or in late Sturtian time. Shale and siltstone predominate in the central

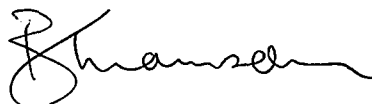
and eastern part of the geosyncline. In the west, red beds and clastics are characteristic of the Group.

TIME SUBDIVISIONS

A major time-rock subdivision into Lower and Upper Adelaidean is proposed at the Burra Group - Umberatana Group boundary. (see fig.) Insufficient radiometric ages are available at present from the succession in South Australia to establish the absolute age of this boundary which marks the beginning of Sturtian Glaciation. The behaviour of the Paralana Quartzite in relation to diapiric Callanna Beds in the Geosyncline is at present speculative. Subsurface exploration by deep drilling and geophysical methods will probably resolve this stratigraphic relationship. The lower limit of Adelaidean time is tentatively placed at 1400m. yrs. (1). This time boundary lies between the radiometric ages (2) of 1345 ± 30 m. yrs. for Reopena Volcanics and the pre-Adelaidean 1535 ± 25 , 1480, 1470 m. yrs. for the Gawler Range Volcanics and Meenta Perphyry.

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