



A PERMIAN COLD WATER MARINE FAUNA IN THE GRANT FORMATION OF THE CANNING BASIN, WESTERN AUSTRALIA

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ABSTRACT

A Permian marine fauna is recorded from a member in the top part of the Grant Formation of the Canning Basin, Western Australia. The member contains varves and tillitic beds with faceted and striated clasts. Eleven species of pelecypods, gastropods, brachiopods, bryozoans and crinoids are present. The sediments and *Dellopecten lyonsensis* and *Calceolispongidae* sp. nov. indicate cold water and the two species indicate correlation with the upper part of the Lyons Group of the Carnarvon Basin, Western Australia. The age is late Sakmarian.

INTRODUCTION

Although glacially derived material has been known in the Grant Formation for a considerable time (Blatchford, 1927, p. 20), a study of its surface stratigraphical relationship has only recently been undertaken as part of the joint Geological Survey of Western Australia and Bureau of Mineral Resources, Geology & Geophysics Canning Basin Project. During the work on the NOONKANBAH 1 : 250 000 Sheet area in the 1974 field season the Grant Formation was examined in detail and the marine fossils were discovered by R. R. Towner and G. E. Wilford of the Bureau of Mineral Resources in the glacial Wye Worry Member (Crowe & Towner, 1976) of the Grant Formation (Locality No. N1206, Lat. 18°39'36"S ; Long. 124°58'36"E ; 10.3 km at 063° from Mt Tuckfield). Although marine fossils have been recorded from the Grant Formation (see Veivers & Wells, 1961, p. 71) this discovery represents the first well authenticated occurrence where the stratigraphical level is known with some degree of assurance.

GEOLOGY

The Grant Formation (originally defined by Guppy, Lindner, Rattigan & Casey, 1952) contains glaciogenic rocks. It consists of sandstone, conglomerate, siltstone, shale, tillite, and minor varved shale. From subsurface information, three subdivisions of the formation have been made : a basal sandstone unit, a middle shale unit and an upper sandstone unit (Young & O'Shaughnessy,

1973). Only the upper sandstone unit is exposed on NOONKANBAH 1 : 250 000 Sheet Area, and following field mapping during 1974, two further subdivisions were made within the upper sandstone unit (Crowe & Towner, 1976).

The subdivision includes :

Millajiddee Member : uppermost sandstone unit of the Grant Formation.

Wye Worry Member : siltstone-shale-sandstone sequence containing tillite.

The sandstone below the Wye Worry Member which makes up the major part of the upper sandstone unit has been mapped as Grant Formation undivided.

GRANT FORMATION UNDIVIDED

On the surface, the undivided Grant Formation is composed of medium to coarse grained quartz wacke, feldspathic wacke, and minor quartz arenite. It conformably overlies the middle shale unit and is conformable or disconformable below the Wye Worry Member.

WYE WORRY MEMBER

The Wye Worry Member consists mainly of sandy siltstone, shale with calcareous concretions and striated and faceted glacial dropstones. Excellent examples are figured by Blatchford (1927, figs. 17, 18). Varves of graded silt and clay are present near the base of the member. The member contains lenses of tillitic congl-

merate and it is sandy towards the top. Marine macrofossils were found in the middle part of the member in the western St. George Range. The member ranges in thickness from 25 m in central St. George Range to at least 95 m in eastern St. George Range. The member probably overlies the undivided Grant Formation disconformably. It is overlain in most places by Millajiddee Member, but in the southwestern St. George Range and at Mt. Thorlan it is unconformably overlain by the Nura Member of the Poole Sandstone.

MILLAJIDDEE MEMBER

The Millajiddee Member is composed mainly of sandstone and minor siltstone and conglomerate. Most

of the member is fine-grained with a medium to coarse-grained part present in the middle of the member. The bedding is poorly defined. Large and small scale cross-bedding is common and the upper part of the unit is slumped in many areas. The member varies in thickness but may be up to 100 m thick. The contact with the underlying Wye Worry Member is gradational, while its contact with the Nura Nura Member is an angular unconformity although the angular relationship is not always apparent.

The Grant Formation is overlain by the Poole Sandstone. At its base is found the Nura Nura Member with a relatively diverse fauna of marine invertebrates (Thomas & Dickins, 1964 ; Thomas, 1958 ; Dickins,

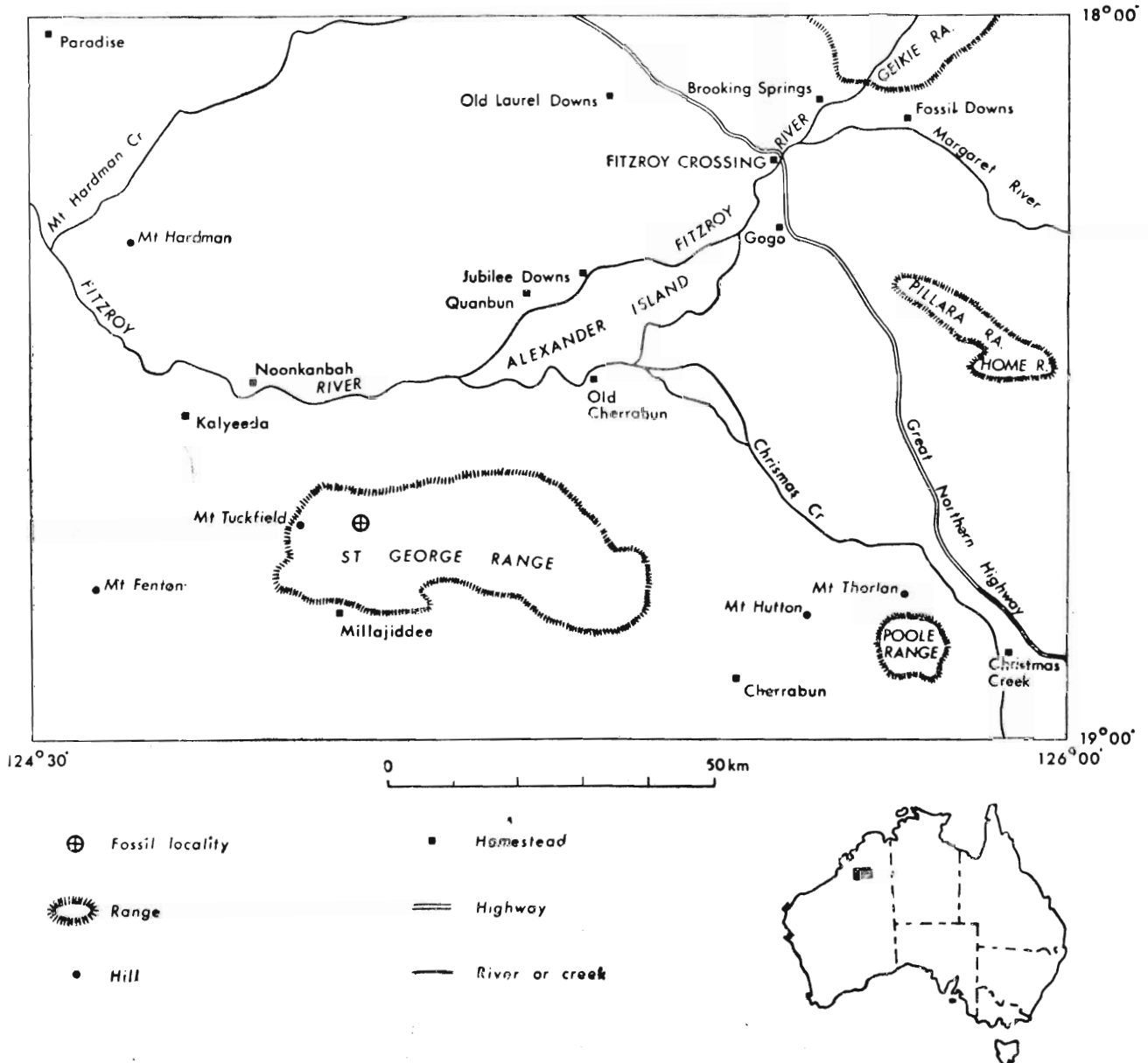


FIG. 1 SKETCH MAP OF NOONKANBAH SHEET AREA SHOWING FOSSIL LOCALITY

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EXPLANATION OF PLATE

PLATE I

- 1-3. *Calceolispongidae* sp. nov., inner, side and upper views of second brachial plate $\times 2$.
4. *Fenestella* sp. $\times 1$.
- 5-8. *Dellopecten lyonsensis* Dickins 1957
5. Anterior ear of right valve $\times 2$.
- 6-8. Shell showing ribbing and ornament $\times 1$.

