EARLY CAMBRIAN TRILOBITES FROM THE OFFICER BASIN, SOUTH AUSTRALIA

by J. B. JAGO* & B. C. YOUNGS†

Summary

JAGO, J. B. & YOUNGS, B. C. (1980) Early Cambrian trilobites from the Officer Basin, South Australia. *Trans. R. Soc. S. Aust.* **104** (6), 197-199, 28 November, 1980.

Fragmentary trilobites, probably of early Early Cambrian age, occur in the Observatory Hill Beds from the eastern part of the Officer Basin. The trilobites were recovered from limestone core at a depth of 87.85 m in Marla-1, a stratigraphic hole drilled by the South Australian Department of Mines and Energy. Their discovery allows the first reliable macrofossil dating of the Officer Basin sediments in South Australia.

Introduction

The Officer Basin is a large intracratonic depression in western South Australia and southeastern Western Australia (Fig. 1). The main part of the S.A. portion covers an area of approximately 100 000 sq. km. and contains sediments ranging in age from Late Proterozoic to Devonian in surface and near-surface outcrops (Fig. 1). Subsurface outliers exist to the east and south of the main basin (Pitt *et al.* 1980). The deep northern parts of the Officer Basin may contain at least 6000 m of sediments.

This paper reports the first trilobites recorded from sediments in the S.A. portion of the Officer Basin. The only previously recorded macrofossil from this part of the Basin is a single specimen possibly representing *Biconulites* (Gatehouse 1976). Prior to the present report, the only palaeontological evidence for the age of any of the basin's sediments came from Devonian microfossils recovered from cores in Munyarai–1[1,2,3] and Early Cambrian microfossils from the Observatory Hill Beds in Wilkinson–1[4]. The specimens figured herein are housed in the palaeontology collection of the S.A. Museum; the catalogue numbers refer to this collection.

Stratigraphy

The stratigraphy of the eastern Officer Basin is summarized in Figure 2. The fauna discussed in this paper was recovered from cores in Marla–1 (lat. 27°28.1′S, long. 133° 44.8′E), a stratigraphic well drilled by the S.A. Department of Mines and Energy in 1974 (Thornton 1978). A more complete section through these beds was drilled during 1979 in Marla–1B (Fig. 3): this well, located near the site of

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1 Harris, W. K. (1968). Continental-Sun-Exoil-Transoil Munyarai No. 1 well palynological examination of cores. S.A. Dept Mines & Energy Rept Book 754, Appendix 4 in envelope 979 (unpublished).

2 Gilbert-Tomlinson, J. (1968). Fossils from Munyarai No. 1 Well, Officer Basin, South Australia. Appendix 7 in S.A. Dept Mines & Energy Rept Book 979 (unpublished).

3 Vlierboom, F. W. (1973). Palynology and source rock potential of core samples from the Conoco exploration well Munyarai-1, Officer Basin, South Australia. *In* S.A. Dept Mines & Energy Rept Book 979 (unpublished).

4 Muir, M. D. (1979). Palynological examination of microfossils from the Observatory Hill Beds, Wilkinson No. 1 DDH, Officer Basin, South Australia. Appendix 2b in S.A. Dept Mines & Energy Rept Book 78/88 (unpublished).

Fig. 1. Locality map, Officer Basin.

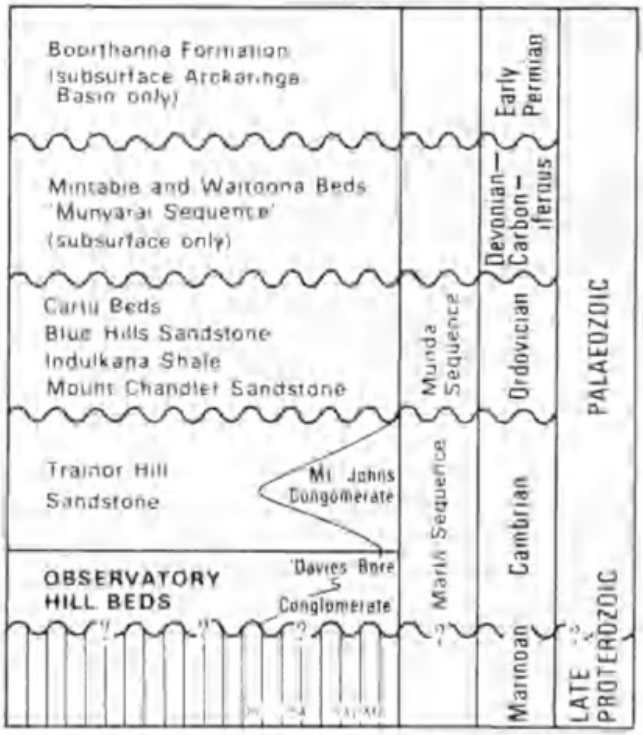

Fig. 2. Simplified stratigraphy, Officer Basin, S.A. (modified after Pitt *et al.* 1980).

Marla–1, intersected nearly 300 m and was still in the Observatory Hill Beds when drilling was stopped.[3] Marla–1 well intersected 22.58 m of Observatory Hill Beds unconformably beneath the ?Early Permian Boorthanna Formation. The specimens described herein are from 87.85 m depth. Other, at present indeterminate, trilobite fragments have been found at a depth of 333 m in Marla–1B.

The Observatory Hill Beds in Marla–1B are a flat lying sequence of predominantly fine-grained, buff to grey, silty carbonates with minor thinly interbedded calcareous siltstones and sandstones. Above 176 m, calcite and dolomite mudstones and boundstones are common, with chert and fluorite occurring throughout. Below 176 m to the total depth of 379 m, the section is predominantly dolomitic and evaporitic mudstones with some boundstones, wackestones and packstones. Fine- to medium-grained calcareous and dolomitic siltstones and sandstones are interbedded throughout. Fluorite is rare, but secondary chert and sulphides are common.

Apart from algal mats and stromatolites throughout the sequence, the only fossils are trilobite fragments. These are found only at the top of the drilled section and were recorded at levels similar to those in Marla–1.

Unlike the Observatory Hill Beds in Byilkaoora–1 (Fig. 1) which are considered non-marine (White & Youngs 1980), those in Marla–1, –1B are interpreted as marginal marine. The basal 200 m were deposited on mudflats and in tidal channels which may have been subjected to periodic exposure. The beds above 176 m show an increase in marine influence and were probably deposited in the shallow, quiet waters of a lagoon on a broad, shallow platform.

Palaeontology

Several trilobite fragments were recovered from limestone core at a depth of 87.85 m in Marla–1, after having been discovered during petrographic work.[4] However, there are only three small, fragmentary specimens on which reasonable comment can be made. The smallest available specimen, P22981, is very small (Fig. 4a) and may be an immature form of the species described below. However, the glabellar furrows of P22981 seem to be shorter and less distinct and the anterior border is narrower than in that species. Until more and better material is available, it will not be possible to identify this specimen.

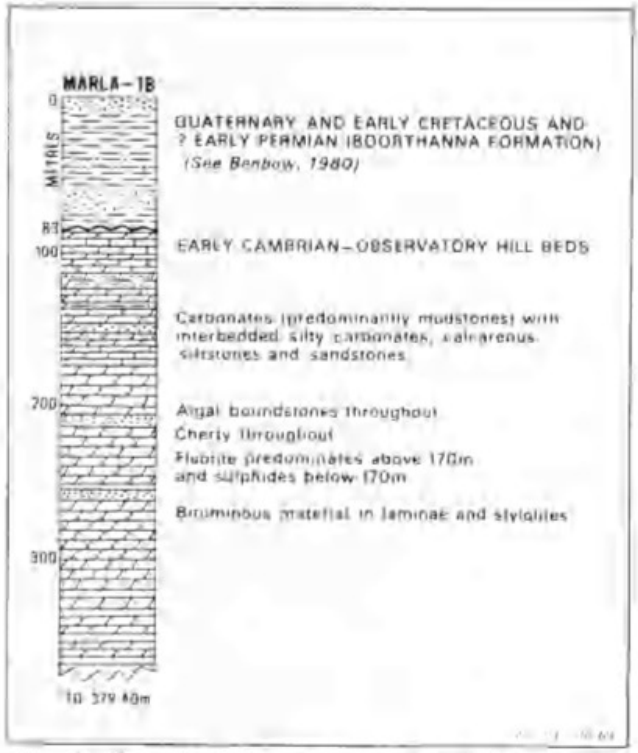

Fig. 3. Simplified log, Marla 1-B, Officer Basin, S.A.

[3] Benbow, M. C. (1980). Marla-1A, 1B well completion report. S.A. Dept Mines & Energy Rept Book 80/22 (unpublished).

[4] Lydyard, A. J. (1979). A petrographic study of the sediments in seven Officer Basin stratigraphic wells. S.A. Dept Mines & Energy Rept Book 79/55 (unpublished).

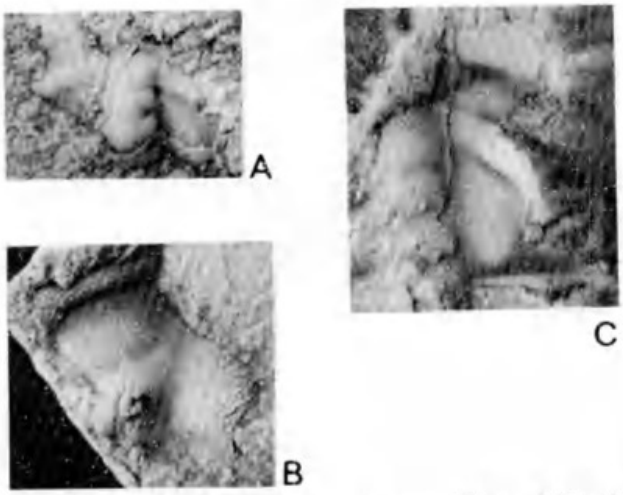

Fig. 4. A. P22981, immature cranidium, X9. B. P22982, part of left hand anterior part of cranidium, X8. C. P22983, partial cranidium, X7.5. All photographs are of silicone rubber casts whitened with magnesium oxide.

The other two specimens, P22982–3 (Figs 4B–C), represent a single species. This species has a glabella which apparently has a well developed occipital furrow and three pairs of lateral glabellar furrows. The lateral glabellar furrows are directed inwards and backwards, with the anterior furrows being shallower than the posterior furrows. The position of the glabellar anterior cannot be determined. The wide palpebral lobes extend from opposite the occipital furrow to opposite the 3p glabellar furrows; the wide eye ridges meet the glabella immediately forward of the 3p glabellar furrows. There is a suggestion of the presence of a para-frontal band.

The wide, almost flat border widens abaxially; it stands well above the preglabellar field from which it is separated by a narrow, shallow marginal furrow. The preocular sections of the facial suture commence opposite the 3p furrows and diverge markedly to the marginal furrow, from where they converge gently. The almost flat palpebral areas of the fixigenae are separated from the palpebral lobes by narrow shallow furrows.

The short, postocular sections of the facial sutures diverge markedly and enclose small posterolateral limbs. The marginal furrows are broad. The forward part of the glabella has a low reticulate ornament. The remainder of the cranidium visible is finely granulose.

The shape of the facial suture, and the shape and position of the palpebral lobes suggest affinity with *Pararedlichia, Eoredlichia, Wutingaspis, Chaoaspis* or a related genus of the Redlichiidae. Such genera are found in lower Lower Cambrian rocks of China (Chang 1966, Lu *et al.* 1974, Li 1980), France (Courtessole & Jago 1980), Vietnam and Morocco (Hupé 1953). In South Australia *Eoredlichia* has been recorded from Faunal Assemblage II in the Flinders Ranges (Daily 1972). Daily correlated this assemblage with the early part of the Atdabanian of Siberia. This suggests that the specimens figured herein are also of early Early Cambrian age. However, until more material is available a more precise age cannot be given. The presence of further trilobite fragments at a depth of 333 m in Marla 1B indicate that the fauna figured herein cannot be of earliest Early Cambrian age.

Acknowledgments

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MUCKERA AND MILLBILLILLIE – AUSTRALIAN ACHONDRITIC METEORITES

BY M. J. FITZGERALD

Summary

The chemistry, mineralogy and petrographic features of two Australian achondritic meteorites are described in detail. The previously undescribed South Australian meteorite, Muckera, found on the Nullabor Plain in 1951, is classified as a howardite. One of the masses of the Millbillillie meteorite from central Western Australia is shown to be chemically and mineralogically similar to another mass presumably from the same fall. This new mass is classified as an eucrite.