



## GR focus review

## A new lower Cambrian shelly fossil biostratigraphy for South Australia



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## ABSTRACT

Definition of early Cambrian chronostratigraphic boundaries is problematic with many subdivisions still awaiting ratification. Integrated multi-proxy data from well-resolved regional-scale schemes are ultimately the key to resolving broader issues of global correlation within the Cambrian. In Australia, early Cambrian biostratigraphy has been based predominantly on trilobites. Phosphatic shelly fauna have great potential as biostratigraphic tools, especially in pre-trilobitic strata because they are widespread and readily preserved, but they have remained underutilised. Here we demonstrate their value in a new biostratigraphic scheme for the early Cambrian of South Australia using a diverse shelly fauna including tommotiids, brachiopods, molluscs and bradoriids.

Biostratigraphic data are derived from ten measured stratigraphic sections across the Arrowie Basin, targeting Hawker Group carbonates including the Wilkawillina, Wirrapowie and Ajax limestones and the Mernmerna Formation. The stratigraphic ranges of shelly fossils are predictable and repeatable across the Arrowie Basin, allowing three discrete shelly biozones to be identified, spanning Terreneuvian, Stage 2 to Series 2, Stages 3–4. The *Kulparina rostrata* Zone (new) and part of the overlying *Micrina etheridgei* Zone (new) are pre-trilobitic (predominantly Terreneuvian). The Cambrian Series 2, Stage 3 *Dailyatia odyssei* Zone (new) features a very diverse shelly fauna and will be described in detail in a separate publication. These zones provide robust means to correlate Terreneuvian–Series 2 successions in neighbouring coeval basins in Australia, particularly the Stansbury Basin. Wider correlation is possible throughout East Gondwana, and especially with South China.

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**1. Introduction**

The Arrowie Basin is a large (55,000 km<sup>2</sup>) depositional basin situated in east-central South Australia (Fig. 1) that has one of the best exposed successions of lower Cambrian sedimentary packages anywhere

in the world (Gravestock and Cowley, 1995; Zang et al., 2004; Jago et al., 2012). Calcareous and organophosphatic shelly fossils (often called “Small Shelly Fossils” [SSF]) are ubiquitous across carbonate-dominated parts of the basin and have been described in a series of papers (Bengtson et al., 1990; Brock and Cooper, 1993; Brock and

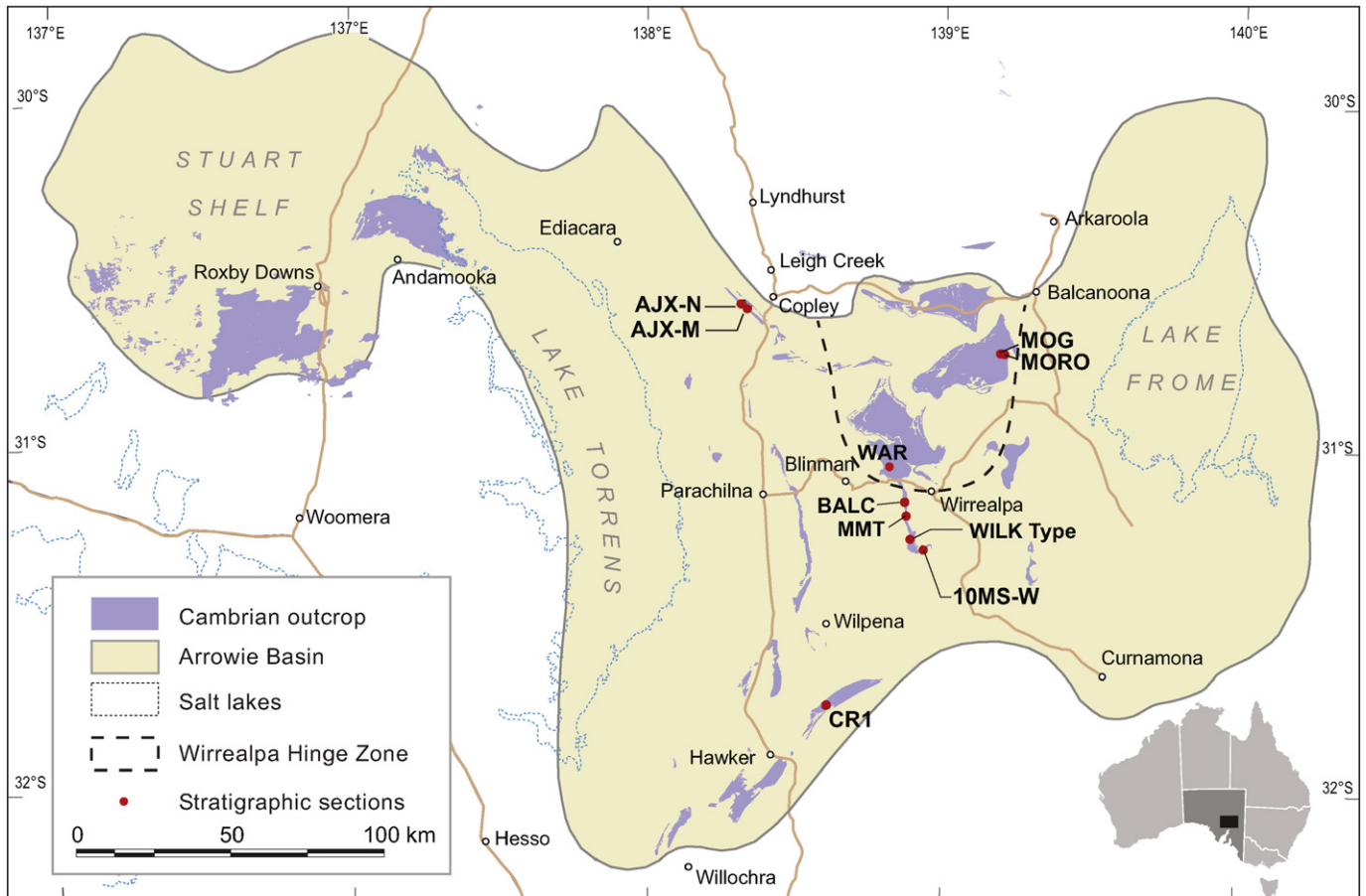


Fig. 1. Extent of Arrowie Basin, South Australia showing Cambrian outcrop and locations of measured stratigraphic sections mentioned in the text.

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