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# Palynostratigraphy of the Permian Wolfgang Basin, Australia: Implications for timing and glaciation

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## Abstract

The Wolfgang Basin in Queensland, Australia is a small rift-controlled half graben that hosts significant coal deposits adjacent to the Bowen Basin. The age of the basin has previously been assessed to be limited to the Cisuralian based on palynological data from the nearby Blair Athol Basin, which features a similar stratigraphy. Recent work in Australia calibrating the biostratigraphic scheme using absolute zircon ages allows for much more accurate age assessments using palynology. New palynological data from the four major coal seams of the Wolfgang Basin (the Wolfgang Main, Wolfgang Upper, Prospect and Gowrie seams) suggest that the period of deposition spanned a number of biozones. The Wolfgang Main and Wolfgang Upper seams are assigned a Kungurian-Roadian age based on the presence of *Praecolatites sinuosus* (APP3.2). Samples from the overlying Prospect Seam feature the first appearance of *Microbaculispora villosa*, the index taxon for the APP3.3 Zone, suggesting an upper Roadian age. The uppermost sample in the Gowrie Seam is assigned to the APP4.2 Zone based on the first appearance of *Didacrydites ericianus* and intermediate forms between *M. villosa* and *D. ericianus*. This indicates deposition occurred in the basin at least into the Wordian but potentially into the Capitanian. Rifting in the Denison Trough of the Bowen Basin is broadly limited to the Cisuralian and is followed by a period of passive thermal subsidence in the Guadalupian wherein little to no deposition occurred in the basin before the foreland basin phase initiates in the Lopingian. The Wolfgang Basin stratigraphy spanning this period (Roadian–Capitanian) suggests that localized tectonic activity was still ongoing in the region. This also coincides with the P3 glaciation, the signal of which may be observed within the carbon isotope record of the Wolfgang Basin, providing a unique record of this phenomena not previously recorded in Queensland.

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