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# Field Relationships at Low Head, King George Island and Their Bearing on the Age of the Oldest Antarctic Glaciation

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King George Island contains one of the most important terrestrial records of Cenozoic glacial history, with evidence for possibly up to four discrete glaciations represented. One of these, the Polonez Cove Formation (PCF), contains a deposit interpreted as a lodgement tillite and locally abundant clasts exotic to the Antarctic Peninsula for which an East Antarctic provenance has been suggested. Dating the PCF palaeontologically has proved difficult and contentious owing to the presence of abundant reworked fossils, and isotopic (K-Ar) ages on associated volcanic rocks are currently believed to be too young owing to thermal resetting. However, from inferences based on field mapping and extrapolation of isotopic ages from adjacent areas, a sizeable literature suggests that the PCF is middle of early Oligocene in age (<34 Ma), and that the PCF represents the oldest pan-Antarctic glaciation represented in the terrestrial record.

Volcanic rocks occur within the PCF, and raise the possibility of dating the PCF directly. They have been interpreted as products of lava deltas, and one of the volcanic outcrops, at Low Head, contains a columnar basalt regarded as a plug much younger than the associated sequence. In contrast with other volcanic rocks associated with the PCF, the columnar rock is essentially fresh and it has a published K-Ar age of 14.4 Ma consistent with current interpretations. However, new field and laboratory investigations of the Low Head sequence indicate that the so-called "plug" and adjacent breccia are indistinguishable lithologically, and in element and isotopic (Sr-Nd) characteristics indicating that they are cogenetic. The outcrops are interpreted as a small (*c.* 588 m estimated original diameter) basalt lava dome emplaced in a subaqueous environment coeval with the PCF. The dome contains a central mass of columnar rock enveloped by fractured basalt and lithic breccia. The breccia is a joint-block deposit interpreted as an unusually thick, dome carapace breccia. It was mainly formed *in situ* by intense dilation, fracturing and shattering caused by natural hydrofracturing during initial dome effusion and subsequent endogenous emplacement of further basalt melt, now preserved as the columnar rock. A new $^{40}Ar/^{39}Ar$ age of 24 $\pm$ 2 Ma (Oligocene-Miocene boundary) has been obtained from the fresh columnar outcrop and is indistinguishable within error from a published K-Ar age of 22.3 $\pm$ 8.8 Ma from the surrounding breccia. Work in progress is aimed at substantiating this age, and others obtained from associated volcanic rocks, which appear to support a younger age for the PCF and the corresponding Polonez Glaciation than is currently accepted.