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The Great Eucrite intrusion of Ardnamurchan, NW Scotland: re-evaluation of the ring-dyke concept

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Ring-dykes are circular sheet intrusions that develop at a sub-volcanic level due to ascent of magma along a steep outward dipping ring-fracture. Magma ascent is triggered by central block subsidence, and when fully formed, ring-dykes comprise a flat-lying roof as well as steeply outward-dipping walls on all sides. The Ardnamurchan peninsula, NW Scotland, is the site of the Great Eucrite, a spectacular gabbro intrusion that has been interpreted and cited as one of the classic examples of a ring-dyke for the past 80 years. Indeed many of the original concepts formulated for ring-dyke development were introduced for the gabbro bodies of Ardnamurchan, and in particular for the Great Eucrite.

We combine field observations, detailed structural measurements of primary magmatic features, and Anisotropy of Magnetic Susceptibility data in a re-investigation of the Great Eucrite. Magmatic layering and macroscopic planar crystal arrangements are inward dipping, and a strongly linear magnetic anisotropy plunges consistently toward the centre of the intrusion, contrasting what would be expected for a ring-dyke. We therefore propose that the Great Eucrite 'ring-dyke' is probably a lopolithic intrusion with an overall 'funnel-shape' geometry. Our results imply that many similar mafic intrusions of the British Tertiary Igneous Province thought to be ring-dykes may also have radically different shapes.