

DOLERITE INTRUSION
HOBART DISTRICT TASMANIA.

by

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This thesis contains no material which has been accepted for the award of any other degree or diploma in any University and, to the best of my knowledge and belief, contains no copy or paraphrase of material previously published or written by another person, except where due reference is made in the text of the thesis.

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"..... the Eternal shall rejoice in his works. He looketh on the earth, and it trembleth: he toucheth the hills and they smoke."

Psalm 104: 31-32

ABSTRACT

Jurassic dolerite intrusions of the Hobart district, Tasmania, have been examined geologically and gravimetrically in order to determine their form. The dolerite intrudes flat-lying shallow marine Permian and continental Triassic rocks. A major problem was the resolution of more recent faulting superimposed upon Jurassic structures.

The intrusions are the result of a limited series of injections (four or five). Each individual intrusion has an irregular flattened trumpet shape. Synchronous intrusions have interconnected to produce a cross-wave pattern in which each hollow represents the site of one or more massive feeders. The feeders are basically dykes up to a mile across, although some are pipe-like extensions or wedges from dykes, and most are related to pre-existing faults.

Sheets have been initiated above feeder wedges at a point where effective intrusion pressure (about $7 \times 10^5 \text{ gm/cm}^2$) has exceeded the load pressure. Dislocation by fracturing was followed by hydrostatic intrusion. The actual form of the sheets, termed chonoliths, is determined at any place by any previous and concomitant fracturing. Fractures are controlled by rock heterogeneities, plastic confining beds, fluid content and distance from the feeder, or proximity of the free surface. Each sheet is about 1,000-1,500 feet thick.

Initial intrusions are normally placed low in the sedimentary column, while later intrusions generally found a higher level. Ultimately a lava plateau could be produced if the magma supply was adequate, although no evidence exists for this feature in Tasmania.

Extreme products of differentiation are to be found only in those parts of the intrusion adjacent to, or above, a feeder. There is no evidence of assimilation within the area.