THE PARAGENESIS AND ORIGIN
OF THE TERRANY CREEK MINERAL DEPOSITS.

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The origin of the gold and base metal deposits in the Lower Proterozoic rocks of Yancam Creek is attributed to basic and intermediate intrusives which, by virtue of their undeformed fabric and field relationships, prove to be the latest igneous intrusives in the area. These intrusives penetrated the Archaean, and Lower Proterozoic rocks as well as the Middle Proterozoic granite plutons. The disseminated and vein-type epigenetic mineralisation which exists in the Archaean in proximity to these basic intrusives, provides a clue to the origin of both the gold and base metal deposits in the Proterozoic rocks.

The basic intrusives and the magnetite and pyrrhotite in the contiguous gneissose, account for the magnetic anomalies in the known area of Archaean. Basic intrusives with similar associated mineralisation may also occur in the deeper unknown areas of the Archaean basement where magnetic lineaments have been defined.

Similar sequences of wall rock alteration exist in both the base metal and gold deposits thus indicating that these have a common origin. The relative positions in depth of the gold and of the base metal deposits, correspond with the increase with depth of the intensity of wall rock alterations. Gold has a greater depth range than the base metal sulphides for it persist in all types of ore from the deepest sulphides to the shallowest auriferous deposits. The gold deposits contain little sulphide and the sulphide deposits little gold.

The Lower Proterozoic sequence embodies conspicuous tuffaceous rocks, in which mantles of volcanic origin in a widespread and
Prominent clastic. Clastic sediments are also present, but not in sufficient amount to provide for the base metal ore deposits. The partial solution of disseminated iron oxides in the zone of reducing waters and their subsequent redeposition in closed structures, give rise to the prominent "ironstone lode formations". These are therefore essentially synmagmatic in origin, progressively formed with continued erosion, and confined to the oxidized zone.

The "ironstone lode formations" are not in themselves, manifestations of mineralization but they indicate the existence of structures favourable to mineralization. Those, which embody economic mineral deposits, occupy coincidentally with epigeanic gold or sulphides, the most fully developed structures and are gradational in depth into concentrated epigeanic magmatic with hydroxides, mafics and carbonates, or with ultramafics and gipses.

The further development of the mineral resources of Tennant Creek may therefore depend upon the study of the distribution of the basic intrusions in relation to regional magnetic trends and upon the coincidence of those with deepening structures. This implies a much more extensive examination of the Archaean basement through deep or deep drilling that has previously been undertaken in the district, and will be aided greatly by concurrent studies of metaconic rock alterations in the overlying Proterozoic rocks.
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