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PRELIMINARY NOTES OF SOME ROCK TYPES OCCURRING ON BETHLEHEM PROPERTY

(N.B. See subsequent note on the occurrence of alkali felspars in these rocks).

GUICHON QD: characterized by poikilitic biotite and by quartz of interstitial, wedge-shaped habit. Mesocratic (about 20% dark minerals, mostly as irregularly-shaped crystals). Biotite approx. balances hornblende. Altered plagioclases fail to show pronounced oscillatory zones.

GUICHON QD (type d): e.g. 58-350 v. little Or. again a rather mesocratic rock. Differs from typical Guichon QD in (a) biotite partly in hexagonal plates, partly in poikilitic plates (b) hornblendes tend to be better shaped, more prismatic, and some are sieve-like, (c) quartz is less obviously wedge-like (is granular-interstitial rather than interstitial) (d) may have a mild foliation due to aligned crystals, but thefoliation is variable in orientation.

BETHLEHEM QD: comprises porphyritic and sub-porphyritic varieties. Phenocrysts are principally hornblende, plagioclase and, occasionally, quartz. Well-shaped hornblendes may reach 1½ cm. length, plagioclases seldom exceed ½ cm. Biotite occurs in prominent hexagonal plates seldom exceeding 2 mm. Quartz is characteristically of spotty or dappled habit, not typically wedge-like. In the sub-porphyritic rock, quartz is granular-interstitial. If present, orthoclase is intimate with quartz and also forms rims on plagioclase crystals. The rock is rather leucocratic, with 10-15% dark minerals. Sieve-hornblendes are usually present. Biotite generally in excess of hornblende. Altered plagioclases may show pronounced oscillatory zones, in common with other rocks of Younger Complex.

BETHLEHEM GRANITE: More correctly a quartz-monzonite. Texturally fairly similar to porphyritic Bethlehem QD but without hornblende and not as porphyritic. Colour pink-red due to 30% orthoclase. Is probably gradational to porphyritic Bethlehem QD but also segregational and locally intrusive into latter rock.

THE PORPHYRIES: These rocks are named on the presence or absence of quartz phenocrysts. They have a fine-grained groundmass which need not be aphanitic, and some of the rocks converge with prophyritic Bethlehem QD in appearance and are hard to distinguish from the latter. Hornblende phenocrysts are present in all rocks, and are commonly well-shaped and often sieve-like. The porphyries are all leucocratic.

(a) Quartz-poor Porphyry.

Comprises P_1 and P_2 as distinguished during mapping.

(i) P_1 - phenocrysts of plagioclase and hornblende compose 40% or less of rock. Quartz forms rare, small phenocrysts which may be absent. Colour of rock variable between white and grey-green. Fresh rock weathers reddish-brown.

Groundmass mainly aphanitic, but with small irregular areas showing quartz, etc.

(ii) P_2- Like P_1 but characterized by rare, small phenocrysts of quartz, a totally aphanitic groundmass and invariably a grey-green colour on fresh exposure. Only identified south of the Jersey Zone.

(b) Aplitic Quartz-Porphyry and P_3.

These are mutually gradational (e.g. in Jersey drill-holes (B-16 at 468 ft and B-36 at 940 ft).

(i) P_3 - is an aphanitic quartz-porphyry characterized by conspicuous rounded, kidney-shaped or otherwise embayed quartz phenocrysts, very well-shaped hornblende phenocrysts, and a variable though usually liberal proportion of white aphanitic groundmass.

P_3 grades to aplitic-aphanitic quartz-porphyry, which differs from P_3 in possessing abundant rounded quartz microphenocrysts additional to the larger quartz phenocrysts. These give the rock a sparsely aplitic appearance under the pocket-lens. (The term "aplitic" is used here for textures dominated by small, rounded grains of approximately equal size).

(ii) Aplitic quartz-porphyry is a phaneric rock. It differs from aplitic-aphanitic P_3 by possessing a groundmass that is fully resolvable under the pocket-lens. This aplitic groundmass consists of minute grains mainly of felspars and quartz. Phenocrysts are of plagioclase, and hornblende, generally together with quartz and rarely with biotite. The grain-size of the groundmass varies from one exposure to another and exceptionally is coarse enough for the rock to be confused with porphyritic Bethlehem QD. The coarser-grained varieties are probably confined to

the interior of the larger masses of P_3 and fail to occur in the narrower parts of these intrusions. Unusual conditions of cooling probably account for rapid alternation of the above-described textural varieties in the larger masses, and may be connected with the formation of intrusion breccia.

(c) Crowded Quartz-Porphyry (Quartz-diorite porphyry of 1956 paper).

With exceptions, this rock is characterized by a high ratio of phenocrysts to groundmass. It is an aphanitic porphyry of post-breccia age, and comprises two varieties for which no age difference is evident.

No certain way of distinguishing from P_3. Generally has larger qz phenos + plag phenos, which are usually more corroded.

(i) The "typical" variety: phenocrysts tend to reach larger sizes than in other porphyries; well-shaped hornblende exceptionally reaches 1 cm., and quartz and plagioclase felspar ½ cm. The phenocrysts account for between 40 percent and 70 percent of the volume. Hornblendes are frequently replaced by radial aggregates of epidote, in a manner that is restricted to this rock-type. Quartz phenocrysts either have an appearance similar to those of P_3 or are subhedral. Felspars are frequently fleshy-white. The colour of the aphanitic groundmass is variously light green, light grey, grey-pink or pink. Chilled extremities of these intrusions are of pink or pink-white aphanitic rock with sparse, small phenocrysts. A variable foliation is generally present in the Crowded Quartz-Porphyry intrusions.

(ii) The second variety: occurs in a restricted area east of the Moly shaft and also on the 4600 level at 5130E. Differs from the typical variety in the following: (a) somewhat smaller size of phenocrysts, (b) groundmass is darker and has a speckled, chloritic appearance, (c) epidote aggregates not commonly radial, and tending to replace felspars as well as hornblendes, (d) felspars are white, not fleshy-white.

(d) Xenolithic Quartz-Porphyry: This is only known in hole B-77 between 201 feet and 229 feet. Its age relative to other porphyries and to breccia is uncertain, but its xenolithic nature may indicate a post-breccia age. The rock has a predominantly pink colour due to the plentiful groundmass, which contains orthoclase. Phenocrysts are up to ½ cm. size and are of well-shaped hornblende and plagioclase, and embayed quartz similar to those in P_3 and Crowded Porphyry. The rock contains evenly distributed, somewhat angular fragments of Guichon QD, which are so numerous as to be practically in contact with one another. The enclosing porphyry is fresh and uncrushed. It possesses some foliation.

Olsen JMC59-106 (hyb bx).

Intrusion Breccia

The breccia bodies contain a varied assemblage of rock-fragments representing the following rock-types: Guichon QD, Bethlehem QD, P_1 (and P_2 ?), and P_3. Rocks not noted as fragments in the breccia include the following: Aplitic Quartz-Porphyry, Crowded Porphyry and Xenolithic Quartz-Porphyry. It is therefore suggested that brecciation occurred immediately following the partial chilling of P_3 intrusions.

Note on the Occurrence of Orthoclase Felspar.

Orthoclase is a recognized groundmass component in the least altered occurrences of the following rocks: Guichon QD, Bethlehem QD, Aplitic Quartz-Porphyry and Xenolithic Quartz-Porphyry. It is a major component of Bethlehem Granite.

In many of the altered occurrences of the above rocks (excepting Bethlehem Granite, which is not seen highly altered), orthoclase is commonly replaced by sodic plagioclase. Such rocks have largely been mapped previously as a "leuco phase" (1956 paper).

Orthoclase also occurs as a high-temperature replacement mineral in veins and patches in the 4600 level adit, and in the East Jersey Zone. In hole B-16 ~~west of the Jersey Zone~~ west of the Jersey Zone and in the East Jersey Zone, some of the breccia-matrix appears to have been affected by orthoclase metasomatism, probably accompanied by silicification.

J.M. CARR.

B.C. Department of Mines,
Victoria, B.C.
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