CANADA

DEPARTMENT OF MINES AND RESOURCES

MINES AND GEOLOGY BRANCH

BUREAU OF GEOLOGY AND TOPOGRAPHY

GEOLOGICAL SURVEY

LEGEND

PRECAMBRIAN

- Mainly pegmatitic muscovite granite
- Granodiorite; may include areas of younger granite
- YELLOWKNIFE GROUP
  - A. Greywacke, argillite, etc.
  - B. Nodular quartz-mica schist and hornfels, derived from greywacke, argillite, etc.
- Andesite, dacite, basalt, rhyolite, tuff, agglomerate, etc.

Trend of bedding and flow contacts .....

Fault .....

Axis of cross-fold .....

Late cleavage .....

Elongation of nodules .....

Mine or prospect .....

Geology mainly from maps published by the Geological Survey; notes by Y. O. Fortier, 1946.

NOTES ON GOLD MINERALIZATION

INTRODUCTORY STATEMENT

Some gold ore deposits in the Yellowknife-Beaulieu region were formed when a muscovite granite was intruded during a period of deformation that resulted in a series of cross-folds being superimposed on already folded strata. The axes of the cross-folds trend north to northwest.

Gold in minor quantity was also deposited after the development of late faulting, which displaced the diabase dykes of the area.

These conclusions are offered as a working hypothesis at a time when the region is being intensively prospected.

ARCUATE, NORTH- TO NORTHWEST-TRENDING AXES OF CROSS-FOLDS

J. F. Henderson (1) has described the folded folds of the Beaulieu River area, and has indicated the general structure of the region by sketching the trend lines of sedimentary strata from air photographs, supplemented by observations in the field. That structural information, together with analogous data obtained by the author within the Ross Lake-Thompson Lake area, and other trend lines sketched from air photographs covering the area north of Clan Lake, appear on the map.

From this regional compilation it appears that the axes of the cross-folds have an arcuate form, trending from northwest to north. A. W. Jolliffe (3) has described cross-folds in the Yellowknife Bay area that trend northwesterly, and believed that they were probably connected with the intrusion of the Prosperous Lake pegmatitic granite.

YOUNGER, PEGMATITIC MUSCOVITE GRANITE

Masses of pegmatitic muscovite granite are indicated separately on the map from masses composed mainly of biotite-, hornblende-, or biotite-hornblende granodiorite. The muscovite granite was intruded at a later period than the granodiorite. The best evidence for this may be observed between Ross and Redout Lakes (2, 4) where hundreds of northwesterly trending basic dykes that intrude granodiorite are intersected by a great number of muscovite-bearing pegmatites and are truncated to the south by the main mass of muscovite granite.

PEGMATITIC MUSCOVITE GRANITE INTRUDED DURING PERIOD OF CROSS-FOLDING

A noteworthy feature of the region is the parallel trend of the masses of pegmatitic muscovite granite to the axes of the cross-folds. In the area between Hidden and Redout Lakes cleavage is developed in many directions. One direction of cleavage, shown on the map, trends northwesterly, generally dips steeply to the northeast, is parallel to the axes of the cross-folds, and, apparently, has no relation to the earlier folds. This cleavage crosses the muscovite granite southeast of Hidden Lake within the area mapped by the author. Nodules (metacrysts) of the quartz-mica schists and hornfels are oriented parallel to and along the northwesterly trending cleavage. It is recognized that the nodules in the schists are an effect of the granitic intrusions into the greywacke and argillite in the Yellowknife-Beaulieu region. In the vicinity of Hidden Lake the nodules are related to the intrusion of the Hidden Lake muscovite granite because the intensity of alteration of the country rocks increases towards the contact with that granite.

The cleavage, which affected the muscovite granite and along which the nodules (due to the granite intrusion) were formed, developed as the granite was introduced and while the already folded strata were being subjected to further folding. In other words the cross-folds, pegmatitic muscovite granite intrusions, nodules, and northwesterly cleavage were roughly coincident developments.

QUARTZ VEINS WITH GOLD IN CONCENTRATIONS HIGH ENOUGH TO PRODUCE ORE FORMED IN THE INTERVAL BETWEEN THE INTRUSION OF THE MUSCOVITE GRANITE AND ITS PEGMATITE DYKES

Veins of white to grey quartz, locally sugary but more often coarsely crystalline and fracturing cleanly, are crossed by pegmatite dykes at many places in the belt of nodular schists east of Hidden Lake. The best known occurrence is the Kim vein on the Thompson-Lundmark property (5). Similar light grey quartz carries gold at the Pensive Yellowknife (Ingraham) mine, north of Pensive Lake.

The muscovite granite southeast of Hidden Lake is crossed by many light grey to white quartz veins that are themselves cut by pegmatites within the granite mass. This granite carries much tourmaline, either in graphic intergrowths with quartz or as disseminated grains. Both this mass of granite and the associated pegmatite dykes have tourmalinized zones at their contacts with the nodular schists. The light grey quartz veins themselves carry noticeable amounts of tourmaline (especially along their walls) in many places in the zone of nodular schists.

The light grey quartz veins with gold, as at the Thompson-Lundmark gold mine, were introduced during the interval between the intrusion of the muscovite granite and that of its pegmatite satellites, and are apparently genetically related to the muscovite granite. It should be noted, however, that these veins are not restricted to the vicinity of the granite masses nor to zones of nodular schists, as indicated by the many gold deposits and occurrences in the relatively unaltered sedimentary strata from Pensive to Gordon Lakes.

QUARTZ VEINS, WITH LOW VALUES IN GOLD, YOUNGER THAN THE DIABASE DYKES AND THE LATE FAULTS THAT HAVE DISPLACED THESE DYKES

Near the southeast tip of the pegmatitic muscovite granite body between Hidden Lake and Cameron River, many narrow, vuggy veins of white, milky quartz cut the granite, the light grey quartz veins, the pegmatite dykes, and some northwesterly trending diabase dykes. The quartz is commonly in crystals projecting towards the vuggy, central parts of the veins, where in some cases seams of hematite as much as 2 inches wide occur. Sulphides of iron and copper are locally abundant. Of five samples of this mineralized quartz one assay yielded 0.005 ounce of gold a ton; four showed traces of gold.

A vertical fault with an apparent horizontal displacement of about 600 feet extends northwesterly from Tibbitt Lake towards the Thompson-Lundmark gold mine. The fault surface is locally a narrow fracture, in other places a zone of breccia as much as 10 feet wide. In places the breccia material is silicified, and vuggy veinlets of white, milky quartz crystals, some with hematite stain, are abundant. Near Tibbitt Lake a northwesterly trending diabase dyke is brecciated near the fault zone and is intersected by seams of pyrite up to 0.25 inch wide, and by rare veinlets of carbonate. Nearby a pit has been dug in the fault zone, in brecciated sedimentary rocks that are silicified and cut by a large number of vuggy quartz veins with local concentrations of copper and iron sulphides. Assays of two samples of vuggy mineralized quartz taken from the pit and nearby gave 0.015 and 0.010 ounce gold a ton. To date gold has been found only in minor amount in northwesterly trending, late faults and in vuggy quartz veins.

REFERENCES

(1) Henderson, J. F.: Structure and Metamorphism of Early Precambrian Rocks between Gordon and Great Slave Lakes, N. W. T.; Amer. Jour. Sci., vol. 241, pp. 430-446 (July 1943).

(2) Henderson, J. F.: Gordon Lake South; Geol. Surv., Canada, Map 645A, 1941.

(3) Jolliffe, A. W.: Yellowknife Bay; Geol. Surv., Canada, Map 790A, 1942.

(4) Jolliffe, A. W.: Rare Element Minerals in Pegmatites, Yellowknife-Beaulieu Area, N. W. T.; Geol. Surv., Canada, Paper 44-12, p. 2 and fig. 2 (1944).

(5) Lord, C. S.: Mineral Industry of the Northwest Territories; Geol. Surv., Canada, Memoir 230, p. 86 (1941).

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PRELIMINARY MAP 46-23

YELLOWKNIFE-BEAULIEU REGION

NORTHWEST TERRITORIES

Scale:- 1 inch to 4 miles

4 2 0 4 8 12 16 20