Glacier Gulch 93/14W

feet of pre-Caradocian conglomeratic, scaly argillite with exotic blocks of volcanics and graywacke. The Dunnage is succeeded by the Dark Hole Formation (new name), about 1000 feet of predominantly pelitic Caradocian strata. The counterpart of these formations in the Cobbs Arm sequence is the Summerford Group, (new name), a 3000-foot thick, complex assemblage of intertonguing volcanic and nonvolcanic rocks. Equivalent strata in the Toogood sequence are grouped in the Luke's Arm Formation, about 1500 feet of volcanic and sedimentary rocks characterized in the upper part of chaotic penecontemporaneous deformational features. Late Ordovician strata in all three sequences are similar and represent a coarsening flysch sequence; this flysch is named the Sansom Graywacke. The Sansom thickens radically from north to south; it is absent by truncation or nondeposition in the Toogood sequence and is piled into a cascade of slump folds over 2000 feet thick in the Cobbs Arm sequence. The Goldson Formation is the youngest formation in each sequence and consists of up to 1500 feet of Llandoverian conglomerate. The Goldson records Early Silurian orogentc movements and lies with apparent unconformity on Ordovician strata in the Toogood sequence; conformity between these systems exists in the southerly sequences.

Structural history of the region is long and complex. Weak evidence suggests that the Lushs Bight Terrane suffered earlier deformations than the region to the south of the Lukes Arm fault. Tectonic deformation of the southern region probably commenced by Late Ordovician when movements on high-angle faults controlled both clastic facies and effluences of volcanics. Penecontemporaneous deformation of Ordovician strata was probably initiated by these movements. Climatic folding about roughly horizontal east-west axes occurred in the Late Silurian; this was accompanied by development of regional south-dipping cleavage and followed by a component of homogeneous flattening. Rejuvenation of earlier high-angle faults probably resulted in slides on the attonuated south limbs of major anticlines, accounting for north-facing sequence repetition. Climactic folds were later cross-flexed about south plunging axes with local development of a vertical north-south strain-slip cleavage. Late wrench faults are tentatively divisible into two basic systems. Early conjugate faults indicate dominant north-nonthwest south-southeast compression; late faults suggest dominant west-northwest east-southeast compression. Both systoms were coeval with kink-banding in pelitic strata.

Numerous striking similaritien exist between the developmental histories of Early Paleozoic troughs in western Ireland and northeastern Newfoundland. Analogues may also be found in eugeosynclinal belts of other ages and regions. The relationships between the Appalachian and Caledonian orogenic belts and the nature of their pre-geosynclinal crusts remain unsolved problems. M $4.20; X $14.85. 327 pages.

A MINERALOGICAL AND GEOCHEMICAL STUDY OF THE ZONAL DISTRIBUTION OF ORES IN THE HUDSON BAY RANGE, BRITISH COLUMBIA.

(Order No. 69-12,384)

Rodney Victor Kirkham, Ph.D.
The University of Wisconsin, 1969

Supervisor: Professor E. N. Cameron

Sulfide-sulfosalt vein and replacement ores rich in Fe, As, Ag, Zn, Pb, and Au; a stockwork-type molybdenum deposit; a Au-Bi-Te vein and replacement deposit; and some small Cu-Fe-Ag deposits in the Hudson Bay Range of west-central British Columbia are zonally arranged about felsic porphyritic Tertiary intrusions. The ores are apparently temporally and genetically related to the intrusions.

A study has been made of the geologic setting of the deposits, the chemistry of the ores, and the geochemistry of sphalerite, pyrrhotite, arsenopyrite, and other minerals in an attempt to define the zoning more closely and to evaluate processes controlling its development.

The 60 or so known deposits of the district have been divided into groups based on their mineralogy, metal content, and structural features. Small "sulfide" vein deposits with variable amoonts of sulfosalt and gangue minenals are by far the most common type. Arsenopyrite, pyrite, pyrrhotite, sphalerite, galena, quartz, carbonate, marcasite, chalcopyrite, tetrahedrite, bournonite, and ruby silvers are the most common minerals. Sulfide replacement bodies, that have many of the mineralogic features of the veins, occur at sulfide vein intersections in limestone lenses.

The molybdenum deposit, which is centrally located, is essentially a very extensive stockwork of small quartz veins containing variable amounts of ore and other gangue minerals. Quartz, magnetite, pyrite, molybdenite, hornblende, biotite, chlorite, potash feldspar, muscovite, calcite, dolomite, pyrrhotite, chalcopyrite, scheelite, and gypsum are the most important vein minerals. The Au-Bi-Te deposit, consisting of native Au and Bi, bismuthinite, Bi-Te sulfides, and molybdenite in quartz veins and replacement pods in highly altered rocks, occurs near the fringe of the molybdenum deposit.

The Cu-Fe-Ag ores are a special type of outer zone deposit. They are mostly small veins, with little associated alteration, containing variable amounts of chalcopyrite, bornite, magnetite, hematite, pyrite, and unidentified silver minerals.

Metal content, mineralogy, and structural features of the ores outline the zoning. The distribution of iron sulfides has been used to divide the district into an inner (pyrite) zone, an intermediate (pyrrhotite) zone, and an outer (pyrite) zone. The inner zone is approximately coincident with the molybdenum deposit and the intermediate and outer zones cover the areas that contain sulfide deposits. An area containing mostly barren quartz veins, between the inner and intermediate zones and somewhat overlapping the two, has been designated the "barren" zone.

Metal content, mineralogy, structural features, and spatial arrangement of deposits suggest that all ores were emplaced under the same regional thermal-hydrothermal regime. But the sulfide ores were probably formed before the molybdenum deposit during or just after the period of thermal metamorphism. The molybdenum deposit was formed largely after the period of thermal metamorphism during a stage of more restricted magmatic activity in the Glacier Gulch area. The thermal-hydrothermal regime established by the emplacement of the Tertiary porphyries could have been the main factor controlling the zonal arrangement of ores.

M $3.00; X $7.60. 162 pages.

CRETACEOUS VOLCANIC ROCKS FROM A PART OF THE COAST RANGE WEST FROM SANTIAGO, CHILE: A STUDY IN LITHOLOGIC VARIATION AND BURIAL METAMORPHISM IN THE ANDEAN GEOSYNCLINE.

(Order No. 69-18,946)

Beatriz Levi, Ph.D.
University of California, Berkeley, 1969

This thesis is a field and petrographic study of alteration phenomena in an area of 100 km^2 in the Coast Range west of Santiago. Supplementary data include chemical analysis of