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GOLD MINERALIZATION OF POSSIBLE LATE PRECAMBRIAN AGE IN THE JACKSON'S ARM AREA (12H/15), WHITE BAY, NEWFOUNDLAND

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INTRODUCTION

Gold mineralization was discovered in granitic rocks of Late Grenville age, located to the west of Jackson's Arm (Figure 1), by prospector Clyde Childs of York Harbour in the fall of 1983. The mineralization occurs in a rusty pyritiferous 'shear zone' that was exposed during construction of the access road to the Cat Arm hydroelectric project. Subsequently, the area surrounding the discovery was staked by Labrador Mining and Exploration (Childs' employers), and additional prospecting has improved the potential of the area (French, 1985).

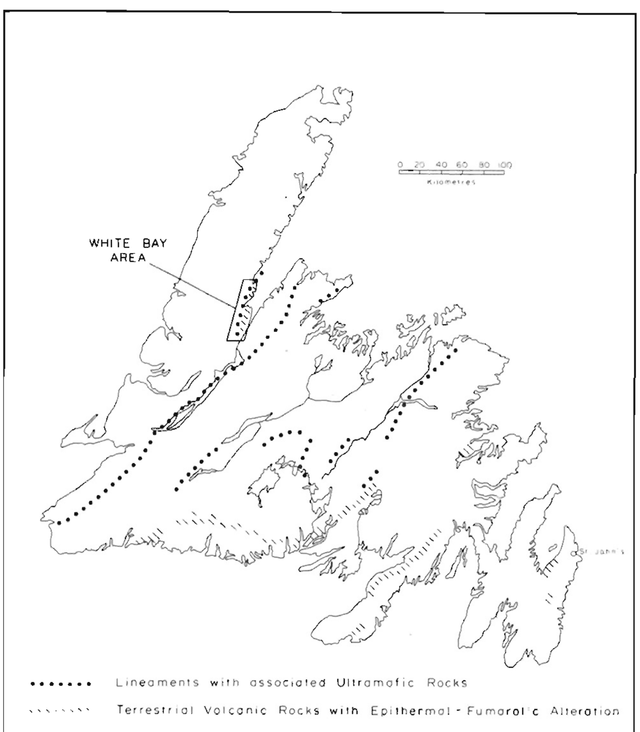

Figure 1: *Location of White Bay area in western Newfoundland.*

The objectives of this report are to outline general geological information, and to present some observations and thoughts on the mineralizing system in the Jackson's Arm area. These may assist in prospecting throughout the Grenville Province and in similar environments elsewhere. It is stressed that the ideas presented are based primarily on field work, in an area of limited exposure, and are subject to considerable modification. Detailed assays, and geological and structural information are currently confidential.

The area of interest is heavily forested with less than 5 percent outcrop, except along the Cat Arm road where there is approximately 95 percent exposure in roadcuts. The topography is rugged (Plate 1), making traversing slow and difficult.

Plate 1: *Topography and vegetation in the vicinity of gold prospects in the Jackson's Arm area.*

This project is a contribution to the Canada-Newfoundland Mineral Development Agreement, 1984-1989

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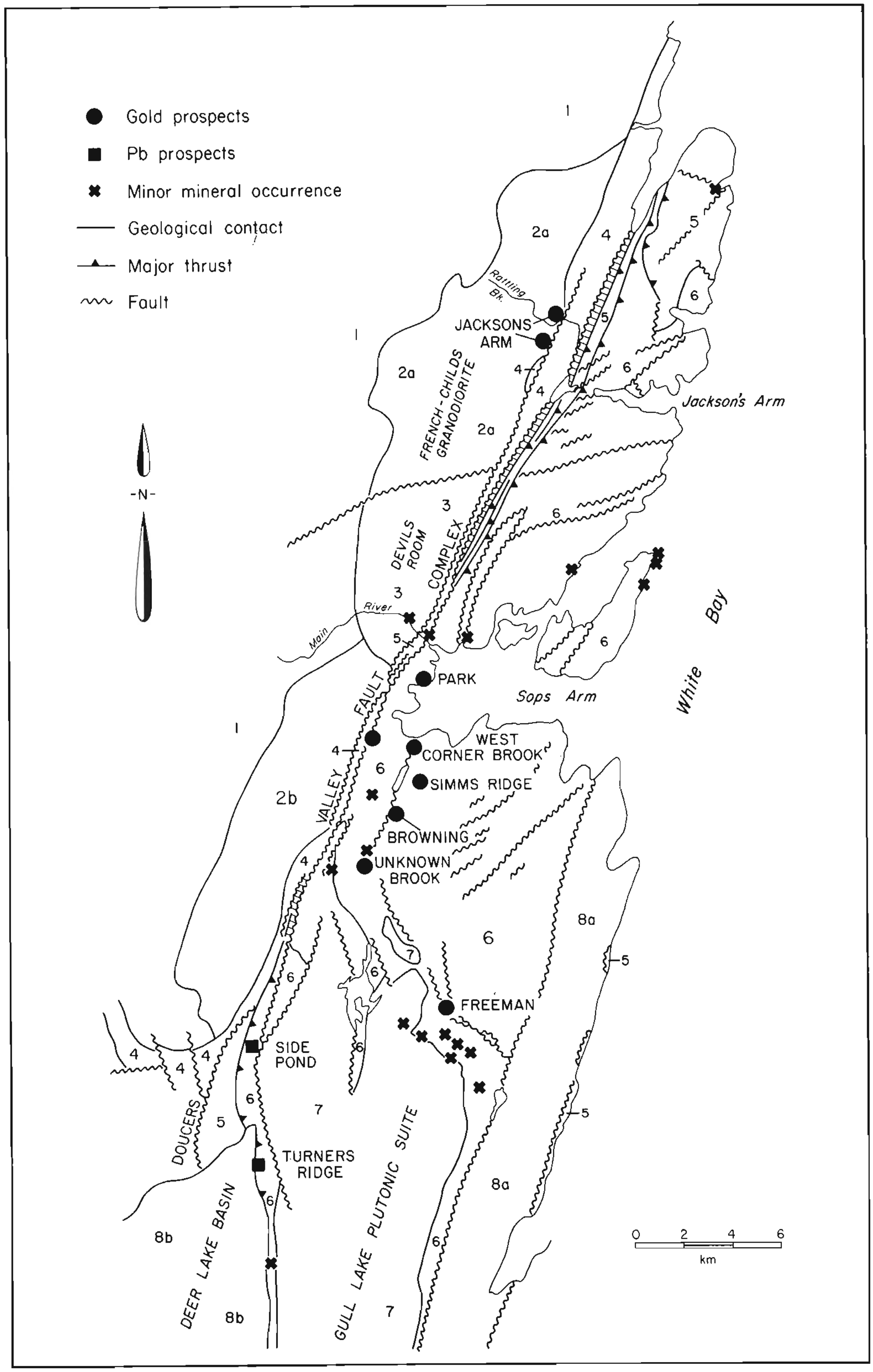

Figure 2: *General geology in the western White Bay area, after Smyth and Schillereff (1982) and Erdmer (1986).*

LEGEND

UPPER PALEOZOIC (Basin Fill Sequences and Intrusions)

CARBONIFEROUS

8 8b, Deer Lake Group (Visean);
8A, Anguille Group (Tournasian)

DEVONIAN OR EARLIER?

7 Gull Lake Intrusive Suite

SILURIAN

6 Sops Arm Group

LOWER PALEOZOIC ALLOCHTHON

CAMBRIAN - MIDDLE ORDOVICIAN

5 Southern White Bay Allochthon—partially ophiolitic; mélange containing ultramafic blocks is cross-hatched.

LOWER PALEOZOIC AUTOCHTHON (platform)

4 Coney Arm Group

PRECAMBRIAN (Grenville basement)

LATE PROTEROZOIC(?)

3 Devils Room Granite [1]

MID PROTEROZOIC AND EARLIER (>1105 ± 90 Ma)

2 Massive to foliated, feldspar megacrystic, granitoid plutons.
2a: French Childs granodiorite; 2b: granite.

1 Leucocratic gneiss, amphibolite and gabbro.

GENERAL GEOLOGY

A generalized geology map of the Jackson's Arm - Sop's Arm area of White Bay is presented in Figure 2. The Paleozoic geology is summarized from Smyth and Schillereff (1981, 1982) and the distribution of rocks in the Grenvillian inlier is taken from Erdmer (1986). Erdmer has initiated a 1:100,000 scale mapping project in the Long Range Mountains to the west of White Bay, and the reader is referred to his report for a description of the Grenvillian rocks.

The host rock to the gold mineralization is a variably foliated, coarse grained, feldspar megacrystic granodiorite (Plate 2), informally known as the French-Childs granodiorite. This pluton is one of several in the Precambrian Long Range inlier, and has intruded Proterozoic leucocratic gneiss and foliated diorite after the deformational and metamorphic peak of the Grenvillian Orogeny (Bostock, 1983; Erdmer, 1986). Foliated plutons in the western and northern Long Range Mountains that are comparable to the French-Childs granodiorite have a Rb-Sr age of 1105 ± 90 Ma (Pringle *et al.*, 1971; recalculated with λ = 1.42). Erdmer (personal communication, 1986) has obtained zircon ages of 1020 Ma from the French-Childs granodiorite and from similar plutons to the west. The granodiorite is nonconformably overlain by basal Eocambrian quartzite (Plate 3) and minor conglomerate of the Beaver Brook Formation (Lock, 1969; Smyth and Schillereff, 1982). These rocks were correlated with the the Bradore Formation of the Labrador Group, which outcrops along the western and northern boundaries of the Long Range inlier.

[1] A recent U-Pb (zircon) date from the Devils Room Granite indicates a Lower Devonian age (P. Erdmer, personal communication, 1986).

Plate 2: *The French-Childs grandiorite.*

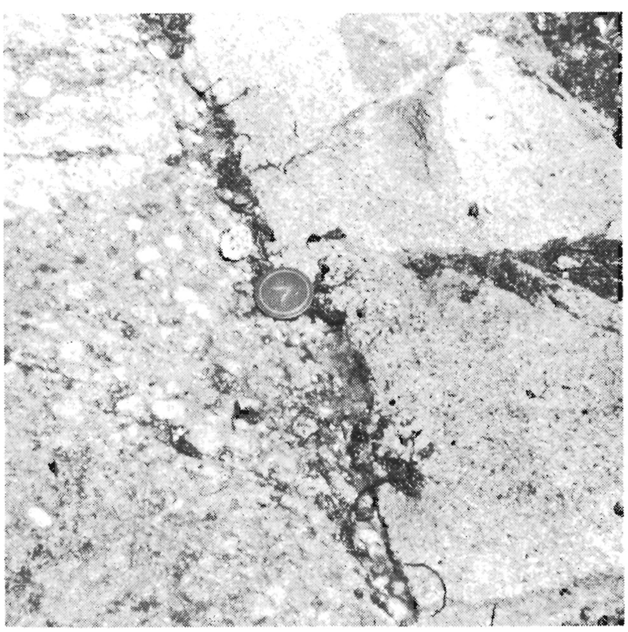

Plate 3: *Eocambrian unconformity showing the Beaver Brook Formation (right) overlying foliated grandiorite.*

The Long Range dikes (Bostock, 1983; Erdmer, 1984) are conspicuous in the gneissic terrane of the area. These trend north-northeast and are strongly retrogressed to greenschist facies assemblages along the eastern side of the Long Range Mountains (Erdmer 1984,1986). Large dikes have not been observed in the French-Childs granodiorite, but there are small retrogressed and boudinaged diabase and diorite bodies which may be related to these dikes. Stukas and Reynolds (1974) obtained an $^{40}Ar/^{39}Ar$ age from the dikes of 614 $\pm$ 10 Ma (recalculated using the decay constants recommended by Steiger and Jager, 1977), which they considered to represent the approximate age of intrusion.

The Devils Room Granite is a triangular-shaped, undeformed, zoned pluton (Smyth and Schillereff, 1982; Dunford, 1984) which is in fault contact with the French-Childs granodiorite (Erdmer, 1986). It intrudes Grenvillian gneiss on its western boundary, and is in fault contact with Cambro-Ordovician rocks along its eastern margin. A zircon age of 390 Ma has recently been obtained by P. Erdmer (personal communication, 1986) which supports earlier suggestions that the pluton is Devonian in age and related to the Gull Lake Intrusive Suite (Lock, 1969). Smyth and Schillereff (1981), and Dunford (1984), correlated the Devils Room Granite with comparable posttectonic granites in the northern Long Range inlier that were assigned to the Precambrian (Bostock, 1983). Long Range dikes are not observed in the Devils Room Granite, a feature which supports a Paleozoic age for the pluton.

Several, relatively unmetamorphosed, 'late' diabase dikes, generally less than 1 m wide, trend east-northeast and cut the French-Childs pluton and its contained alteration and mineralization. Dikes with comparable appearance and attitude intrude the Cambro-Ordovician carbonate succession in Little Coney Arm (Plate 4). These dikes appear to postdate the Taconic Orogeny, and may provide a younger age limit for the mineralizing event in the French-Childs granodiorite.

Plate 4: *Diabase dikes cutting Cambro-Ordovician limestone sequences of the Coney Arm Group in Great Coney Arm.*

Grenvillian rocks in the western and central parts of the Long Range inlier are at upper amphibolite to granulite facies metamorphic grade. Most of the rocks in the western margin of the inlier have been retrogressed to greenschist facies assemblages, including the French-Childs granodiorite and the Long Range dikes. More than one period of retrogression may have occurred (Bostock, 1983), and these may be attributed to overthrusting and westward movement of the ophiolite klippe in western Newfoundland during the Taconic Orogeny, prior to uplift of the Long Range Mountains (Bostock, 1983; Erdmer, 1986).

Structure in the Long Range inlier was described by Erdmer (1986). Several prominent linear trends are evident at 030, 060, and 155 degrees and reflect post-Grenville fracturing and possible fault movement in the Long Range inlier. The major structures in the Paleozoic rocks to the east of the Long Range inlier trend north-northeast and parallel a major lineament defined by the Doucer's Valley Fault Complex (Lock, 1969; 1972), and by intensely deformed mafic rocks of probable oceanic affinity (Williams, 1977).

Rock Types

The following descriptions are confined to rocks and mappable units which may be related to the gold mineralization in the French-Childs granodiorite.

The French-Childs granodiorite. This pluton consists predominantly of a grandiorite phase, and a minor alkali-feldspar granite phase.

Grandiorite phase

This phase is a variably foliated, coarse grained, feldspar megacrystic, biotite granodiorite which intrudes Grenvillian leucocratic gneiss and diorite. Its western boundary in the Jackson's Arm area is a complex zone up to 1 km wide, consisting of granodiorite and country rocks. The granodiorite is unconformably overlain by Eocambrian quartzite on its eastern boundary. The pluton outline on Figure 1 was defined by Erdmer (1986). Xenoliths and particularly resorbed xenoliths of leucocratic gneiss, felsite, diorite and amphibolite are common, and biotite-rich schlieren are ubiquitous. Felsic xenoliths are generally small (less than 1 m across), in contrast to the mafic xenoliths (up to 50 m across). Deformed and boudinaged, amphibolitized and chloritized, diabase and diorite bodies may be partly derived from Long Range dikes. Small, foliated, pink, fine grained, granitic patches, and local areas of pegmatite, may represent late differentiates formed during magma crystallization.

The granodiorite is mottled, dark green to gray and buff, and contains 35 to 50 percent coarse, buff to gray feldspar crystals (up to 3 cm long) which are variably epidotized. Intense epidotization of megacrysts and groundmass results in a pale green, mottled rock which occurs in zones up to 150 m wide. Feldspar is fractured and broken, and crystal outlines vary from subhedral to ovoid to extremely elongate. The feldspar and the mafic minerals define an augen texture. The matrix consists of quartz, plagioclase, biotite, actinolite, chlorite, and magnetite. Relict clinopyroxene and hornblende and minor sphene were observed in thin section, and up to 10 percent potassic feldspar and minor secondary sericite are present. The pluton ranges from weakly foliated granodiorite to mylonite, recording extreme inhomogeneity of strain during deformation. The attitude of the augen fabric is highly variable throughout the pluton and is seen to 'swirl' in individual outcrops.

Alkali-feldspar granite

This phase of the French-Childs granodiorite is a foliated, orange, generally mafic-mineral free, alkali-feldspar granite. Potassic feldspar has been identified by staining, and by thin section study, and its presence is inferred from high K_2O values in whole rock analyses. It is exposed on the Cat Arm Road for 400 m to the north of Rattling Brook, and for 100 m to the south of Rattling Brook. The contact between the alkali-feldspar granite and the granodiorite to the south is complex, and is marked by either a gradual or sharp color change. Typically, potassic feldspar in the granodiorite phase increases toward the alkali-feldspar granite. Numerous fractures in the granodiorite have selvages and alteration halos of potassic feldspar, and massive, extremely coarse grained feldspars locally occur along fractures in the alkali-feldspar granite (Plate 5). Amphibolite and diorite xenoliths and possible boudinaged dikes occur in the alkali-feldspar granite.

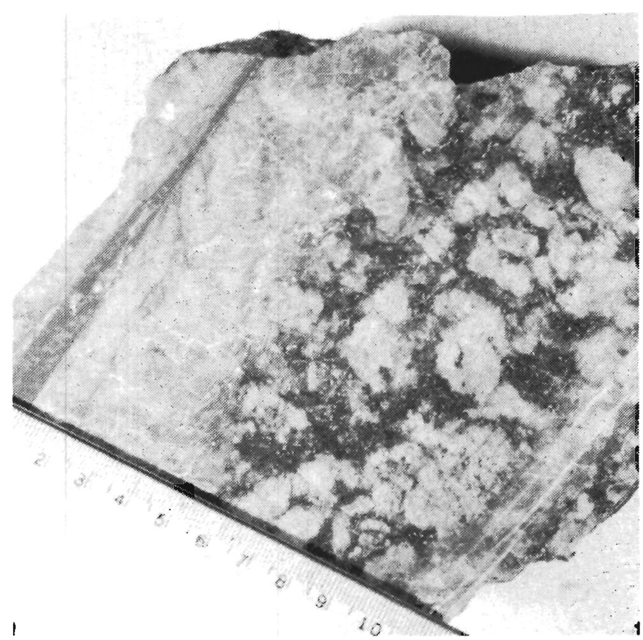

Plate 5: *Massive potassic feldspar crystals bordering cryptocrystalline silica-carbonate-filled fractures in French-Childs grandiorite.*

Foliation and augen textures in the granite are identical to those in the the granodiorite. However, the granite also contains abundant pyrite-quartz-carbonate stockworks, fractures, and gas breccia textures (tuffisite) which postdate the penetrative fabric. Weak, partial sericitization of the alkali feldspar is ubiquitous, and may be related to either hydrothermal alteration phenomena described below or to regional metamorphic retrogression. The alkali-feldspar granite exhibits up to five times greater background radioactivity than the granodiorite.

Quartzite and conglomerate. Eocambrian quartzite of the Beaver Brook Formation unconformably overlies the French-Childs granodiorite along the Cat Arm road (Plate 2). This impure quartzite is characterized by blue quartz grains up to 0.5 cm across and by magnetite-rich laminae. Locally, small pockets of pebble to boulder conglomerate are present and contain well rounded fragments of the French-Childs granodiorite, along with individual plagioclase crystals weathered from the granodiorite. The conglomerate is generally matrix supported, and pebbles of foliated diorite and coarse grained milky quartz are also present.

The quartzite which overlies the alkali-feldspar granite has abundant carbonate and sericite in the matrix, and contains minor pyrite as disseminations and along isolated fractures. No lithic fragments were observed which could be identified as originating from the granite.

Devils Room Granite. This pluton has been described by Smyth and Schillereff (1982), and Dunford (1984). It has a core of medium grained, equigranular, biotite-muscovite granite, surrounded by coarse grained to feldspar megacrystic, biotite granite. Fine grained, massive felsite occurs near the northern boundary of the granite. Fluorite locally occurs in fractures (Smyth and Schillereff, 1982; Dunford, 1984)

Medium to coarse grained, orange to red, equigranular and locally feldspar porphyritic, biotite granite is exposed in new roadcuts on the north bank of the Main River. White, bleached areas up to 50 m long show clay-mineral alteration. Fluorite is present as coatings up to 1 cm thick on fractures, and fluorite-silica cement is present in a 1.5 m wide tuffisite vein. These features represent a late hydrothermal event after granite crystallization. Traces of chalcopyrite and chalcocite are present on isolated fracture surfaces.

The granite is progressively more fractured and brecciated toward its east side. Chlorite-hematite-calcite-manganese coatings are abundant, and slickensides (locally horizontal) are extensively developed. The spatial association of these features with the major lineaments to the east of the granite implies that they developed in response to movement along these lineaments.

Aplite and quartz porphyry. A 2 m outcrop of fine grained, pink aplite occurs in the northern part of the French-Childs granodiorite, and a 1 m outcrop of pink quartz porphyry containing less than 5 percent euhedral quartz phenocrysts (up to 2 mm across) is located approximately 2 km south of the gold showing on the Cat Arm road. Both of these intrusions are unfoliated, and are similar to the aplitic phase in the Devils Room Granite.

A single, 0.3 m thick, subvertical, pink, fine grained aplite vein, trending 060, was observed in the Cambrian(?) limestones just east of the Beaver Brook Formation, and approximately 2 km north of Rattling Brook. This aplite is tentatively correlated with the fine grained, felsic plutons described above.

Late diabase intrusions. Fine grained, dark gray, unmetamorphosed diabase intrusions, up to 1 m wide, trend 060 to 070 and dip from vertical to 70 degrees north (Plate 6). The dikes have well developed chilled margins and coarse grained centres (crystrals up to 1 mm across). These dikes cut the French-Childs granodiorite, the alkali-feldspar granite, and pyritic quartz veins in the granite. Similar dikes with comparable trends intrude the Cambro-Ordovician carbonate sequence exposed in Little Coney Arm (Plate 4).

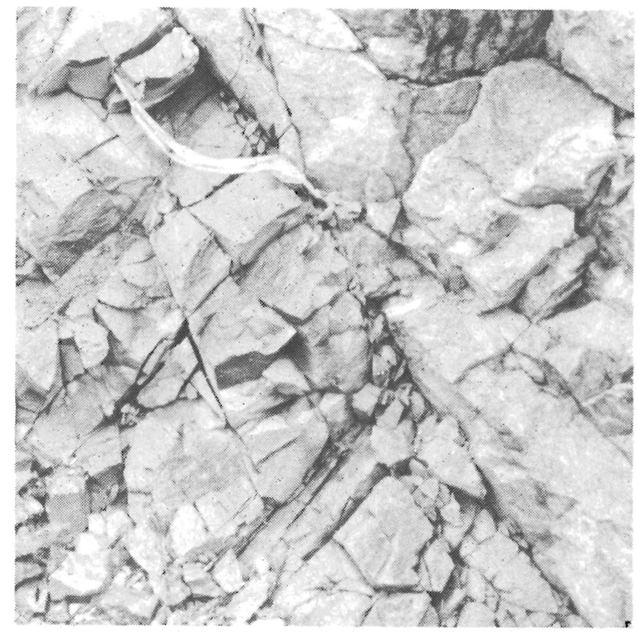

Plate 6: *Late diabase dike intruding potassic feldspar granite.*

ALTERATION AND MINERALIZATION

The well exposed section along the Cat Arm road gives insight into the type of mineralizing system that resulted in gold deposition in the Jackson's Arm area. Structural, textural and well developed alteration phenomena indicate that a moderate to high temperature hydrothermal system overprinted the French-Childs granodiorite after penetrative deformation. Comparable alteration containing minor gold values has been found throughout the French-Childs granodiorite in association with lineaments.

The alteration features observed in the field are subtle and not readily recognizable as being related to a hydrothermal system. Sulfides are present as a minor constituent and gossan zones are rare; hair-line fractures that are carbonate lined form the bulk of the stockwork system, and the potassic zone resembles a deformed alkali-feldspar granite.

Potassic Alteration

A spatial association between potassic feldspar and fractures, and the local presence of coarse grained potassic feldspar as selvages around fractures (Plate 5), were noted in the contact zone between granodiorite and granite to the south of Rattling Brook. This suggests that the alkali-feldspar granite was formed by fluid alteration of granodiorite outward from fractures. The northern exposures of the granite are characterized by abundant stockworks and sheet fractures which are spaced at 1 to 5 cm. These stockworks and sheets contain pyrite, arsenopyrite, quartz, ankerite(?) and sericite, and some contain gold mineralization. Tuffisite is present locally and may have a silicified, carbonated and sulfidized matrix.

The features outlined suggest that the color, mineralogy and composition of the alkali-feldspar granite formed as a result of moderate to high temperature, potassic alteration of a foliated granodiorite. The regionally developed, penetrative foliation which is preserved in the altered granite, is unrelated to the later hydrothermal event. The foliation and the well developed augen structres are cut by stockwork veins and volatile breccias related to the mineralizing system.

Increasing reaction of the wall-rock with hydrothermal fluids, which may relate to fluid composition, temperature, pressure, fluid/rock ratio and fracture density, is thought to have resulted in total replacement of the original feldspar and dissolution of all mafic minerals. Growth of new potassic-feldspar crystals is confined to fracture margins. A late stage of sericite alteration in microfractures radiating from fractures or fluid channels was observed. These fractures commonly contain carbonate, cryptocrystalline silica, fine grained micas and sulfide.

It may be possible that the alkali-feldspar granite represents a separate intrusive phase of the French-Childs granodiorite. However, the transitional boundaries, the spatial relationship to the stockwork system, and the fact that potassic-altered granite is found along several of the pronounced lineaments throughout the French-Childs granodiorite argue for a hydrothermal origin.

Sericite, visible in the intense 'shear' zones and in carbonate- and feldspar-bordered fractures, is a product of the alteration system. Weak, pervasive, partial alteration of potassic feldspar to fine grained sericite is common, and this may be a late stage of development in the alteration system. Alternatively, it may represent a late metamorphic retrogression, correlative with regional retrogression in the eastern Long Range inlier (Bostock, 1983; Erdmer, 1984, 1986).

Carbonate Alteration

Minor Fe-rich carbonate (ankerite?) occurs throughout the alteration system in the Jackson's Arm area, and weathers to a distinct limonitic brown. It is present in silica-sericite-sulfide-rich shear zones, fracture stockworks, and in the matrix to potassic-altered granite and brecciated granite. It is generally very fine grained, but coarsely crystalline carbonate occurs in fractures. Flat-lying fracture sheets, accentuated by limonite staining, are common to the south of the potassic-altered zone around Rattling Brook (Plate 7). Limonite staining related to Fe-carbonate is ubiquitous adjacent to many of the lineaments throughout the Jackson's Arm area.

Gold values are associated with carbonate alteration. However, carbonate alteration does not always contain gold mineralization.

Silica Alteration

Cryptocrystalline silica is found in some of the shear zones and in the matrix to some mineralized tuffisite breccias. Preliminary results from whole rock analyses indicate that the potassic-feldspar alteration is accompanied by an increase in silica content of the rock.

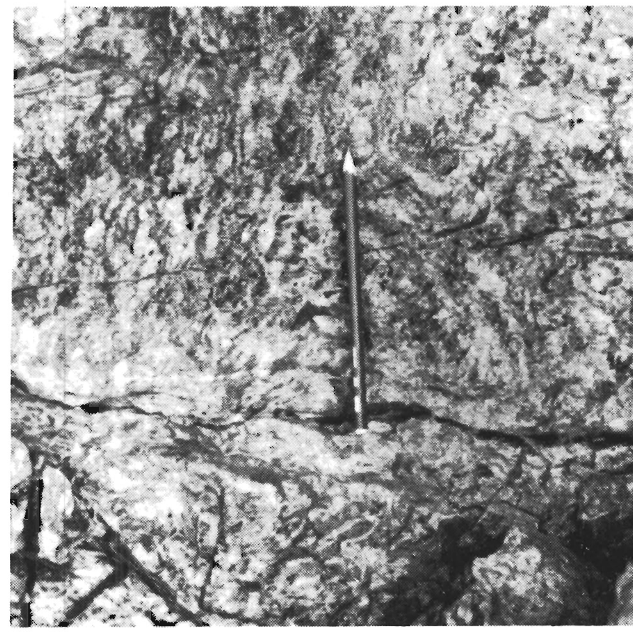

Plate 7: *Parallel fractures, some of which are bordered by limonite staining (bleached area), in grandiorite.*

Coarse grained milky quartz is present in some of the narrow stockwork veins in the alkali-feldspar granite, and is commonly associated with minor carbonate and pyrite. Larger, coarse grained quartz veins are also present, and cross-cutting relationships suggest that they were formed at different stages during the early development of the hydrothermal system. These veins may document a history of dilatent movements (Plate 8). Large quartz veins on the Cat Arm road do not contain anomalous gold values.

There are numerous quartz veins throughout the French-Childs granodiorite. Many of these are deformed and probably predated the alteration system exposed on the Cat Arm road.

Mineralization

Native gold has not been observed. Total sulfide content of the altered rocks is generally less than 5 percent, except in areas of intense alteration (shear zones or tuffisite breccia) where concentrations up to 15 percent occur rarely. Fine grained pyrite is ubiquitous in mineralized shear zones and outcrops, and fine grained, acicular arsenopyrite is locally developed. Fine to coarse grained pyrite and arsenopyrite occur in fractures and as disseminations in the potassic-altered granite. No other sulfide minerals were identified in the field that could be related directly to the gold-bearing system. The French-Childs granodiorite does not contain visible sulfides.

Minor chalcopyrite occurs in folded quartz veins and in narrow, deformed, hematite-bearing pegmatite veins in the French-Childs granodiorite. Traces of chalcopyrite associated with minor pyrite were also observed in several subvertical

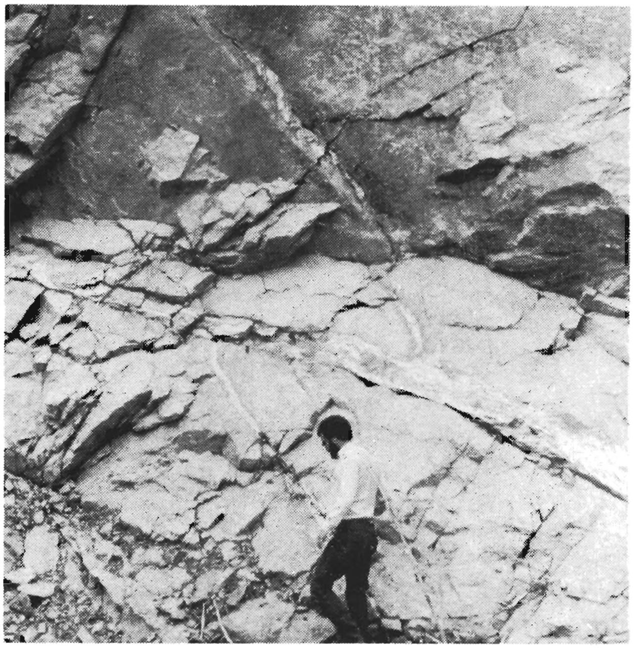

Plate 8: *Barren quartz vein in potassic feldspar granite. Note evidence for dilatent movement—steeper dipping vein is offset by shallow vien.*

quartz veins that cut the Beaver Brook quartzites. These veins trend 060, are up to 30 cm wide, and occur approximately 4 km south of Rattling Brook.

Structure

Numerous lineaments are present in the Grenville terrane where they are expressed as scarp faces and deep narrow canyons. The most prominent trends are 030, 060, 090, and 155 degrees. The lineaments trending 060 and 090 are parallel to, and continuous with, lineaments in the Paleozoic rocks. Lineaments trending 155 degrees appear to be confined to the Long Range inlier. Lineaments trending 030 are parallel to those in the Paleozoic terrane, and may represent either Paleozoic structures or reactivation of older Proterozoic structures. Bostock (1983) and Erdmer (1984, 1986) provide further discussion of late fractures and faults in the Long Range inlier.

Gold mineralization, minor sulfides, and carbonate and/or potassic alteration are associated with numerous lineaments and shear zones (of various trends) throughout the French-Childs granodiorite in the Jackson's Arm area. In addition, weak gold mineralization has been recorded from graphite- and chalcopyrite-bearing quartz veins associated with lineaments cutting gneiss and diorite to the west of the French-Childs granodiorite. Current data does not permit any conclusions about the large scale structural controls on the mineralizing system.

Model

A schematic diagram based on the rock section exposed along the Cat Arm Road is presented as Figure 3. This is an attempt to summarize the observations described above.

The core of the alteration system exposed on the Cat Arm access road, expressed by potassic-feldspar alteration, extends 400 m north and 100 m south of Rattling Brook. The contact with the external zone of steep, silica- and carbonate-bearing, altered shear zones and flat-lying, carbonate-altered fracture sets is transitional, and the shear zones and fracture sets occur up to 1 km to the south of the potassic-altered zone. The northern boundary of the alteration system is covered by overburden in a topographic depression. This depression may represent a fault or major fracture separating unaltered granodiorite to the north from the potassic-altered rocks.

Potassic-feldspar alteration is widely reported in the hot cores of many gold-bearing, epithermal systems (Buchanan, 1981), and is associated with lode-gold veins (Colvine *et al*, 1984). Pervasive, high temperature, potassic-feldspar replacement of pre-existing mineralogy is an inherent feature in the cores of large stockwork systems such as those of the Climax type (c.f. White *et al.*, 1981).

Age of Mineralizing System

Radiometric analyses are currently in progress in an attempt to date the mineralizing system and the magmatic and thermal events that have occurred in the Jackson's Arm area. Field observation suggests that the hydrothermal system postdates intrusion of the Long Range dikes (c.a. 614 Ma), and that the system is unconformably overlain by Eocambrian quartzite (c.a. 570-590 Ma). The trace of the unconformity on the east side of the granodiorite is not offset by fractures or possible shear zones related to the development of the hydrothermal system; this observation supports evidence for Precambrian fracturing and mineralization.

The indicated age range of mineralization is coincident with that of the Round Pond granite located to the west of Deer Lake, which has been dated at 602 ± 10 Ma (U-Pb, zircon; Williams *et al.*, 1985). This pluton is a variably foliated alkali-feldspar granite with slight alkaline affinities. Williams *et al.* (1985) have suggested that the Round Pond granite and associated volcanic rocks are related to rifting which preceded initiation of the Iapetus Ocean. This magmatic event may have provided a heat source for mineralization and alteration in the Grenvillian rocks. It is suggested here that the mineralization system in the Jackson's Arm area formed at this time.

However, further field evidence for age of mineralization is ambiguous. Firstly, the identification of the Long Range dikes in the French-Childs granodiorite needs to be confirmed, and secondly, the Eocambrian quartzite may have acted as an impermeable cap to trap hydrothermal fluids of a younger age. The presence of carbonate, sericite and pyrite in the quartzite overlying the alteration system may be interpreted to represent remobilization after deposition, or a later hydrothermal event. There is a strong possibility that the mineralizing event leading to gold precipitation resulted from intrusion of the Devils Room Granite in the Lower Devonian.

The gold-mineralizing event may also be related to the formation of epithermal-fumarolic gold-bearing systems located to the south of Sop's Arm (Tuach, *this volume*). These latter systems are almost certainly of Silurian age. Removal of the post-Devonian, dextral, strike-slip component of 15 km

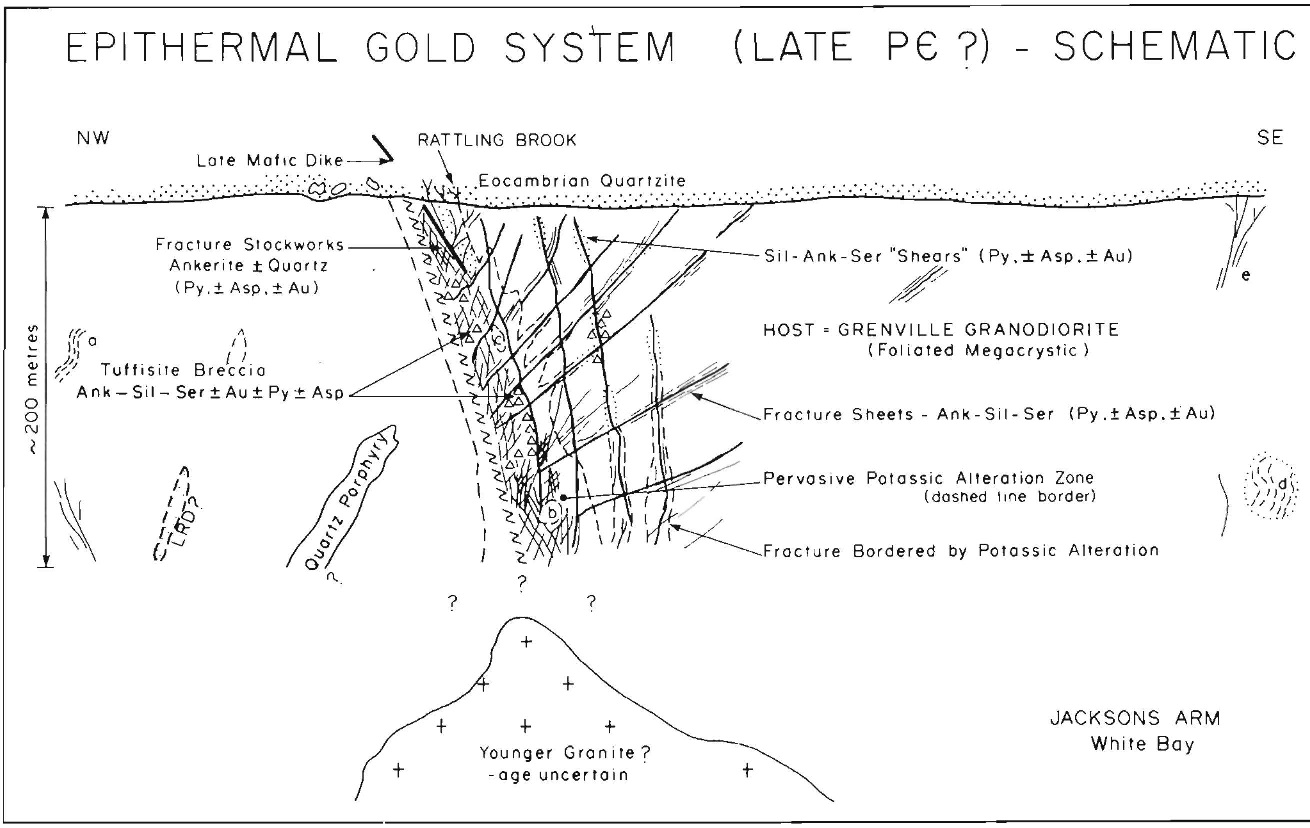

Figure 3: *Schematic representation of the alteration system exposed on the Cat Arm access road. (a), biotite schlieren; (b), amphibolite pod; (c), unaltered country rock; (d), gneissic xenolith; (e), isolated carbonate-bearing fracture sets. LRD - Long Range Dikes.*

on the Doucer's Valley Fault Complex, suggested by the correlation of the Devils Room Granite and the Gull Lake Intrusive Suite (Lock, 1969), juxtaposes the known gold mineralization in the Jackson's Arm area with that in the Sop's Arm area. Finally, there is the possibility of multi-stage mineralizing events.

DISCUSSION

This is the first significant gold prospect located in Grenvillian rocks of Newfoundland and Labrador, and therefore speculations on the metallogenic implications of the discovery may be useful.

If the metallogenic system is related to Late Precambrian tectonic structures and/or magmatism, then a broad-scale evaluation of the potential for gold mineralization throughout the Grenville Province is necessary. The lake sediment geochemical surveys of the Long Range area (Butler and Davenport, 1982) and of southern Labrador (Geological Survey of Canada, 1985) may assist in the selection of areas with above-average values for metals associated with vein-gold systems. Radiometric surveys may assist in the location of potassic-rich granites.

It is probable that the mineralization is related to the major lineament in the Sop's Arm - Jackson's Arm area, which is defined by the Doucer's Valley Fault Complex (Lock, 1969, 1972) and is accentuated by melange zones and multiple faults in the southern White Bay Allocthon (Williams, 1977). This lineament probably extends to the north along the eastern margin of the Long Range inlier, and southward becomes covered by Carboniferous (Visean) rocks in the Deer Lake Basin (Lock, 1972).

There is a variety of significant mineral deposits and minor prospects located adjacent to this lineament in the White Bay area (Figure 2). The Jackson's Arm gold prospects may be of Late Precambrian age. The Unknown Brook, Browning, Simms Ridge, Corner Brook, and Park prospects may represent epithermal-fumarolic environments of Silurian age (Tuach, *this volume*). The Turners Ridge and the Side Pond prospects are stockwork-galena deposits in brecciated Silurian limestones (Dimmel, 1979), and minor copper mineralization is reported to occur in brecciated Silurian rhyolite (Smyth and Schillereff, 1982). Fluorite mineralization is present in the Devonian Devils Room Granite, and fluorite, pyrite, and molybdenite occurences are associated with the Devonian Gull Lake Intrusive Suite.

North of the Sop's Arm area, in Canada Bay, high background to anomalous gold is present in sandstones of the Cambrian Maiden Point Formation and is associated with pyrophyllitic and sericitic alteration (P. Dean, personal communication, 1985). In the Deer Lake Basin to the south of the White Bay area, significant uranium-vanadium-silver-copper mineralization in sandstone may be associated with the Wigwam Fault (a possible extension or splay of the Doucer's Valley Fault Complex), and is thought to be of Permian age. A significant copper (bornite-chalcocite) prospect and minor uranium mineralization are located in Carboniferous limestone adjacent to the Wigwam Fault (Westfield Minerals Ltd. 1980-1983; Hyde, 1982) In addition, chalcocite-bornite-bearing rhyolite-breccia boulders have been noted in Carboniferous conglomerate, and chalcopyrite-bearing, chloritic volcanic rocks of possible Ordovician age in close proximity to the Wigwam Fault.

Thus a variety of mineralizing events of different ages are spatially associated with the major lineament in the area. The stratigraphic record indicates that this lineament was reactivated at various periods from the Late Precambrian to the Middle Carboniferous, and it is reasonable to suggest that the gold mineralization is related to this deep seated, long lasting structure. Gold mineralization may have occurred at different periods, or during a single mineralizing event.

Major lineaments are a favoured locale for gold mineralization (Colvine *et al.*, 1984; Landefeld, 1985). The Baie Verte Lineament (Hibbard, 1984), the Gander River Ultrabasic Belt (Blackwood 1982), and the Cape Ray Fault Zone (Wilton, 1984) in Newfoundland are recognized as having significant gold potential (see Figure 1).

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