GEOLOGICAL MAPPING IN THE CENTRAL MINERAL BELT, LABRADOR: REDEFINITION OF THE CROTEAU GROUP*

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Introduction

Geological mapping by the Mineral Development Division in the Central Mineral Belt of Labrador commenced in 1974. Field work concentrated on selected areas covering the Croteau Group and parts of the Seal Lake Group (see Marten and Smyth, this volume). The aims of this work were to establish the stratigraphy, structure and metallogeny of the Croteau Group, its relationships to the surrounding rock groups, and to incorporate this information with the numerous unpublished company maps of the area, with the aim of publishing 1:100,000 geological maps.

Major findings of this summer's work were:

(1) Recognition of a large area of Archean migmatite, gneiss and greenstone east of Moran Lake.

(2) Establishment in the field of an angular unconformity within the Croteau Group and its redefinition as two new groups: the Moran Group and the Bruce River Group.

(3) Recognition of an ancient graben that initiated sedimentation of the Bruce River Group.

(4) Identification of the acid volcanic rocks of the Bruce River Group as ignimbrites.

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(5) Discovery of an unconformity separating the Bruce River Group from the younger Seal Lake Group (see Marten and Smyth, this volume).

(6) Spot checks have shown that the belt of felsic rocks between Otter Lake and Nipishish Lake forms part of the Bruce River Group, and that previously undifferentiated rocks in the Bald Mountain area to the west belong to the Bessie Lake Formation of the Seal Lake Group (see Fig. 1, Marten and Smyth, this volume).

Previous Work and Nomenclature

Halet (1946) in a private company report to Dome Exploration first named the volcanic and sedimentary rocks around Croteau Lake as the Croteau Series. He identified a lower, marine sedimentary succession disconformably overlain by an upper, continental, sedimentary and volcanic succession. Fahrig (1959) published the first geological map of the western part of the area, and redefined the Croteau Series as the Croteau Group. He confirmed Halet's divisions but made no mention of the disconformity. Williams (1970) mapped the eastern part of the area and recognized three major divisions in the Croteau Group. The Croteau area was explored by geologists from Dome Exploration (1946), American Exploration Incorporated (1952-1954), Frobisher Limited (1955-1957), and British Newfoundland Exploration Limited (1957-1969), with resultant discovery of numerous copper, lead, zinc and uranium occurrences. Beavan (1958) compiled and summarized much unpublished company data on the regional relationships and mineralization.

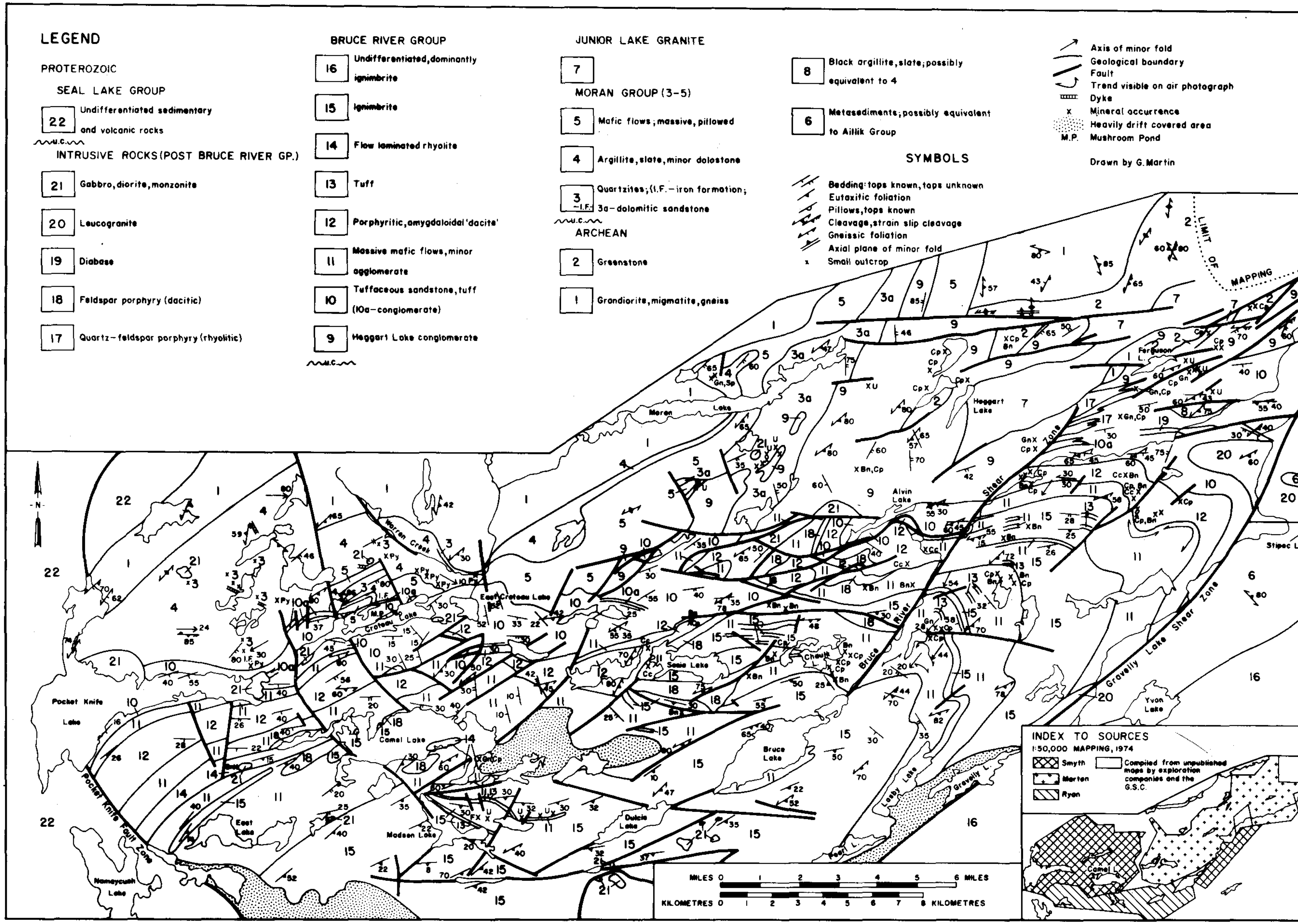

Fig. 1 Geological map of the Moran Lake-Bruce River area.

In a recent publication, Roy and Fahrig (1973) stated that an unconformity separates the lower marine and upper continental sequences in the Croteau Group and restricted usage of the name Croteau Group to the upper division. Our mapping has conformed an angular relationship and supports division of the Croteau Group. However, under the rules of the American Commission on Stratigraphic Nomenclature (1970), it is not permitted to use the former group name for a new division of the same rank, and, regrettably, the name Croteau Group must be dropped. Here, we propose the name Moran Group for the Lower Croteau marine series, and the name Bruce River Group for the Upper Croteau continental series.

Archean

Quartzo-feldspathic gneiss, minor greenstone and deformed granite underlie and outcrop north of the Aphebian (Williams, 1970) Moran Group. These rocks have been deformed and metamorphosed prior to deposition of the Moran Group and form part of the Archean Nain structural province. Leuco-granite outcrops below the Moran Group unconformity in most places. Where examined, the granite exhibits a single pervasive foliation.

This summer's work has shown that a large area of the Kaipokok River basin, east of exposures of the Moran Group, is also underlain by Archean gneiss, migmatite and greenstone. These rocks are shown on the Geological Map of Labrador as being of Aphebian age: "In part, highly metamorphosed equivalents of Lower and Middle Croteau and Aillik Groups" (Greene, 1972).

The author's mapping has shown that this complex is unconformably overlain by the Bruce River Group. An irregular belt of greenstone at least 2 km. in width has been partly outlined, and is very similar in lithology and structural relationships to the Ugjoktok belt some 25 km. to the north. The belt is composed of massive greenstone and greenschist, with irregular and tabular bodies of leucocratic granodiorite that vary in texture from massive to intensely foliated. It is bordered on the west by agmatite, tonalitic gneiss and leucocratic granodiorite. The complex had suffered at least two intense zonal deformations before deposition of the overlying Bruce River Group. Its relationship to the Moran Group was not seen, but the contrast in lithology and plutonic history render correlation with the Archean rocks to the north-west virtually certain.

Moran Group

The Moran Group comprises a succession of quartzite, iron formation, slate, mudstone, dolostone and mafic volcanic rocks that extends from Moran Lake in a NE-SW trending belt. The Group corresponds to Halet's and Fahrig's lower division of the former Croteau Group. The Moran Group was examined from Pocket Knife Lake to Moran Lake where it is very poorly exposed (5%); contact relations were rarely observed.

White, medium-grained quartzites form the base of the Group and, in the area mapped, are presumed to unconformably overlie the Archean Complex; the unconformity was observed about 40 km. northeast of Moran Lake outside the map area. Only a few meters of exposure gap separates the quartzites from a deformed granite north of Warren Creek. There the quartzites are only 7 to 10 meters thick but appear to thicken southwards away from the basement complex. North of Croteau Lake near Mushroom Pond the unit is best and most widely exposed in the core of a westerly plunging anticline. The quartzites are well sorted, massive bedded, uniform textured and locally have a slightly calcareous cement.

Cherty iron formation apparently overlies the quartzites near the northwest end of Mushroom Pond and a half mile north of the west end of Pocket Knife Lake. The iron formation consists of alternating jasper and haematite beds, from 5 to 10 cm. thick. Less than 10 meters of the unit is exposed at both localities.

Slates and mudstones with rare dolostone and limestone interbeds apparently overlie the iron formation. This unit is approximately 700 m. thick and although areally the most extensive of the Moran Group, is poorly exposed. Locally, the slates are pyritiferous, and deeply-weathered gossans are present along the outcrop length of the unit.

Mafic volcanic rocks up to 800 m. thick overlie the slates and mudstones north of Croteau Lake and at Moran Lake. The volcanics are generally massive but are pillowed just north of the large cove on the north side of Croteau Lake. The pillows indicate tops up to the south. Hexagonal cooling joints are developed in the volcanic rocks two miles west of East Croteau Lake, indicating subaerial deposition.

Structure

The Moran Group suffered polyphase deformation prior to deposition of the Bruce River Group, but paucity of outcrop does not permit detailed structural analyses. The first deformation produced a slaty cleavage that is best developed in the slates and mudstones. No associated major folds were recognized. The second deformation produced widespread N.W. to N.E. trending, open to close, steeply plunging folds, that are in most places overturned to the north. The associated fabric varies from a strain-slip to a slaty cleavage. Sufficient outcrop is present north of Mushroom Pond to delineate a major, westerly plunging, overturned anticline-syncline couple.

Mineralization

The iron formation is too thin and of limited extent to be of economic significance. However, its occurrence within a stratigraphic sequence almost identical to one of the sedimentary cycles in the Labrador Trough is important for regional and age correlations.

The sulphide gossans in the slate-mudstone unit contain trace amounts of chalcopyrite, pyrrhotite, sphalerite and galena. Assays carried out by a joint Brinex-Frobisher venture revealed only trace concentrations of copper and nickel.

The mafic volcanic unit locally contains small amounts of disseminated pyrite and chalcopyrite. Brinex discovered minor lead-zinc mineralization in small breccia zones cutting this unit north of Moran Lake.

Junior Lake Granite

The Junior Lake body occurs some 5 km. east of Moran Lake and is a massive homogeneous hornblende biotite (chlorite) granite. The body intrudes leucogranite that forms part of the Archean complex, and is itself unconformably overlain by basal conglomerate of the Bruce River Group. The Junior Lake Granite probably post-dates the Moran Group as it is lithologically alien to anything seen in the Archean complex, and has not suffered any of the deformational episodes seen in the nearby Archean Rocks.

Metasediments Possibly Equivalent to the Aillik Group

A map unit in the area immediately southwest of Stipec Lake is correlated with the Aillik Group on the Geological Map of Labrador (Greene, 1972). The map unit is separated from the Bruce River Group by the Gravelly Lake shear zone. It was briefly visited in view of its regional significance. The outcrops seen consist of a grey semipelitic to psammitic metasediment with a biotite-quartz-plagioclase-garnet assemblage. It varies from massive to banded (bedded) on a 2-4 cm. scale, and a composite schistosity is developed parallel to the banding.

Scattered calc-silicate pods up to 80 cm. long were noted.

There is a marked contrast in metamorphic grade and intensity of deformation between the metasediments and the adjacent Bruce River Group, and it is reasonable to assume that these effects pre-dated the Bruce River Group. The metasediments resemble, both in lithology and metamorphic style, a formation in the lower part of the Aillik Group in the Kaipokok Bay area. Greene's (1972) tentative correlation appears to be a valid working hypothysis.

Bruce River Group

The Bruce River Group unconformably overlies the Moran Group and outcrops to the south of it in a 25 km. wide NE-SW trending belt. The type section lies south of and parallel to Bruce River. The Group corresponds to Fahrig's (1957) upper division of the Croteau Group and to Williams' (1970) Middle and Upper Croteau Group.

Mapping has shown that the group consists of three main divisions (see Table 1), defined by disconformities or contrasting lithologies. The lowermost division comprises a great thickness (300 m.) of conglomerate restricted to a graben-like structure around Heggart Lake. This division corresponds to Williams' Middle Croteau Group. The middle division comprises tuffaceous sandstones and a thin basal conglomerate; it unconformably overlies the Moran Group from near Alvin Lake to Pocketknife Lake. The upper division consists of mafic to acid flows and ignimbrites

	WEST		EAST		
	UNIT	Thickness (meters)	UNIT	Thickness (meters)	MINERALIZATION
DIVISION 3	Ignimbrite	3,000	Ignimbrite, rare beds of tuff and tuffaceous sandstone.	3,000	U
	Mafic volcanic flows, minor tuff	16	Mafic volcanic flows, minor tuff and sandstone.	800	Cp, Bn, Gn
	Ignimbrite	170	Ignimbrite	170	
	Mafic volcanic flows, minor agglomerate, tuff and sandstone.	900	Mafic volcanic flows, minor tuffaceous sandstone.	1,100	Cp, Cc, Bn
	Ignimbrite (only north of East Lake)	300	Ignimbrite	700	
	Mafic volcanic flows, agglomerate and minor thin ignimbrite units at Sesia Lake.	320	Mafic volcanic flows	35	
	Flow laminated rhyolite or ignimbrite	400	Ignimbrite Crystal feldspar tuff	700 100	Cp, Gn
	Mafic volcanic flows, plagioclase porphyry, minor tuffaceous sandstone.	830	Mafic volcanic flows	330	
	Purple porphyritic 'dacite'	1,100	Grey porphyritic 'dacite'	800	Cp, Cc, Bn
	Mafic volcanics	100	Mafic volcanics	170	
DIVISION 2	Tuffaceous sandstones minor acid tuff.	1,000	Tuffaceous sandstone, minor acid tuff.	1,000	
	Conglomerate	30	Conglomerate	30-60	
DIVISION 1			Heggart Lake Conglomerate, minor sandstone, mafic volcanic flows.	1,000	U, Cp

Table 1: Stratigraphic compilation of the Bruce River Group.

with minor tuffs, agglomerates and tuffaceous sandstones. A Rb/Sr whole rock age of 1474 m.y. has been obtained from volcanic rocks of the upper division of the Bruce River Group (Wanless and Loveridge, 1972).

Division I: Heggart Lake Conglomerate

Massive conglomerate with minor sandstone and mafic flow units occur in a thick (1,000 m.) northeast trending prism east of the Moran Group in the Heggart Lake area. The conglomerate is inferred to lie unconformably on the Moran Group along the west margin of the prism, although this contact appears to be in part fault-bounded. On the east side, the conglomerate is partly fault bounded and also rests unconformably on the Archean Complex and on the Junior Lake Granite. Lenses of granite wash (arkose) occur at the unconformity with the Junior Lake Granite. The conglomerate is overlain by a thin red conglomerate forming the basal unit of the overlying division. The contact is gradational over 1-2 m. and does not appear to represent a major time break, although the Heggart Lake Conglomerate is rapidly overstepped by the overlying sediment-tuff formation.

The conglomerate is polymictic and pale greyish in colour. The clasts are subangular to subrounded, are poorly sorted and range from less than 1 cm. up to 50 cm. in diameter; they are composed of granodiorite, foliated and gneissic granodiorite, mylonitic gneiss, greenstone, grey sandstone, diorite, felsite, massive porphyry, andesite, jasper, recrystallized chert, vein quartz, pegmatite and aplite. One cobble of dolomite similar to that occurring in the Moran Group was observed. The matrix of the conglomerate is a gritty feldspathic sandstone; in places, the conglomerate is matrix-supported. In most outcrops, the conglomerate appears to be massive, but rare sandstone and mafic flow units occur in places. The sandstones are usually about 40 cms. thick and are themselves massive or faintly laminated; cross lamination was seen in only one outcrop. The mafic flow units are up to 110 m. in thickness.

The relationships of the Heggart Lake Conglomerate indicate that deposition of the Bruce River Group was initiated by rifting of a northeast trending graben with subsequent rapid filling by fanglomerate deposits and minor mafic volcanic rocks. The graben developed in a pre-existing structural lineament, trending northeastwards to Kanairiktok Bay, that appears to have controlled the structure and present outcrop distribution of the Moran Group.

Division 2

This division is of formational rank and comprises a basal conglomerate overlain by a thick sequence of sandstones and tuffs. It unconformably overlies the Moran Group from Pocketknife Lake to south of Moran Lake, and from there eastwards disconformably follows the Heggart Lake conglomerates, from which it is distinguished by clast content and color. The unconformity with deformed volcanics of the

Moran Group is exposed on the northwest shore of Croteau Lake. Nearby, north of Mushroom Pond, a small exposure gap separates conglomerate from underlying volcanics, slates and quartzites. There, the unconformity truncates the southern limb of a syncline in the Moran Group, clearly demonstrating the unconformable relationship. The conglomerate is best exposed northwest of the large bay on the north shore of Croteau Lake.

The basal conglomerate contains clasts derived from the Moran Group, the Archean complex, and contemporaneous sediments and acid volcanics. Clasts derived from the Moran Group are dominant in the Croteau Lake area, where typical composition is: white quartzite 60-70%, jasper 10%, black and grey chert 15%, iron formation 5%, phyllite 1%. To the east, clasts of acid volcanics and maroon arkose are abundant and contribute to the overall red colour of the unit. The clasts are subrounded to well rounded and are poorly sorted; the majority are of cobble size though the range is from pebbles to boulders. The basal conglomerate unit is in the order of 30-70 m. in thickness.

The overlying sediments (1,000-1,300 m.) are fine-to-medium-grained, pale pink to red tuffaceous sandstones and acid tuffs. The sediments are well bedded on a 2 cm. to 3 m. scale and cross lamination is common. Grey to clean white terriginous sandstones are interbedded with the tuffaceous sediments in the Ferguson Lake area. Intercalations of creamy white, pink and pale green dust tuffs of cherty aspect are common, and one thin (10 m.) rhyolite flow was noted.

Thin conglomerate units are locally interbedded with the sediments; one of these occurring north of Sesia Lake marks a local unconformity within the sedimentary sequence. Some of the conglomerate units are composed almost exclusively of maroon tuffaceous sandstone indicating contemporaneous erosion. Local erosion channels further testify to instability during the sedimentation.

The sediments are intruded by mafic sills south of Ferguson Lake; one of those is about 150 m. thick.

A lens up to 150 m. thick of dark grey, locally pyritic, argillite and greenstone occurs within the sediments south of Ferguson Lake. The lens contrasts strongly in depositional environment with the adjacent sediments, and black argillite was not seen elsewhere within the sediment-tuff formation. On the other hand, the argillite strongly resembles parts of the Moran Group. Bedding in the lens trends at an angle to bedding in the adjacent sediments and it is possible that it is an upthrust section of the Moran Group. If this is so, the true thickness of the sediments in the Ferguson Lake area may be only half the apparent thickness.

Division 3

The upper division comprises mafic to acid flows and sills, thick ignimbrite sheets and minor intercalated agglomerate, tuff and sandstone. Acid volcanics increase in volume and thickness towards the top of the division, which is capped by about 3,000 m. of ignimbrite. Stratigraphic thickness and lithology varies along strike (see Table 1).

The mafic volcanic units are, in most places, dark green, fine-grained, vesicular or amygdaloidal flows. Locally, the flows are slightly porphyritic containing small (2-4 mm.) euhedral plagioclase laths. The second mafic unit above the base is characterized by numerous sills of spectacular, coarse grained, mafic porphyry. Bladed plagioclase crystals from 1-5 mm. long are set in a fine-grained, dark grey groundmass. The rock is locally amygdaloidal and may be extrusive in part, although definite cross-cutting relationships were noted at two localities. The third mafic unit is similar to the others but contains greater amounts of flow breccia and agglomerate. Minor ignimbrite units up to 170 m. thick are interbedded in this mafic unit in the Sesia Lake area and south of East Lake.

A thick, purple, porphyritic, amygdaloidal 'dacite' unit overlies the lowermost mafic unit. The 'dacite' contains euhedral plagioclase crystals 2-5 mm. long in an aphanitic purple groundmass. This rock has not been defined chemically.

A flow laminated and autobrecciated rhyolite unit occurs between the second and third mafic units in the Camel Lake area. The rhyolite is aphanitic, red to purple, with thin purple and white laminations in intricate, fold-like, flow patterns. South and east of Sesia Lake an ignimbrite with eutaxitic textures occurs at this stratigraphic level, suggesting that the rhyolite to the west may be in fact a rheo-ignimbrite.

The upper part of the section is dominated by ignimbrites. These were identified by Barager (1969) as felsic volcanic rocks although eutaxitic textures are well preserved. However, in a recent publication, Barager (1974) states that some of the rocks "are almost certainly ash flow tuffs". The ignimbrites are excellently exposed in the type section south of Bruce River and around Madsen Lake. The thick ignimbrite units shown in Table 1 are composite, containing numerous sheets separated by thin tuffs and tuffaceous sandstone beds.

The ignimbrites are commonly purple to red, but white, grey and pink varieties are also present. They show great internal variations from well welded types with distinct eutaxitic structures to non-welded and to recrystallized varieties, the latter resembling quartz-feldspar porphyries. Crystals, shards and pumice fragments are well preserved, especially in the less strongly welded varieties. Feldspars, up to 3 mm. across, are the dominant crystals and form about 15-25% of the rock. Quartz crystals form 0-5% of the rock and only occur locally. Rock fragments account for less than 25% of the ignimbrites; they are commonly acid volcanic rocks but a few mafic fragments were also noted.

Locally, the ignimbrites are vuggy with vacules up to 5 cm. across infilled with calcite and quartz. North of Madsen Lake, vugs also contain small, deep blue, fluorite crystals.

Thin mafic tuffs, crystal tuffs and sandstone beds in units less than 15 m. thick, occur throughout the upper division of the Bruce River Group. Generally, they outcrop at the base of cliffs. The sandstones are white to red, medium grained, commonly cross-bedded and resemble those of the middle division of the Group. Bedded and slump folded crystal tuffs up to 100 m. thick underlie the first ignimbrite unit west of Bruce River. Feldspar crystals, from 2-6 mm. across, comprise 50-60% of the rock and are set in a fine-grained, light grey groundmass. The mafic tuffs are medium to fine-grained and green to dark grey. Spectacular, high angle cross beds up to 3 m. thick, occur in a 16 m. thick unit of tuff between ignimbrite units west of Bruce River. This tuff is probably an eolian deposit.

Post Bruce River Group Intrusive Rocks

Zoned Dioritic Pluton

A poorly exposed body of diorite has intruded the lower part of the Bruce River sequence west of Alvin Lake. The body has been dissected by faults but has a minimum diameter of at least 1000 m. A marginal mafic phase is seen locally, but the bulk of the pluton is a medium to coarse grained, massive diorite. The diorite grades into a core approximately 300 m. in diameter of quartz monzonite, with K-feldspar phenocrysts up to 2 cm. in size.

Leucogranite

The sediment-tuff formation is intruded by leucogranite east of Bruce River. Two wedge shaped bodies have tongued westwards along bedding and probably merge eastwards into a large pluton that bounds the Bruce River Group east of the area mapped. Contacts are sharp and hornfelsing effects are negligible. Sills of leucogranite up to 40 m. thick occur adjacent to the northern wedge-shaped body. A xenolith 15 m. long of banded, pyritic argillite and siltstone was noted in the northern body; the xenolith resembles sediments in the Moran Group. The leucogranite is weakly to moderately foliated, and is locally massive.

Monzonite

Massive coarse-grained monzonite was noted at two localities, one southwest and one east of Otter Lake, within the outcrop area of the Bruce River Group. An intrusive contact between monzonite and ignimbrite was seen at the former locality, and it is inferred that monzonite forms the large body straddling south Otter Lake (see Geological Map of Labrador, Greene, 1972). The monzonite is unconformably overlain by the Seal Lake Group (Marten and Smyth, this volume).

Quartz Feldspar Porphyry

Southwest of Ferguson Lake, the Heggart Lake Conglomerate is intruded by a body of pink quartz feldspar porphyry up to 600 m. in width. The body passes marginally into numerous northeast trending dykes. Similar dykes intrude the Junior Lake Granite and the Archean complex in the area north and northeast of Ferguson Lake.

The quartz feldspar porphyry may possibly represent an intrusive phase related to the acid volcanism in the Bruce River Group, but a notable difference is the rarity of quartz phenocrysts in the acid volcanics.

Gabbro Plugs and Mafic Dykes

At least twelve gabbro plugs, up to 1.5 km. across, intrude both the Moran Group and the Bruce River Group in the Croteau Lake and Pocketknife Lake areas. Most are medium grained, but in one occurrence, on the north shore of Croteau Lake, plagioclase and pyroxene crystals are up to 15 cm. long. The central part of this body passes sharply into pyroxenite. The gabbros are probably the same age as the numerous mafic sills in the Seal Lake Group, exposed only a few kilometers to the west.

Approximately thirty-five diabase dykes, with dominant south-east trends, were observed in the same general area as the gabbros. In the Moran Group, the dykes are post-tectonic, but are weakly cleaved in the Bruce River Gorup. The dykes may be related to rifting of the Seal basin and are probably the same age as the diabase dykes which cut the Harp Lake Complex to the north (Emslie, 1974).

Structure

The Bruce River Group was folded (or at least tilted) and eroded before deposition of the Seal Lake Group (Marten and Smyth, this volume). However, the nature of this pre-Seal Lake event is not clear due to the effects of subsequent regional scale folding related to the Grenville orogeny that affected both the Seal Lake Group and Bruce River Group.

An early structural event that may be either pre-Seal Lake Group or early Grenvillian in age is locally recognized in the Bruce River Group. The lower part of the succession is repeated by stratabound faults in the Alvin Lake area, and in the type section a slaty cleavage parallel to bedding is developed in some tuff horizons that separate the massive volcanic units. Both of these features pre-date the main period of folding and faulting and are indicative of minor thrusting.

The Bruce River Group has been deformed into large open upright folds that plunge gently to the southwest. This folding can be traced directly into and correlated with the main phase of folding in the Seal Lake Group (west of Otter Lake). The major structure in the area mapped is a large syncline whose axial trace lies about 1 km. south of Bruce River. The hinge zone of this fold is contained between two major shear zones about 6.5 km. apart that are related to the folding: the Bruce Lake shear zone and the Gravelly Lake shear zone. This zone of closure, when extrapolated southwestwards coincides with the axial zone of the

Seal Lake syncline. The folding is associated with a locally developed slaty to fracture cleavage.

The structure of the southern unmapped part of the Bruce River Group is unknown. However, spot checks in the area between Otter Lake and Nipishish Lake suggests that the lower part of the succession is not repeated there. The regional structure of the Group is therefore probably that of a synclinorium with the southern limb truncated.

Mineralization

Numerous copper and a small number of uranium showings and occurrences were reported by exploration companies working on the Bruce River Group (Beavan, 1958). We found only a few new occurrences but our work has placed all the occurrences in a stratigraphic perspective (see Table 1).

The Heggart Lake Conglomerate hosts small copper and uranium showings. Uranium mineralization south of Moran Lake, and radioactive zones south of Ferguson Lake, occur in fractured quartzites and conglomerates (Beavan, 1958). The main uranium showings in the Moran Lake area are in a unit of dolomitic sandstones, which according to most company maps and Williams' (1970) map would be part of the Bruce River Group. Although we did not visit this area, our compilation suggests, on the basis of map patterns and lithology, that these rocks belong instead to the Moran Group. The mineralization occurs close to small outliers of

Heggart Lake conglomerate and there appears to be a relationship between the old eroded surface of the Moran Group and the mineralization. Where mafic volcanics of the Moran Group crop out close to the Heggart Lake conglomerates, they also host minor uranium mineralization.

In the Ferguson Lake area, chalcopyrite occurs in fractures in the conglomerates, sandstones and mafic volcanics. The copper mineralization appears to be of syngenetic origin and later remobilized into fractures and shears. It is interesting to note that the Ferguson Lake showings occur on the extension of the Bruce River shear zone (Beavan, 1958).

The purple 'dacite' of Division 3 contains trace amounts of disseminated chalcopyrite. In the Sesia Lake area, chalcopyrite, chalcocite and bornite occur in small shears and veins in this unit.

Flow laminated rhyolite at Camel Lake is characterized by high background levels of radioactivity. Galena and chalcopyrite, infilling joints and fractures in this unit, were discovered during this mapping.

The mafic volcanic horizons intercalated with the ignimbrites in the type section contain numerous occurrences of disseminated chalcocite, chalcopyrite and bornite. The most important occurrences are in fractures and veins in the Bruce River shear zone.

The ignimbrites contain high background levels of radioactivity and uranium mineralization was discovered by Frobisher Limited (Beavan, 1958) in the Madsen Lake area in fractured ignimbrites and in a thin tuffaceous sandstone unit.

In summary, it appears that certain of the volcanic units are characterized by high background values of copper and, to a lesser extent, lead, and that these trace amounts have recrystallized into minor tensional openings where the rocks have been fractured, e.g., adjacent to the Bruce River shear zone. Assessment work to date indicates that the numerous mineral occurrences in fractures have a low economic importance. However, they are significant because they indicate that any fumarolic activity or exhalations, associated with the volcanism, may have been enriched in base metals. The main base metal potential of the Bruce River Group lies in the possibility of stratabound deposits within the intercalated tuff and sediment units; these are usually unexposed and form valley bottoms. The base of the Heggart Lake conglomerate is now recognized as a zone of significant uranium showings and further mapping and prospecting along this contact should be carried out. The uranium potential of the ignimbrites appears high, and the upper part of the Group south of the map area warrants further exploration, although exposure there is poor.

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