TAMARACK RIVER FORMATION, SIMS LAKE - MENIHEK LAKE AREA WESTERN LABRADOR

by

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INTRODUCTION

The Tamarack River Formation is a newly defined sedimentary sequence (Ware and Wardle, 1979) outcropping in the southern part of the Labrador Trough between Menihek Lake and Sims Lake (Figure 1). Originally, the strata of the Tamarack River Formation were assigned by Eade (1949), Tiphane (1951) and Fahrig (1967) to the Aphebian Knob Lake Group of the Labrador Trough. However, MacDonell and Walker (1975) included the Tamarack River Formation sequence into the Helikian Sims Formation based on lithologic and structural similarities between the two formations. Recent studies by Ware and Wardle (1979) suggested that the Tamarack River Formation lies unconformably on the Knob Lake Group but also demonstrated that the unit is unconformably overlain by the Sims Formation in the Muriel outlier (Figure 1).

During the past summer two weeks were spent studying the sedimentology, stratigraphy and contact relationships of the Tamarack River Formation. This work, together with similar studies on the Sims Formation carried out in 1978, will form the basis of an M.Sc. thesis at M.U.N. by the author.

New information arising from this past summer's work necessitates revision of Ware and Wardle's (1979) description of the Tamarack River Formation. The formation is now found to consist of four mappable members with a probable total thickness of 300 m and was locally penetratively deformed prior to deposition of the Sims Formation. The recognition of a major period of deformation (i.e. the Hudsonian Orogeny) separating the Tamarack River and Sims Formations requires abandonment of the nomenclature used by Ware and Wardle (1979) which involved the combination of the Tamarack River and Sims Formations into the Sims Group and the renaming of the Sims Formation as the Muriel Formation.

GENERAL GEOLOGY

The Tamarack River Formation lies at the southern end of the Labrador Trough just north of the Grenville Province. At this latitude the Labrador Trough consists of very poorly exposed sedimentary and volcanic strata belonging to the Aphebian Knob Lake Group (see legend, Fig. 1). The Tamarack River Formation appears to unconformably overlie the Knob Lake Group, is probably at least 300 m thick, and consists of four informally defined members. Both the Knob Lake Group and Tamarack River Formation were deformed in the Hudsonian Orogeny *circa* 1800 Ma (Stockwell, 1972).

The Sims Formation, a sedimentary sequence of basal conglomerate, arkose and orthoquartzite, up to 700 m thick, rests unconformably on both the Tamarack River Formation and Knob Lake Group.

The Knob Lake Group, the Tamarack River and Sims Formations were subsequently intruded by the Shabogamo Gabbro at 1685 Ma (Brooks and Wardle, in preparation) The latest event in the area was the Grenvillian Orogeny *circa* 1000 Ma (Stockwell, 1972) which produced northeast-southwest trending structures in the southern part of the area.

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The geology of the Knob Lake Group, Sims Formation and Shabogamo Gabbro in the map area has been previously described by Ware and Wardle (1979) and will not be repeated here. A considerable amount of new information has emerged regarding the stratigraphy and contact relationships of the Tamarack River Formation and is discussed below.

Tamarack River Formation

The Tamarack River Formation is a newly defined term (Ware and Wardle, 1979) for the poorly exposed sedimentary sequence which underlies the dominantly drift covered region between the Muriel outlier and Menihek Lake (Fig. 1). The formation is probably at least 300 m thick and consists of four informally defined members: an algal dolomite member, a lower red sandstone member, a green silstone member and an upper red sandstone member. The algal dolomite, lower sandstone and green siltstone members correspond to the previous three subdivisions of the formation recognized by Ware and Wardle (1979).

The formation is best exposed in three sections on the western flank of the Muriel outlier (Figure 1, Sections A, B, C). The upper part of Section A (Figure 2) is lithologically similar to the lower part of Section B and the upper part of Section B is, in turn, very similar to the lower part of Section C. On this basis, the three sections are considered to be in sequence and together define a type section for the formation. The possibility of lateral facies changes between the various sections cannot be completely ruled out but appears unlikely.

The lowest exposed lithology in the Tamarack River Formation is a 5 m thick unit of finely laminated green siltstone and mudstone with calcareous intercalations. This is overlain by a 20 m thick algal dolomite member which is composed of thickly bedded orange, red and brown algal dolomite interbedded with buff to maroon, microcrystalline dolomite. The member is characterized by an abundance of algal pisoliths and oncolites with minor digitate stromatolites.

Abruptly overlying the algal dolomite is a 20 m thick lower red sandstone member which consists mainly of arkosic sandstone with minor interbeds of granule conglomerate, red siltstone and intraformational mud chip conglomerate. Clast lithologies in the granule conglomerate include quartz, red chert, iron formation, orthoquartzite and mafic volcanic, all apparently derived from the Knob Lake Group. Sedimentary structures in the member include ripples, planar, trough and herring bone crossbedding, flaser and lenticular bedding and parallel lamination.

The lower red sandstone member fines gradually upward into the green siltstone member. This member, which is at least 150 m thick, is composed of thinly laminated and rippled green, brown and red siltstone and mudstone containing some interbeds of graded sandstone with load balls, flame structures and mud chip conglomerates.

This member gradually coarsens upwards into the 200 m thick upper red sandstone member which comprises fine to medium grained feldspathic sandstone with abundant detrital mica, thin laminations of red mudstone and calcareous mudstone intercalations. The lower parts of the member are characterized by mudcracks, mud chip conglomerates, parallel lamination, convoluted bedding, ripples and medium scaled (less than .75 m thick) planar and trough crossbedding. The upper part of the member is dominated by large scale (up to 2 m thick) planar-tabular crossbedding and medium scaled trough crossbedding.

Paleocurrents measured in the upper red sandstone member indicate the existence of an easterly dipping

LEGEND

9	Shabogamo Gabbro:	Mafic intrusive.
8	Sims Formation:	8c, Orthoquartzite; 8b, arkose; 8a, basal conglomerate.
7	Tamarack River Formation:	7e Undifferentiated; 7d upper red sandstone; 7c green siltstone; 7b lower red sandstone; 7a algal dolomite.

Knob Lake Group

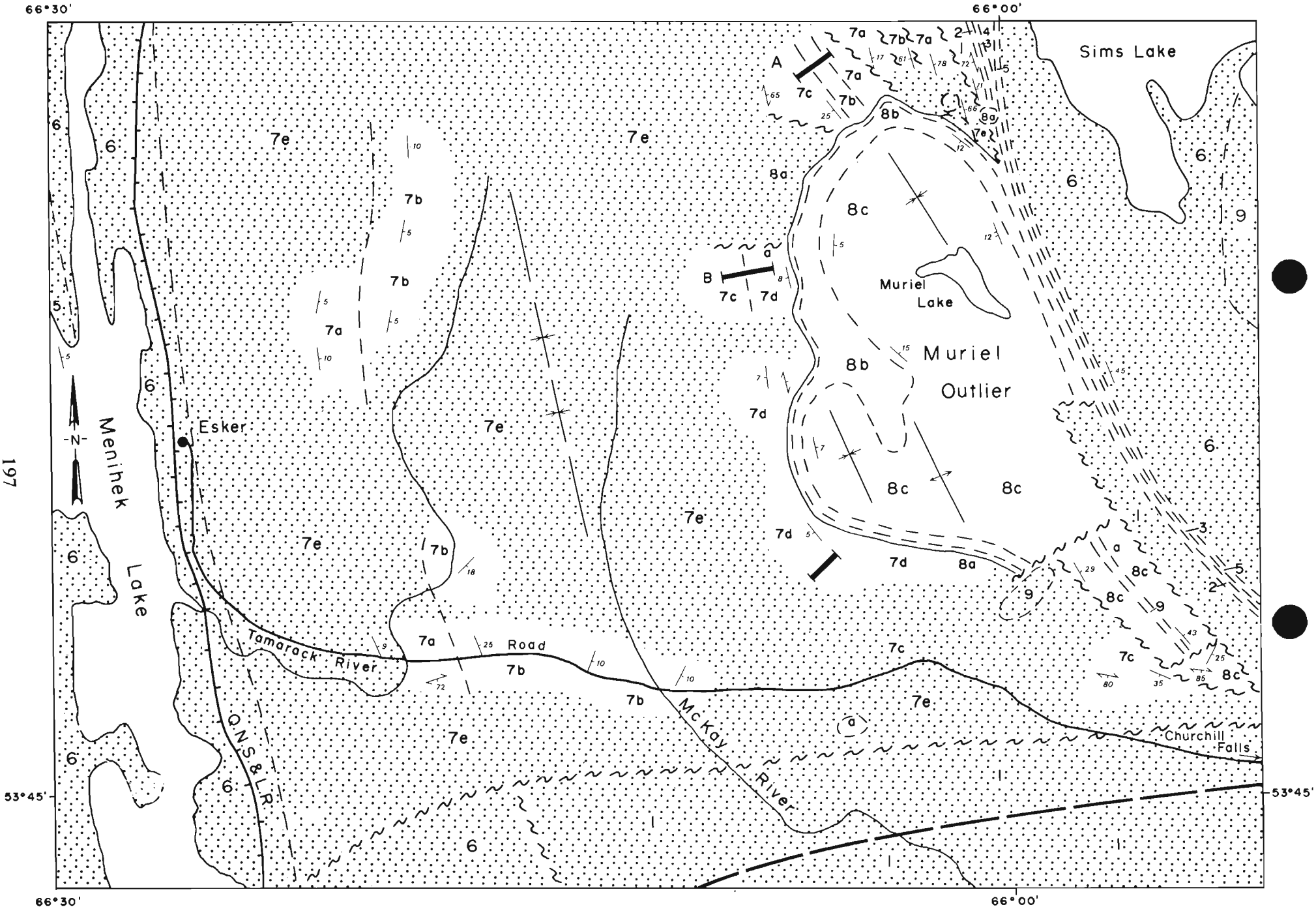
6	Menihek Formation:	Argillite, graywacke, and slate.
5	Sokoman Formation:	Iron Formation.
4	Nimish Subgroup:	Mafic volcanics.
3	Wishart Formation:	Feldspathic sandstone.
2	Denault Formation:	Carbonate.
1	Attikmagen Formation:	Argillite, graywacke and slate.

SYMBOLS

Location of measured stratigraphic section. . . . . 

Approximate northern limit of Grenvillian deformation. . . . . 

Drift covered. . . . . 



TAMARAC RIVER FORMATION STRATIGRAPHY

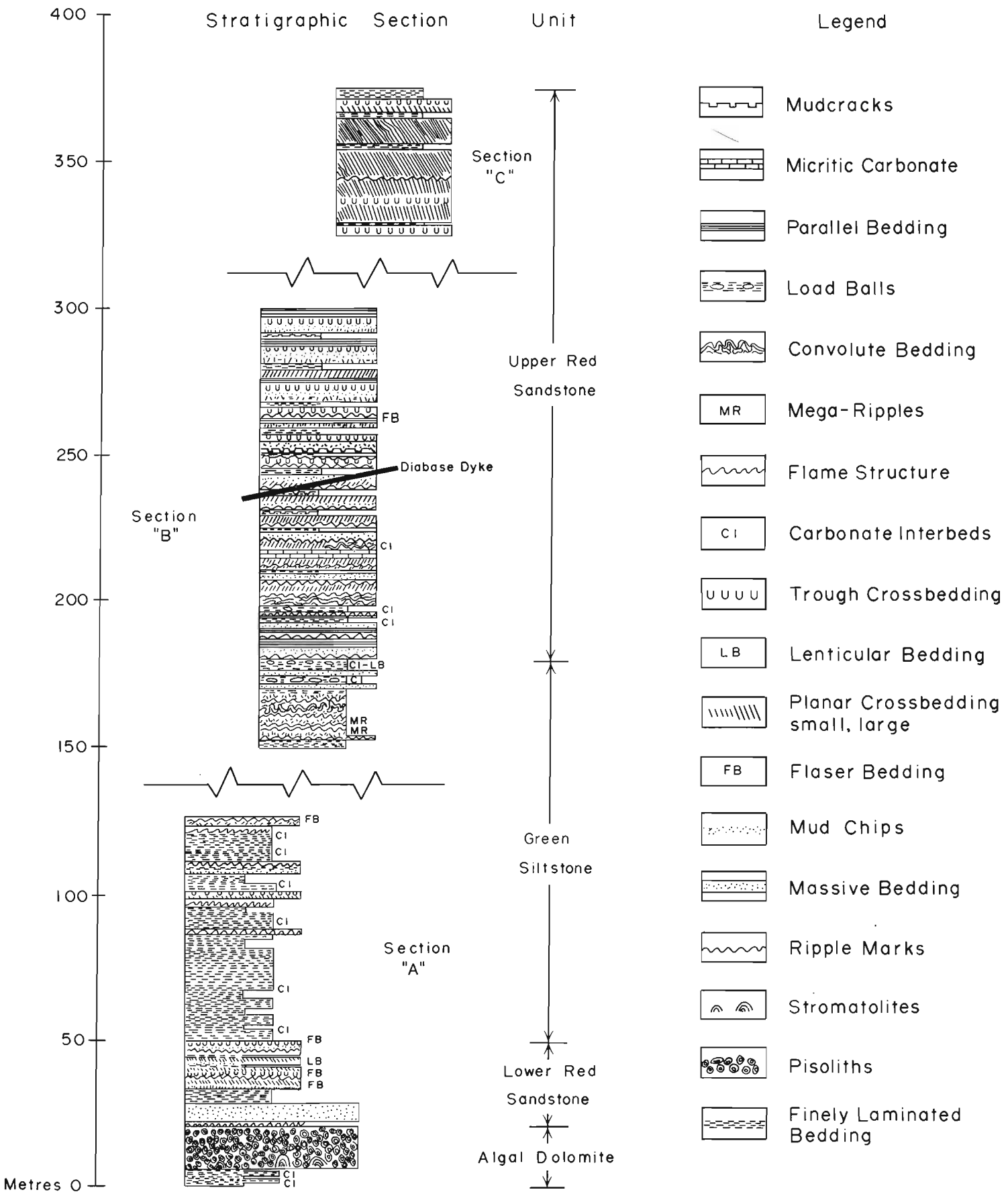


Figure 2

paleoslope during deposition of this part of the Tamarack River Formation.

Contact Relationships

The basal contact of the Tamarack River Formation is nowhere exposed, but the formation is thought to rest unconformably upon the Knob Lake Group (Ware and Wardle, 1979). Evidence for this assumption comes from the algal dolomite and arkose members of the formation which contain numerous clasts of typical Knob Lake Group lithologies (*i.e.* iron formation and red chert from the Sokoman Formation, quartzite from the Wishart Formation and mafic volcanics from the Nimish Subgroup).

The outcrop pattern of the Tamarack River Formation also suggests that it oversteps the Attikamagen and Menihek formations. However, the poor exposure and general similarity of Attikamagen and Menihek lithologies makes it very difficult to decide where the fault contact between the two units lies. It is conceivable, therefore, that the Tamarack River Formation could rest entirely on either the Menihek or Attikamagen formations.

The upper contact with the Sims Formation is an angular unconformity which was initiallly recognized by Ware and Wardle, (1979). This relationship has been further demonstrated in the area immediately northeast of the Muriel outlier where two small outliers, less than 0.5 km^2 in area, were recently found overlying cleaved and folded Tamarack River Formation strata.

The eastern contact of the Tamarack River Formation is in part a fault against the Knob Lake Group and in part an unconformity with the overlying Sims Formation. The southern contact of the formation with the Knob Lake Group is interpreted to be a fault produced during Grenvillian deformation. The northern and western limits are poorly defined. The northern boundary may extend a considerable distance north of the map area to include red siltstones located about 15 km north of Esker and mapped by Mauffette (1951) as part of the Menihek Formation.

STRUCTURE

The Knob Lake Group, Tamarack River Formation, and Sims Formation north of the Grenville Front have all been deformed, to varying extents, into northwesterly trending structures.

The Knob Lake Group and Tamarack River Formation in the western part of the map area (Figure 1) have gentle easterly dips and are only moderately cleaved. Structural complexity increases to the east so that in the area northeast of the Muriel outlier both units have steep bedding attitudes, are cleaved, and have been affected by numerous, small, high angle faults.

The Sims Formation is gently folded about northwesterly trends but does not possess a cleavage.

In the previous mapping in the area (Ware and Wardle, 1979), it was proposed that the major stratigraphic break in the area lay between Tamarack River Formation and Knob Lake Group and that this corresponded to the Hudsonian Orogeny. However, the more recent detailed mapping around the Muriel outlier has shown that in its eastern extremities the Tamarack River Formation is strongly cleaved and apparently has been deformed together with the Knob Lake Group. These two units are overlain by two small outliers of undeformed, flat lying Sims Formation. It is evident from this later relationship that the major stratigraphic break in the area, i.e. the Hudsonian Orogeny, occurs between the Tamarack River and Sims Formations. On this basis, the age of the Tamarack River Formation must be redefined as late Aphebian rather than Paleohelikian as suggested by Ware and Wardle (1979).

The unconformity between the Knob Lake Group and Tamarack River Formation is probably the result of minor disturbance and uplift in the Labrador Trough prior to the Hudsonian Orogeny.

The gentle folds in the Sims Formation may be attributed either to drap over pre-existing structures, or to a weak residual pulse of the Hudsonian Orogeny.

The southern exposures of the Tamarack River Formation have been affected by the local development of an east-west trending fracture cleavage which is interpreted to be the result of Grenvillian (circa, 1000 Ma) deformation, and to mark the most northerly development of penetrative Grenvillian structures in western Labrador.

ECONOMIC GEOLOGY

The major potential of the Tamarack River and Sims Formations continues to be for uranium mineralization (Ware and Wardle, 1979). Both the probable unconformity at the base of the Tamarack River Formation and the unconformity at the base of the Sims Formation offer potential exploration targets for epigenetic mineralization.

ACKNOWLEDGEMENTS

I am very grateful to R.S. Hyde and T.M. Davies for arranging their summer schedules to allow me the opportunity to carry out this field work. I would also like to thank C.F.L.Co. and Brinex for the hospitality accorded to me during my stay in Esker. In the field, fruitful discussions were held with D.J. Busch and A. Taylor, both of Brinex, and R.N. Hiscott of Memorial University. R.J. Wardle initiated and supervised the project and offered many improvements to the manuscript.

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