



DEVONIAN

- Ds** Grey sandstone, minor conglomerate.
- Sr** Basalt, minor diabase.
- Sv** Mainly aphyric grey and red rhyolite, volcanic breccia and tuff. Locally interbedded with red sandstone and tephra.
- Ss** Red sandstone, minor arkose and conglomerate.

SILURIAN

- SPgd** Unfolded to foliated, dark grey to green, mainly medium- to coarse-grained, partly amphibolized equigranular to plagioclase-phyric hornblende tonalite, gabbro, or diabase. Gabbro locally contains layers of pyroxene and peridotite. Matrix mafic rocks commonly have mixed arc to non-arc-like compositions.
- SR** Mainly massive, fine- to coarse-grained, compositionally arc-like, calc-alkaline hornblende (schistogranite) gabbro, diorite and quartz diorite and amphibole-biotite gneiss. Contains locally abundant mafic dykes and related intrusions. Locally cut by abundant pink, felsic dykes (SRf).

ORDOVICIAN-SILURIAN

- OSg** Unfolded to foliated, biotite granodiorite and/or granite, locally with K-feldspar megacrysts. May in part be equivalent to Srg. Some gneisses contain muscovite. Also includes biotite-muscovite granite, which may in part be equivalent to the Lake of the Hills intrusive complex.

ORDOVICIAN

- OSBtg** Generally well foliated, white, medium- to coarse-grained, mainly biotite- and/or hornblende-bearing, tonalite and/or granodiorite. Includes minor quartz diorite. Commonly contains abundant mafic enclaves or schlieren of diorite, amphibolite and hornblende. Matrix enclaves or schlieren are locally as abundant as the rock and appear agmatic. The mafic enclaves/schlieren in part probably represent melt-infiltrating structures. Locally contains abundant, well-sorted, commonly display up-dip alteration. Locally includes crosscutting pink muscovite-bearing dykes, granite and pegmatite dykes of the Lake of the Hills suite and gabbro or diorite of the Puddle Pond Complex (OSp).

LOWER-MIDDLE ORDOVICIAN

- OHB** High- α mafic formation (Lanvin): mainly light grey to white, ash to quartz crystal tuff, minor rhyolite, volcaniclastic sandstone and shale. All lithologies are locally interbedded with red shale and/or chert.
- OHrmv** Harbour Round Formation (Lanvin): mainly green to red hematized, pillow to massive basalt, pillow breccia, diabase, and andesite. All lithologies are interbedded with red chert and shale, whereas the pillow basalt locally contains interstitial intrusions. The basaltic rocks are divided into two members separated by a largely volcanoclastic, poorly sorted conglomerate. The basalt is compositionally similar to the conglomerate and exhibit predominantly island-arc to transitional island-arc-back-arc compositions.
- OML** Mink Lake Formation (Lanvin): mainly hematized, reddish purple to green pillow basalt, basaltic breccia, massive flows. Locally interbedded with felsic tuff containing red paper fragments. Dated at circa 473 Ma.
- OO** Otter Pond Complex (Anegig-Lanvin): Mainly white to beige, aphyric, banded, strongly foliated muscovite rhyolite. Locally interbedded with granitic gabbro, mafic schist and amphibolite. Dated at circa 488 Ma. Ooqt: massive to weakly foliated tuff to pill flow, medium-grained hornblende-biotite granodiorite to tonalite.

LOWER ORDOVICIAN

- OKb** Anegig-Clutch (A) (King George IV Ophiolite Complex (circa 480 Ma): Mafic rocks have predominantly supra-subduction zone chemical characteristics.
- OKd** Unfolded to foliated, mainly fine-grained pillow basalt. Variably altered to amphibolite or greenschist-facies assemblages. Contains diabase dykes.
- OKad** Sheeted diabase complex, mainly variably altered to amphibolite and/or greenschist-facies assemblages. Locally includes some transition zone rocks.
- OKgb** Mainly foliated to unfoliated, medium- to very coarse-grained, layered to massive gabbro, olive gabbro, and oxide gabbro. Contains locally pyroxene layers, pegmatite gabbro, and in part biotite to amphibolite dykes. Variably altered to amphibolite and/or greenschist-facies assemblages.
- OKa** Mainly mylonitic to moderately foliated amphibolite, probably highly metamorphosed equivalent of unit OKgb. Commonly interbedded with symmetric sheets of tonalite and diorite of the Southwest Brook Complex. Locally may include screens of paragneiss.

NEOPROTEROZOIC TO MIDDLE ORDOVICIAN

- OCp** Mainly well-banded granodiorite to tonalite orthogneiss (circa 483 Ma).
- OCcmv** Strongly foliated, locally pillowed or layered mafic volcanic rock. Probably also includes minor diabase and gabbro. Generally intensely metamorphosed into garnet and/or clinopyroxene-bearing amphibolite. Some mafic rocks contain layers rich in graphite, which suggest that some volcanic rock experienced pre-metamorphic hydrothermal alteration.
- OCGs** Strongly foliated, generally strongly migmatite sillimanite-garnet schist commonly interbedded with abundant gneiss/carbonate rock, minor metapsammite, and rare calc-silicates.

EXPLOITS SUBZONE

- SRL** Rogerson Lake Formation (Lower Silurian): mainly red to grey, polymictic conglomerate, and minor micaceous sandstone and siltstone. Here massive beds. Clasts are commonly derived from underlying volcanic and plutonic rocks, but also include Jasper, shale, and red sandstone. Locally includes diabase and gabbroic dykes.

CAMBRIAN-MIDDLE ORDOVICIAN

- OPPhv** Victoria Lake Supergroup: Pats Pond Group (Upper Cambrian - Tremadoc): Mainly light green, biotite volcanic breccia (COPI); minor fine-grained basaltic to dioritic tuffs, quartz and feldspar porphyritic diorite rocks and medium to green calc-silicate vesicular pillow basalt (COPII), with interstitial Jasper. Locally includes sulphide mineralization.

RED CROSS GROUP (Anegig-Caraboe)

- OPF** Five Falls Formation (Lanvin-Caraboe): mainly light greyish-green to green basalt and associated minor gabbro ranging in composition from MORB-like to island arc tholeiite-like to calc-alkaline. At least in part pillowed, interbedded with minor intrusions and dark grey to black, granitic shale and siltstone. The black shale locally contains thin beds of silty shales and is transformed into a broken formation of mélange with felsic volcanic clasts near major faults. The dark grey to black shale and siltstone are mapped as the Lake of the Woods Member.
- OST** Storm Brook Formation (Anegig-Lanvin): mainly light buffaceous sandstone, conglomerate, siltstone and shale, locally pyritic, rare limestone, quartz and feldspar porphyry to aphyric to intermediate volcanic rock (OSTv) and minor basalt (OSTm) and associated gabbro ranging in composition from E-MORB-like to tholeiite. The volcanic rocks are designated as the Carter Lake Member. The diorite and/or gabbroic rocks are commonly graded and locally contain abundant dark grey to black quartz xenocrysts.

DEVONIAN

- Dm** Mainly coarse- to medium-grained, grey to green hornblende-pyroxene gabbro, diabase and/or orthogneiss. Locally includes dark green regions and/or enclaves of pyroxenite. Cut by mafic and/or granitic pegmatite veins.

NORTH BAY GRANITE SUITE

- DBg** Medium- to coarse-grained, generally light red to grey K-feldspar porphyritic to equigranular biotite granite (North Bay phase dated at circa 404 Ma) and medium- to coarse-grained, generally light red to grey, equigranular hornblende-bearing quartz diorite to granodiorite and muscovite-bearing granite. Planar and linear structures are generally moderately to weakly developed or absent. Foliation is generally well developed close to shear zones. Locally includes patches of migmatite and screens of paragneiss.
- DSpgrd** Medium-grained, grey biotite-bearing tonalite, granodiorite (Spruce Pond phase dated at circa 417 Ma) and minor gabbro. Generally displays compositional igneous layering and a mineral foliation, which is less penetrative than the Peter Strick granitoids. Metasedimentary sequences where present, are commonly folded parallel to the foliation. Locally includes patches of migmatite and screens of paragneiss.

CAMBRIAN-MIDDLE ORDOVICIAN

- OPFsg** Grey to light red, generally strongly foliated, medium-grained biotite granodiorite and granite (circa 467 Ma).
- OPStg** Mainly grey, generally well foliated, medium-grained hornblende tonalite to light red biotite granite (circa 458 Ma) with abundant amphibole dykes. Locally includes screens of paragneiss.

PETER STRICK GRANITOID SUITE

- OBn** Bay Du Nord Group (Anegig-Caraboe): Unfolded grey to black shale, siltstone, sandstone, and felsic volcanic rocks.
- OCMcm** Stronach to mafic migmatite. Leucosomes mainly made-up of Dspgrd and Dspg. Palaeosome mainly derived from Cambrian-Ordovician Gander Group. Palaeosome locally includes amphibolite dykes. Boundary with Dspgrd and Dspg is typically gradational.
- OCMcp** Mainly amphibolite facies paragneiss and amphibolite derived from the Cambrian-Ordovician Gander Group, locally weakly mylonitized by granitic and pegmatite veins (OCMcmv). Gneiss commonly contains sillimanite, but locally contains also staurolite and/or cordierite. Contains amphibolite dykes. Mainly amphibolite facies lithological equivalent of the Spruce Pond Formation. Is cut by the Peter Strick Suite.

Geological boundary (approximate, assumed)

Fault, undifferentiated (approximate or assumed)

Thrust fault, undifferentiated (approximate or assumed)

Unconformity (approximate or assumed)

Outcrop, this study (single, area)

Outcrop, compiled (Kean, 1983)

Bedding, top known (inclined, overturned)

Bedding, top unknown (inclined)

Bedding, top known, dip if known (inclined)

Younging direction from sedimentary or volcanic structures

Foliation (generation - S₁, S₂)

Foliation (generation - M₁, M₂)

Lineation: main, mineral or extension

Lineation: hinge or intersection (generation - L₁, L₂, L₃, L₄)

Sense of fold asymmetry

Dyke (inclined)

Shear zone (sense of motion - dextral, sinistral)

U-Pb zircon age determination

Mineral occurrence; National Mineral Inventory Number

REFERENCES

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Oeschub, D., Ted, J., and Kibik, G. 2001. Red Indian Line. In: *Geological Survey of Canada Open File 3623*, Government of Newfoundland and Labrador, Department of Mines and Energy, Geological Survey Branch, Open File 3623, CD-ROM.

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Zagorevski, A., Rogers, N., and van Staal, C.J. 2003. Tectonostratigraphic relationships in the Loope River and Tula Brook region of central Newfoundland: a geological link between the Red Indian Line and King George IV Lake. In: *Current Research, Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 03-1*, 167-178.

Table 1. U-Pb geochronology

Sample number	UTM zone 21, NAD 83	UTM easting	UTM northing	Crystallization age (Ma)	Age of mineral (Ma)	Reference
81-HPAD-280	8086	451089	5343763	429 ± 7	1990	ROM Dunning et al. (1990)
81-HPAD-284	8055	448569	5343614	429 ± 7	1990	Dunning et al. (1990)
RAX00-915	444450	5336150	467 ± 6	2001	GSC	Valverde-Vaquero, unpublished
RAX00-916	440006	5336717	463 ± 3	2001	GSC	Valverde-Vaquero, unpublished
RAX00-917	452033	5336981	458 ± 3	2001	GSC	Valverde-Vaquero, unpublished
RAX00-920	449148	5323853	403 ± 1	2001	GSC	Valverde-Vaquero, unpublished
V1.01-A067 (27252)	449094	5341669	ca. 487	2002	GSC	Zagorevski and McNeil, unpublished
V1.01-A087 (27253)	436177	5324266	ca. 473	2002	GSC	Zagorevski and McNeil, unpublished

GSC: Geological Survey of Canada, Ottawa, Canada. ROM: Royal Ontario Museum, Toronto, Canada.

Table 2. Mineral occurrences

Mineral occurrence	UTM zone 21, NAD 83	Name	Alternate name	Commodity	Status
Ag001	454490	5342750	Woods Brook (Victoria River)	Ag, Pb, py	Showing
Au001	429790	5320250	Moraine Pond	Au	Indication
Au002	429790	5327000	Second English River	Au, Zn, Pb, py	Showing
Au003	454490	5343600	Victoria Lake South	Au, py, asp	Showing
Au004	443450	5338400	Wood Lake	Au, asp, py	Showing
Cu001	446110	5340250	Burgio Road #1	Cu	Indication
Mo001	421100	5318800	North Moraine Pond Muldyhornum	Mo	Indication
po001	427250	5318800	South Moraine Pond #2	po, py	Showing
py001	445170	5343900	Maria Pond Occurrence	py	Indication
py002	448700	5341800	Victoria River Southward	py	Indication
py003	450700	5342370	Yet Another Pond	Budget Zone #1	py
py004	445480	5339800	Budget Zone #1 South	py	Indication
py005	446290	5342000	Burgio Road #2	py	Indication
py006	451850	5340100	Victoria River South	Final Mag Zone #0	py
py007	428800	5319650	North Moraine Pond #1	py, po, Au, Ag	Showing
py008	428800	5319640	North Moraine Pond #2	py, po, Au, Ag	Showing
py009	429370	5318350	South Moraine Pond #1	py, po, Au, Ag	Showing
py010	440860	5338800	Wood Lake DDI #1-S	py	Showing
py011	432650	5342900	King George IV Pyrite #11	py	Indication
py012	441710	5341600	King George IV Pyrite #12	py, Zn, Cu	Indication
py013	444800	5336700	King George IV Pyrite #13	py, Cu	Indication
py014	448800	5326700	King George IV Pyrite #14	py, Cu	Indication
Zn001	442930	5334330	Wood Lake Zinc	Zn, Au, Cu, Pb	Showing

Note: Modified after the Mineral Occurrence Data System (MOSDS) of the Geological Survey of Newfoundland and Labrador. National Mineral Inventory Number has the form IDAN104:001.

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GEOLOGY
NEWFOUNDLAND AND LABRADOR

Authors: C.J. van Staal, P. Valverde-Vaquero, A. Zagorevski, S. Pehrsson, S. Boutma, and M.J. van Noorden

New geology and interpretation by C.J. van Staal, P. Valverde-Vaquero, A. Zagorevski, S. Pehrsson, S. Boutma, and M.J. van Noorden (2000-2003)

Additional unpublished geochronological data from V.J. McNicol (2001-2003) and P. Valverde-Vaquero (2000-2003)

Geological compilation by C.J. van Staal and H. Rogers (2003)

Pre-existing geological data presented on map compiled from Kean (1983)

Distribution of units and position of geological boundaries in part inferred from geophysical data (Oeschub et al., 2001, 2002)

Digital cartography by P. Corrigan, Earth Sciences Sector Information Division (ESS Info)

This map was produced from processes that conform to the ESS Info Publishing Services Subdivision Quality Management System, registered to the ISO 9001:2000 standard

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Digital base map from data compiled by Geomatics Canada, modified by ESS Info

Some geographical names subject to revision

Mean magnetic declination 2005, 21°29' W, decreasing 10.0" annually

Elevations in metres above mean sea level

Scale 1:50 000/Échelle 1/50 000

Universal Transverse Mercator Projection / Projection transverse universelle de Mercator
North American Datum 1983 / Système de référence géodésique nord-américain, 1983
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12 B16	12 A13	12 A14	12 A15	12 A16	2 D13
12 B9	12 A12	12 A11	12 A10	OF456	OF455
OF451	OF168	OF169	OF454	12 A9	2 D12
12 B8	12 A5	12 A4	12 A7	12 A8	2 D5
OF166	OF164	OF167	OF457		
12 B1	12 A4	12 A3	12 A2	12 A1	2 D4

NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND GRID TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

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