CANADA
DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

SHEET 21 G/9

LEGEND

CARBONIFEROUS

PENNSYLVANIAN

PETITCODIAC GROUP (21-23)

23a, 23b — *DIVISION C:* **23a**, *gray sandstone and conglomerate;* **23b**, *red sandstone and conglomerate*

22 — *DIVISION B: gray sandstone and conglomerate; gray and purplish shale; coal*

21 — *DIVISION A: gray, green, and red sandstone, conglomerate, and siltstone*

MISSISSIPPIAN OR PENNSYLVANIAN

20 — *Basalt*

HOPEWELL GROUP (?)

19 — *Red and green conglomerate, sandstone, shale*

MISSISSIPPIAN

WINDSOR GROUP

18 — *Limestone, calcareous shale*

MONCTON GROUP (15?, 16, 17)

17 — *Red conglomerate, sandstone, shale; minor grey beds*

16 — *Rhyolite flows, breccias, and tuffs*

15a, 15b — **15a**, *conglomerate;* **15b**, *grey sandstone*

DEVONIAN

12, 14 — **12**, *syenite;* **13**, *granite;* **14**, *granophyre*

13 — *Gabbro, diabase*

SILURIAN

UPPER SILURIAN

MASCARENE GROUP ? (9-10)

10 — *LONG REACH FORMATION: basic lavas, tuffs, breccias and related intrusive rocks; minor acidic flows; interbedded shales, slates, and argillites; minor shaly limestone*

9 — **9**, *JONES CREEK FORMATION: shale, slate, argillite, hornfels*

ORDOVICIAN OR EARLIER

CHARLOTTE GROUP (6-8)

8 — **8**, *PALE ARGILLITE DIVISION: slate, argillite, micaceous sandstone and quartzite, graphitic schist; minor hornfels*

6–7 — *DARK ARGILLITE DIVISION:* **6**, *basic to intermediate volcanic rocks; some slate, argillite, and quartzite;* **7**, *argillite, slate, quartzite, hornfels; minor volcanic rocks*

CAMBRIAN AND ORDOVICIAN

ST. JOHN GROUP

5 — *Red and gray breccia, sandstone, and shale*

COLDBROOK GROUP (4)

4 — *Acidic to basic volcanic rocks*

3 — *Felsite. Age relations to* **4** *uncertain*

PALÆOZOIC

PROTEROZOIC

PRE CAMBRIAN

1. *Basic volcanic flows, agglomerates, and tuffs; slate and argillite*
2. *Rhyolite porphyry (intrusive); granitic gneiss*

Area thickly covered with valley alluvium
Observed rock outcrop
Bedding (inclined, vertical)
Cleavage or schistosity (inclined, vertical)
Fault (defined, approximate)
Anticlinal axis (approximate)
Synclinal axis (approximate)
Glacial striae
Fossil locality
Quarry
Coal seam (thickness in inches) ..... COAL, 6"
Mineral occurrence

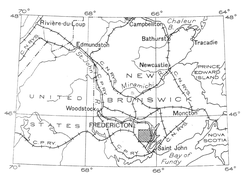
SYMBOLS FOR METALS AND MINERALS

Arsenopyrite	Asp
Copper	Cu
Fluorite	F
Galena (lead)	Pb
Graphite	C
Pyrite	Py
Quartz	Q
Silver	Ag
Sphalerite (zinc)	Zn
Stibnite (antimony)	Sb

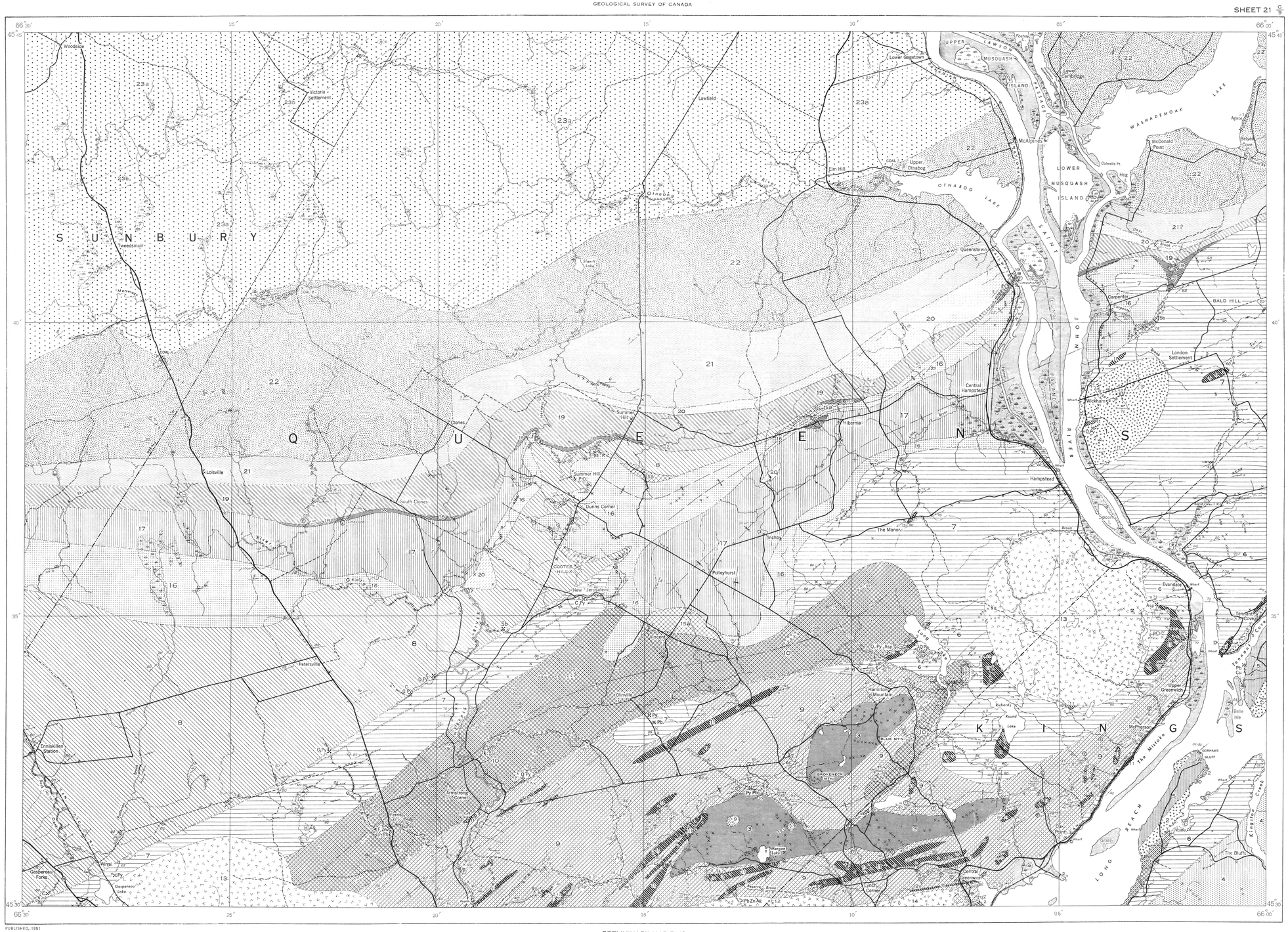
Geology by G. S. MacKenzie, 1946, 1948

Main roads — Route No.
Other roads
Trail
Railways
County boundary
Intermittent stream
Rapids
Marsh or swamp
Lighthouse

Approximate magnetic declination 22°15′ West



INDEX MAP



PUBLISHED, 1951

PRELIMINARY MAP 51-19

HAMPSTEAD

QUEENS, KINGS AND SUNBURY COUNTIES

NEW BRUNSWICK

Scale: 1/40,000

Miles

DESCRIPTIVE NOTES

The rocks of map-unit **1** resemble those of the Robin Hood formation of Westfield map-area to the south, and like them are probably of Archean age.

The felsites of map-unit **3** are remarkably uniform in character. They are generally massive, though fractured, and locally are flow-banded and brecciated. Their composition is near that of trachyte. The rock is similar to some of the felsitic flows of the Coldbrook group (**4**), and may represent lava domes or vents of the same age.

The sedimentary rocks of the Charlotte group (**6-8**) are distinguished from those of the Mascarene group (**9, 10**) chiefly by the presence of felsite in the latter. The volcanic rocks of the Charlotte group display a higher degree of metamorphism than do those of Silurian age. Some beds and volcanic rocks of Silurian age lacking fossils have probably been mapped with the Charlotte group, notably along The Mistake on the northwest shore of the Long Reach. On the other hand, other rocks such as those southeast of the Long Reach may be Proterozoic in age. However, an Ordovician age appears most probable for most rocks of the Charlotte group. The Pale Argillite division (**8**) constitutes a lithologically distinct unit, which displays remarkably little variation within the map-area and southwestward across the province except for alternating beds of slate and micaceous sandstone. For all most rocks are discernible in one exposure.

The fossils in the Jones Creek formation (**9**) are best seen around Hamilton Mountain and Central Greenwich and westward to Jones Creek. Brachiopods are most common, accompanied by a few large pelecypods and, locally, gastropods. Solitary corals occur in the rubbly base of the formation where it immediately overlies the felsite northwest of Lynds Corner.

The Long Reach formation (**10**) northeast and southwest of Armstrong Corner is composed chiefly of basaltic lava flows, some coarsely porphyritic, and basic volcanic breccias. Secondary epidote is a conspicuous constituent. An interbedded sedimentary rock exposed in a brook entering Nerepis River northeast of Armstrong Corner contains an abundant fossil fauna, including a primitive fish. The lavas southwest of Long Lake are less basic than those of the main band, and may not be stratigraphically equivalent.

The gabbro and diabase intrusions of Devonian age (**11**) are mainly dikes or nearly concordant masses, though some are stocklike in form. Their occurrence is generally marked by ridges or hills. Grain size ranges from fine to coarse, and some masses are porphyritic. Colours are light to dark green. These rocks are potential sources of block granite.

The Devonian granite (**13**), where quarried from the stock opposite Spoon Island on Saint John River, has a grey colour due to marginal assimilation. It is lighter coloured within the stock, and contains some red feldspar.

Rhyolite pyroclastic rocks and flows (**16**) constitute the base of the Carboniferous succession across most of the map-area. Remnants of an older conglomerate (**15a**) are exposed locally beneath the volcanic rocks, and at one place east of Saint John River a grey shaly sandstone (**15b**), resembling the sandy facies of the Albert formation of southeastern New Brunswick, underlies the rhyolite. The pyroclastic rocks are mainly breccias, with pre-dominant fragments of coarsely porphyritic rhyolite and occasional areas of the pre-Carboniferous rocks. A faint bedding can be detected in many exposures. True flows are recognizable in only a few places. These acidic volcanic rocks are probably the stratigraphic equivalent of the "ash beds" classed with the Weldon formation of the Moncton group in the Hillsborough map-area of southeastern New Brunswick where the Mississippian successor is more fully represented than in the Hampstead map-area. Coarse conglomerates (**17**), with large boulders of rhyolite, immediately overlie the volcanic rocks in most places and can perhaps be correlated with the Hillsborough formation of the Moncton group. Locally the Windsor limestone (**18**) or beds of the Hopewell group (**19**) rest directly on the rhyolites, and in some cases on the pre-Carboniferous formations.

The Windsor limestone (**18**) is mostly light-coloured coquina composed largely of fragments of a single brachiopod, with an occasional large coralend. A flaggy, argillaceous facies is also represented. The limestone has been quarried in earlier years and is still a possible source of lime for agricultural and other purposes.

The basalt (**20**) appears to rest with slight angular discordance on the beds of the Hopewell group, particularly south of Queenston on Saint John River. The basalt is nearly black, and is fine grained and amygdaloidal. A basaltic dyke cuts the rhyolite breccia (**16**) on the main highway along Saint John River south of Queenston, and probably represents a feeder to once overlying flows. The occurrences of basalt south of the Hopewell beds are regarded as outliers. No boulders of basalt could be discovered in the nearby conglomerate upstream and downstream from the exposure at Nerepis River west of Coombs Hill, though boulders of rhyolite are common.

The boundary between Divisions **A** and **B** of the Petitcodiac group marks the approximate upper limit of the occurrence of red and green (flamingo) beds rather than a distinct stratigraphic break. The boundary between Divisions **B** and **C** marks the occurrence of a coal seam with underlying shale beds. The coal is less than a foot thick where exposed, except north of Clones where it is up to 3 feet thick and where a second seam has been reported over a small area. Some coal was mined here, and used locally during the last century. A drill-hole put down in 1946 penetrated 50 feet of shale below the coal, 130 feet of grey beds beneath the shale, and 270 feet of red and green beds to the bottom of the hole, which gives an indication of the thickness of Divisions **A** and **B** at this point.

The folds of the pre-Carboniferous formations trend approximately northeasterly and are a product of different periods of deformation. The Upper Silurian formations, deformed during the Acadian orogeny of late Devonian time, are generally less closely folded than the older formations. The beds of the Jones Creek formation have dips as low as 20 degrees southward towards the Devonian granitic intrusions at the southern limit of the map-area. The Proterozoic felsitic ridges appear to have acted as buttresses against which the Jones Creek formation was thrust both from the north and south. Dips are northward on the north side of the ridges and eastward in that direction, and the cleavage displays a similar direction of dip and strike. The beds of the Long Reach formation around Armstrong Corner are generally steeply dipping, and are locally slightly overturned to the south, suggesting thrusting against the Jones Creek formation to the south. The area of the fault in the Silurian formations near northeast line of the provincial mapping of Upper Silurian rocks south of Hampstead on Saint John River.

Movement along the northeasterly trending longitudinal faults of the map-area appears to have occurred at different times. Late Silurian lava flows and associated intrusions suggest contemporary movement for some of the faults along the Long Reach. Adjacent parallel faults affect beds of early Mississippian age northeast of the map-area. The two northeasterly trending faults in the southcentral part of the map-area appear to be steeply northward dipping thrust faults developed during the Acadian orogeny, with later, probably transverse faults superimposed. It has not been demonstrated that the beds of Mississippian age northeast of the projection of the more northerly of the two faults have been affected by movements along the fault zone. The attitude of the Carboniferous formations reflects the underlying, fault-controlled, pre-Carboniferous topography. This relationship probably accounts in part for the existence of Washademoak Lake.

The northwesterly trending transverse faults in places cross intrusive rocks of Devonian age. The formation of these faults, the later movements along the longitudinal faults, and the development of strong, persistent, northeast and northwest trending joints in the Devonian granite may probably be ascribed to the same period of post-Devonian stress, possibly in early Mississippian time, possibly later.

Overlaps and irregularity of distribution of the Mississippian and early Pennsylvanian formations are indicative of disconformity and minor angular unconformity within the succession, though erosional gaps can be attributed for in part by the topography of the pre-Carboniferous land surface.

Metallic mineralization within the map-area may be partly associated in origin with the Devonian intrusions, but some is associated with post-Devonian faults. The quartz-arsenopyrite and quartz-stibnite occurrences may be related to the Devonian granite. A few assays of samples from the quartz-arsenopyrite deposits and showings with pyrite or pyrrhotite have indicated only a negligible gold content. However, the major fault zones, not formerly recognized, and the map-area as a whole, have received little systematic exploration. The stibnite on Pender Brook occurs along fractures in a silicified, quartzmineralized lens and represents an appreciable though possibly not workable concentration; other occurrences may be present along the nearby fault-zone. Galenite is also reported to have been discovered east of Wickham.

The lead-zinc-silver occurrence on Reserve Brook in the south-central part of the map-area consists of a vein traced for 1,500 feet along a northwesterly trending fault-zone in Devonian syenite. Heavy concentrations of silver-bearing galena and of sphalerite, as well as smaller quantities of tetrahedrite, chalcopyrite, arsenopyrite, and pyrite, occur in veinlets along the vein in a gangue of siderite, quartz, and cherand syenite. Workable quantities of ore have not been outlined by the limited exploration to date, but this and other smaller base-metal occurrences related to parallel transverse faults and to the longitudinal fault zones indicate that these zones are worth prospecting.

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