

GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

DESCRIPTIVE NOTES

PRELIMINARY SERIES

SHEET 41 1/2

- LEGEND**
- 10 Gabbro, diabase and basalt; 10a, granophyre
 - COBALT GROUP (8, 9)
 - 9 LORRAIN FORMATION: quartzite, siltstone, greywacke, pebble conglomerate
 - 8 GOWGANDA FORMATION: greywacke and argillite, commonly conglomeratic, polymictic conglomerate; subordinate quartzite, limestone, and arkose; 8a, limestone
 - BRUCE GROUP (3-7)
 - 7 SERPENT FORMATION: mainly fine-grained quartzite; minor conglomerate arkose, argillite, and grit; 7a, conglomerate, argillite
 - 6 Limestone
 - 5 Polymictic greywacke conglomerate, greywacke (Bruce conglomerate?)
 - 4 Basic volcanic rocks, commonly amygdaloidal; minor pillow lava and interbedded sedimentary rocks
 - MISSISSAGI FORMATION: arkosic quartzite; minor argillite and quartz-pebble conglomerate
 - 3
 - 2a, 2b, dominantly granite and granitic gneiss; subordinate amphibolite and migmatite; 2b, mixed zones of granite, granite-gneiss, amphibolite, and migmatite
 - 1 Amphibolite, minor migmatite

- Heavily drift-covered area
- Geological boundary (approximate, assumed)
- Limit of geological mapping
- Bedding (inclined)
- Bedding (dip known, tops not indicated)
- Schistosity (inclined, vertical, dip unknown)
- Gneissosity (inclined, dip unknown)
- Fault or shear zone (approximate)
- Glacial striae (direction of ice movement known, unknown)
- Mineral prospect (copper, Cu)

Geology by M. J. Frarey, 1956 and 1958

Roads

Cart track

Intermittent stream

Marsh or swamp

Height in feet above mean sea-level (approximate) 850

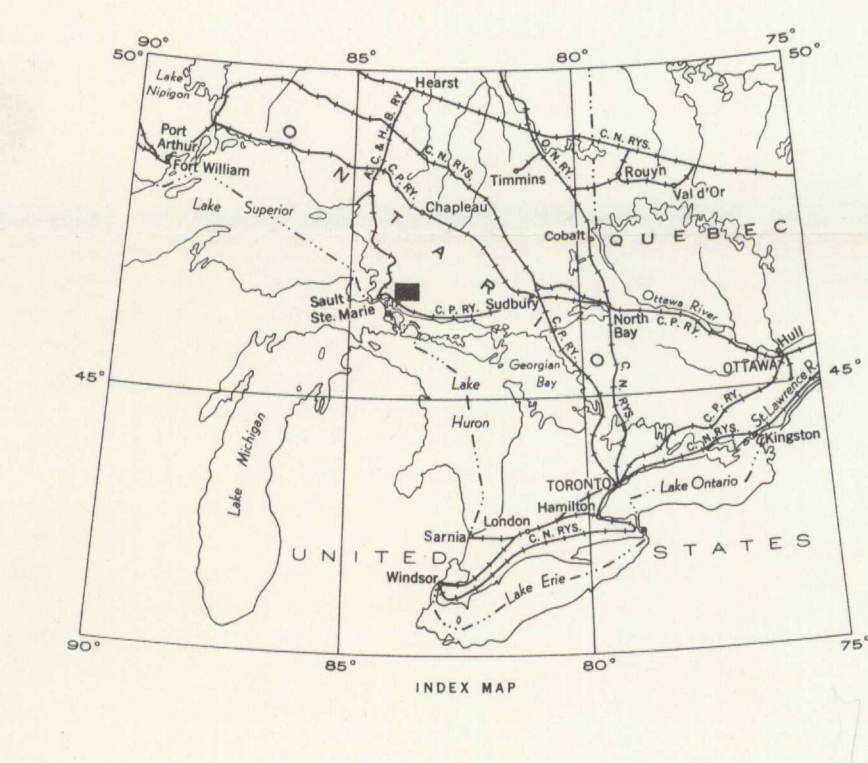
Cartography by the Geological Survey of Canada, 1959

Approximate magnetic declination, 05° 01' West

Geographical names subject to revision

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa, Ontario

In response to public demand for earlier publication, Preliminary Series maps are now being issued in this simplified form, thereby effecting a substantial saving in time. There is no loss of information, but the maps will be clearer to read if all or some of the map-units are hand-coloured.



The centre of the map-area lies about 25 miles north of Lake Huron and 30 miles east of Sault Ste. Marie, Ontario. The southern part is readily reached by motor road and bush road from Thessalon, Bruce Mines, and other points along provincial highway No. 17; the northern part is accessible from the same highway where it lies west of the area. The central part is difficult to reach. Except for cultivated tracts, the country is heavily wooded and, in general, fairly rugged. The total relief is about 1,100 feet and many hills and ridges are 300 to 500 feet high. The valleys of Garden River, Echo River, and to a lesser degree, Thessalon River, form conspicuous, broad, step-walled depressions as much as 750 feet deep.

General Geology

The area lies along the northern margin of the 'original Huronian area', and was in part previously mapped by Collins and Emmons'. Collins' stratigraphic nomenclature has been largely retained, but a considerable change has been made in the distribution of map-units. Amphibolite (1) is widespread throughout the pre-Huronian terrane, but only around Horner Lake and a few subordinate localities does it constitute a mappable unit. It is essentially an equigranular assemblage of medium-grained plagioclase feldspar and amphibole, of moderate to strong foliation, commonly injected and partly assimilated by granite. Weakly foliated granitic rocks (2) make up an overwhelming proportion of the pre-Huronian basement. Distinct bodies of uniform granite appear to be lacking, though in a zone a mile or so wide just north of Stuart and Patten Lakes, and extending to Darragh Lake, red massive granite is more common than elsewhere and is perhaps dominant. This grades northward into a complex of intergradational grey to pink granite and granitic gneiss containing many amphibolite remnants. No evidence of two ages of granitic intrusion was obtained. The subdivision of the pre-Huronian rocks is restricted by the lack of clear-cut lithologies, and by the lack of sizeable exposures.

The Mississagi formation (3) is restricted to a single band about a mile northeast of Aberdeen Lake and Coffee Creek. This band is closely similar in texture, lithology, and sedimentary structures to much of the Mississagi quartzite of the region. It consists of rather poorly exposed, medium- to coarse-grained, feldspathic quartzite beds 1 foot to 3 feet thick, in some cases separated by argillite laminae up to a few inches thick. Planar crossbedding is common. Quartz-pebble conglomerate and pebbly quartzite were seen within the formation about 1 1/2 miles northwest of McMahon Lake. The overlying band of volcanic rocks (4) contains thin interbeds of quartzite, grit, and quartz-pebble conglomerate near its base. The bulk of the unit consists of fine-grained, dark grey to black, massive, basaltic flows, most of which are amygdaloidal. Well-formed pillows and flow breccia were also observed. Commonly, the volcanic rocks are converted to chloritic schist along narrow shear zones. The polymictic conglomerate (5) along Aberdeen Lake corresponds stratigraphically and lithologically to the Bruce conglomerate of other areas, except that here, greenstone fragments predominate. The limestone (6) at Echo Lake closely resembles Bruce limestone elsewhere, but appears to be anomalously underlain by Serpent quartzite, previously classed as Mississagi. The anomalous relations here may be due to faulting. The Serpent formation (7) appears to be much more extensive in this map-area than formerly thought. Southwest of Coffee Creek, northwest of Echo Lake, and near Skookum and Cooper Lakes are broad areas underlain by massive, thick-bedded, fine-grained, poorly crossbedded quartzite, formerly termed Mississagi but which on lithological grounds are here classed as Serpent. Gritty facies and quartz-pebble beds occur north of Cooper Lake at or near the contact of the quartzite with granite. Interbeds of polymictic conglomerate and argillite (7a) occur northwest of Echo Lake, and a similar conglomerate bed underlies the quartzite near the southeast shore.

Most of the Huronian terrane is underlain by rocks of the Cobalt group. A broad overlap beyond the limits of the Bruce group has resulted in the deposition of the younger sediments directly on the basement rocks in many places across the area. As most of these overlapping beds were previously classed as Mississagi, a major revision has also been required in the distribution of the Cobalt group.

The Gowganda formation (8) appears to overlie Serpent quartzite with slight unconformity in most places. The formation varies considerably from place to place, and consists of heterogeneous assemblages of bedded argillite, massive argillite, fine-grained greywacke and siltstone, in part conglomeratic, and conglomerate. A close-packed, pebble- to cobble-conglomerate, a few feet or tens of feet thick, is normally at the base but similar layers may be found higher. Much of the apparently massive, uniform argillite and greywacke is rudely bedded and contains scattered fragments. Pink granite fragments are characteristic of these conglomeratic beds, and lenses of fine-grained pinkish grey quartzite are numerous. Between Echo River and Garden River an upper laminated argillite is present. A thin band of overlying Serpent quartzite and also beds of greywacke-conglomerate, has been included for the time being in the Gowganda formation. A similar occurrence has been reported in Striker and Scarfe townships north of Blind River. The Gowganda formation southwest of Skookum Lake is probably about 3,000 feet thick. A zone of siltstone and greywacke several hundred feet thick has been assigned to the base of the Lorrain formation (9), above which rest thinner red and grey quartzite and greywacke beds. The remainder is dominantly medium- to coarse-grained white quartzite containing an irregular zone of pebble beds characterized by abundant jasper. Probably little of the upper Lorrain, as described elsewhere, is exposed in this area. North of Echo Lake the formation appears to be about 5,000 feet thick.

Sheet-like intrusions of gabbro and related rocks (10) occupy large areas of high ground. At a few places, these were seen transecting the sediments at low angles. Narrow dykes of similar composition are numerous and generally trend northwest. Dykes cutting basement rocks are commonly markedly porphyritic. Olivine gabbro or diabase dykes were not recognized. South of Darragh Lake, along McMahon and Patten Lakes, and northwest of Coffee Creek, reddish granophyric masses are gradational with normal gabbro.

Structure

Although poorly developed over large areas, foliation in the granite and gneiss generally strikes northwest, and, less prominently, northeast. Fold-like structures appear to be lacking. The Huronian formations are homoclinal, consistently dipping southwest at various moderate angles. In the east half of the area, dips are commonly gentler, and in places along the basement contact, beds are almost horizontal. The Gowganda formation displays reversals of dip east of Patten Lake and north of Echo Lake. Around Iron Lake near the southwest corner, the strata appear to swing westerly, suggesting a possible syncline continuing outside the map-area.

Prominent intersecting sets of lineaments trending dominantly northwest and northeast characterize the Archaean terrane. Some of these extend well beyond the map-area and probably represent regional faults. Those striking northeast along Echo River, Garden River, and Dam Lake are faults of left-hand lateral displacement. At least part of Thessalon River valley is probably also occupied by a fault. Strong shearing along Paquette Lake indicates faulting along that lineament. Strike faults have disturbed the normal stratigraphic succession of Huronian rocks along Pearl Creek and McMahon Lake.

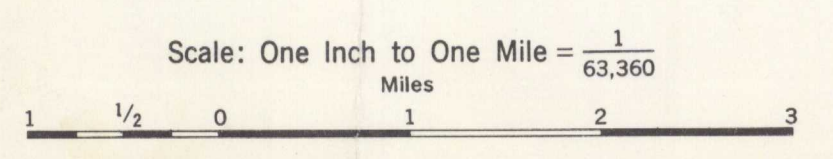
Economic Geology

The district has long been known for its copper occurrences, and in this area chalcopryite-bearing quartz veins are numerous, commonly closely associated with the basic intrusive rocks. Bornite also occurs in some of these. The veins are below commercial size or grade, although more prominent occurrences have undergone preliminary development work, notably those about a mile north of the northwest corner of Echo Lake and two miles northeast of Patten Lake. Local concentrations of specularite in and near quartz veins and also in scattered beds of the Lorrain formation have attracted attention, but none appeared to be commercially promising. Radioactive quartz-pebble beds which have been previously investigated, have been reported as follows: along Wood Creek about 2 1/2 miles below Shelden Lake; about 1/2 mile northeast of the east end of Cooper Lake; and immediately south of the map-area about 1/2 mile west of the road to Patten Lake.

¹Abraham, E. M.: The North Shore of Lake Huron from Gladstone to Spragge Townships; Roy. Soc. Can., Spec. Pub. No. 2, 1957

²Collins, W. H.: North Shore of Lake Huron; Geol. Surv., Canada, Mem. 143, 1925.

MAP 23-1959
GEOLOGY
ECHO LAKE
DISTRICT OF ALGOMA
ONTARIO



5-17
A. Geol. Echo Lake, Ont.
23-1959

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