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DEPARTMENT OF MINES AND TECHNICAL SURVEYS

R. E. Garrett

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SNARE RIVER AND INGRAY LAKE MAP-AREAS NORTHWEST TERRITORIES

C. S. Lord

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By
C. S. Lord

DEPARTMENT OF
MINES AND TECHNICAL SURVEYS
CANADA

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Snare River and Ingray Lake Map-areas, Northwest Territories

CHAPTER I

INTRODUCTION

GENERAL STATEMENT

Snare River and Ingray Lake map-areas lie north of the North Arm of Great Slave Lake, Northwest Territories, and include about 8,400 square miles. Snare River map-area lies between latitudes 63 and 64 degrees, longitudes 115 and 117 degrees, and was mapped by the writer in 1938 and 1939. Ingray Lake map-area lies between latitudes 64 and 65 degrees and longitudes 115 and 117 degrees; the south half was mapped by J. T. Wilson in 1939 and the north half by the writer in 1940. The following men provided efficient assistance in the field: R. W. Ashley, J. C. Scott, F. G. Smith, M. S. Stanton, and J. Woolfenden in 1938; J. D. Allan, J. M. Browning, G. C. Camsell, A. F. Killin, K. W. B. Moodie, C. I. Robertson, and F. G. Smith in 1939; and J. D. Allan, J. J. McLaughlin, C. R. D. Miller, M. S. Stanton, and W. W. Stewart in 1940. F. G. Smith was in charge of mapping of the northeast quarter of Snare River area in 1939, and in 1940 J. D. Allan mapped that part of Ingray Lake area lying north of latitude 64 degrees 45 minutes and east of longitude 115 degrees 30 minutes.

Prospectors and geologists employed in the areas rendered much valuable assistance. Special thanks are due Messrs. A. W. Johnston and W. L. Brown, geologists for Territories Exploration Company, Limited, who provided geological maps of a large area in the southeast part of Ingray Lake area and the northeast part of Snare River area, and who co-operated in many other ways.

No previous geological mapping had been done by the Geological Survey in Ingray Lake area, but Kidd[1] mapped the southwest part of Snare River area in 1934 and Jolliffe[2] made a reconnaissance survey of most of Snare River area in 1935.

ACCESS

The areas can be reached by aeroplane from Yellowknife on the north shore of Great Slave Lake, or by canoe from Rae on Marian Lake, an arm of Great Slave Lake. Rae, about 10 miles south of the south boundary

[1] Kidd, D. F.: Geol. Surv., Canada, Mem. 187 (1936).
[2] Jolliffe, F.: Geol. Surv., Canada, Prel. Rept. 36-5, 1936.

of Snare River area, is a Hudson's Bay Company post with a well-stocked general store, a hospital, and frequent air mail service. Yellowknife, the nearest settlement where prospecting parties can be adequately outfitted and supplied, is about 90 miles southeast of the centre of Snare River area and about 150 miles south-southeast of the centre of Ingray Lake area. Two transportation companies base aeroplanes at Yellowknife for charter. The settlement includes several general stores, a Government wireless station, Mining Recorder's office, hotel, post office, bank, hospital, and many other facilities. Yellowknife and Rae may be reached by aeroplane from Edmonton, Alberta, or by boat from railhead at Waterways, Alberta. In normal seasons boats and aircraft on floats can operate between Yellowknife or Rae, and Waterways and Edmonton, from about June 7 to about October 7, and aircraft on skis from about December 1 until April 15. Aircraft on floats can operate between Yellowknife and the northern part of Ingray Lake area from about June 15 to about October 1.

HISTORY OF PROSPECTING

Very little prospecting had been done in the area before 1938. In the spring of that year a few small gold deposits were found in the southern part of Snare River area near Mosher, Russell, and Slemon Lakes and Snare River, but most of the prospectors, attracted by reports of spectacular gold discoveries east of Yellowknife, left Snare River area shortly after break-up. The first gold discoveries in Ingray Lake area were made by prospectors of Territories Exploration Company, Limited, in the summer and autumn of 1938. These discoveries became generally known in Yellowknife by October and resulted in a rush to stake claims near Indin Lake during the winter of 1938-39. Some of these claims were prospected during the early summer of 1939. Only a little prospecting was done in Snare River and Ingray Lake areas during the late summer of 1939 and during 1940. Most prospectors have searched for gold deposits. No mineral deposits have been developed beyond the prospect stage (1940).

DRAINAGE

The watershed between Great Slave and Great Bear Lakes trends north-northeast across the northwest corner of Snare River area and across the centre of Ingray Lake area.

Marian, La Martre, Emile, Snare, Bousso, and Wecho Rivers flow into Marian, Slemon, and Russell Lakes and thence into Great Slave Lake. Marian River flows southwesterly from Saddle Lake to Mazenod Lake and thence southeasterly to the head of Marian Lake. It is interrupted by numerous rapids and falls between Saddle and Hislop Lakes. La Martre River flows northeasterly to enter Marian River about 19 miles from Marian Lake and has no falls or rapids below a point about 3 miles below La Martre Falls. Emile River flows south-southwest from the northeast corner of Ingray Lake area through a series of elongated lakes, to enter Marian River about 22 miles from Marian Lake. It is interrupted by a few rapids and falls from its mouth to a lake 12 miles south of the north boundary of Ingray Lake area, and rapids are numerous beyond that lake. Snare River drains Indin Lake, flows south-southwest through Kwejinne and Bigspruce Lakes, and turns near its mouth to flow about southeast through Slemon Lake into Russell Lake. There are numerous rapids and falls in a 5-mile section of Snare River about midway between Bigspruce and Slemon Lakes, but only a few in other parts of the river. Bousso River is a comparatively small, shallow stream with numerous rapids and flows southwesterly from the east border of Snare River area to the north end of Russell Lake. Wecho River flows about west-southwest from the east border of the area through Inglis and Mosher Lakes, to Lajeunesse Bay of Russell Lake; rapids and falls are particularly numerous below Mosher Lake.

The waters of Wopmay and Meuse Rivers reach Great Bear Lake by way of Hardisty Lake and Camsell River. Wopmay River crosses the northwest corner of Ingray Lake area, flowing south through Grant and Little Crapeau Lakes and then west towards Hardisty Lake. Rapids and falls are particularly numerous immediately above and below Grant and Little Crapeau Lakes. Meuse River flows southwesterly from the north boundary of the area into the east end of Little Crapeau Lake with several long stretches of rapids about midway along its course.

There are probably many sites suitable for development of hydro-electric power on Snare, Emile, and Wopmay Rivers. The flow of these rivers probably compares favourably with that of Yellowknife River, waterfalls occur in many places, and the large lakes provide considerable storage basins.

CANOE ROUTES

There are several good canoe routes in the area and in normal seasons boats with a draught of about 2 feet can reach the heads of Marian, Slemon, and Russell Lakes from Rae and from Great Slave Lake. Marian and Emile Rivers provide an excellent canoe route (thirteen portages below Basler Lake and twelve portages above Basler Lake) from Marian Lake to a lake about 12 miles south of the north boundary of Ingray Lake area, but Emile River is not readily navigable beyond that lake. Many portages can be avoided by portaging from the northwest corner of Norris Lake to the south end of a large lake 2 miles north of Norris Lake. Fast water on Emile River about 3 miles west of the south end of Arseno Lake connects two large lakes, and two well-cut portages south of the river connect these lakes and provide the best canoe route. Marian River provides a good canoe route (eighteen portages) from Marian Lake to Hislop Lake, but there are numerous poorly defined portages between Hislop and Saddle Lakes and this part of the route is not recommended for large canoes. La Martre River is a deep, uniformly fast stream from its mouth to near La Martre Falls where a portage several miles long is reported to pass around the south side of a series of falls and rapids to reach a stretch of navigable water above La Martre Falls. Snare River is a good canoe route from Russell Lake to Indin Lake. A stretch of fast water between Bigspruce and Slemon Lakes is unnavigable, and to avoid this thirteen good portages, aggregating 301 chains, have been cut east from the northeast side of Slemon Lake and thence north, connecting a line of lakes to Bigspruce Lake on Snare River. Bousso River is a fair route for light canoes. Wecho River is a good route, with thirteen well-cut portages between Russell and Inglis Lakes. Wopmay River provides a fair route (sixteen portages) to the north end of Grant Lake, but is impracticable north of Grant Lake. Portages are in good condition and follow the river except for a 3-mile stretch of fast water south of Grant Lake where four portages connect a line of lakes lying about 1 mile west of the river. One short portage is sometimes necessary in the lower 10 miles of Meuse River, but eleven portages, totalling 181 chains, are necessary in the next 20 miles.

TOPOGRAPHY

The map-areas are underlain by Precambrian rocks except for a small area underlain by Palæozoic rocks in the southwest corner of Snare River area. The Palæozoic and Precambrian areas present contrasting types of topography. The eastern border of the Palæozoic area is marked by a low scarp that faces east and in most places rises from a swamp and drift-covered part of the Precambrian area. A nearly flat bench extends west from this first scarp to a second, higher and much more conspicuous scarp, from which a nearly flat land surface rises very gently westward to and beyond the west border of Snare River area. The eastern scarp rises only a few feet above the Precambrian area, whereas in places the second scarp rises rather abruptly 100 feet or more above the first. In many places a line of lakes marks the base of the second scarp, but in general there are fewer lakes within the Palæozoic than within the Precambrian area. A few hills of Precambrian rock project through the Palæozoic cover and some of them rise several hundred feet above the otherwise nearly flat surface. The Palæozoic surface is everywhere well timbered and rock outcrops are in general scarce.

The surface of the Precambrian area ranges in elevation from 495 feet at the south edge of Snare River area to about 1,350 feet near the northeast corner of Ingray Lake area. It is rugged in detail. In southern Snare River area bare, rocky ridges commonly rise abruptly from 50 to 100 feet above the innumerable, intervening muskegs and lakes, but in Ingray Lake area they commonly rise 150 feet or more. A few ranges of hills rise more than 400 feet above adjacent lakes, and those near Kwejinne Lake rise about 700 feet. In general, areas of prominent hills are underlain by sedimentary rocks, volcanic rocks, porphyries, basic dykes, or large quartz veins. Where hilly areas are underlain by sedimentary and volcanic rocks, as near Wijinnedi, Ranji, and Indin Lakes, the volcanic rocks commonly rise above the sedimentary rocks as abrupt, flat-topped ridges. Areas underlain by Late Precambrian and sedimentary rocks, such as that extending through Basler, Mattberry, Norris, and Arseno Lakes and thence north-northeast, contain many long, narrow ridges parallel to the trend of the underlying rocks, in this case north-northeast. A similar area, wherein the ridges trend north to northwest, lies near Rebesca Lake, Wopmay River, and Little Crapeau and Grant Lakes. A range of hills underlain mainly by porphyries extends northwesterly from a point 9 miles east of the north end of Rabbit Lake to the east end of Mazenod Lake and thence northerly for 19 miles. Other porphyry hills occur 8 miles south of Tumi Lake. A hilly area underlain by Early Precambrian sedimentary rocks extends from the north end of Slemon Lake to a point about 10 miles north-northwest. A few isolated ridges underlain by large quartz veins occur in Snare River area west of a line connecting Marian and Saddle Lakes, and some of these probably exceed 400 feet in height. Most of these ridges are less than 1 mile long. One ridge extends, with short breaks, for 25 miles from a point 9 miles east of the north end of Rabbit Lake southwesterly to near the west border of Snare River area.

Long, nearly straight, drift- and water-filled depressions are common throughout the areas, but are most prominent where the underlying rock is granite. They trend in many directions and in places are bounded by abrupt walls several hundred feet high. Some of them are underlain by faults.

The longest valleys trend about north and branch in places to form several closely spaced parallel valleys. The most conspicuous straight valley extends 170 miles from the mouth of Stagg River, 12 miles southeast of Rae, through Russell, Bigspruce, Kwejinne, Basler, Mattberry, and Arseno Lakes to a point about 7 miles west of the northeast corner of Ingray Lake area. East of Arseno Lake the east side of the valley rises about 350 feet above the lake. Another valley extends 18 miles northeast from the southwest end of Hislop Lake, and thence north through Wopmay River and Grant Lake, and beyond along Wopmay River. This valley is 115 miles long within Snare River and Ingray Lake areas.

Most of the large lakes are underlain wholly or in part by Precambrian sedimentary or volcanic rocks, or both, and long stretches of shoreline are roughly parallel to the trend of the underlying rocks. Nearly straight shores are particularly characteristic of Basler, Mattberry, Norris, Arseno, Little Crapeau, and Grant Lakes and other lakes underlain by Late Precambrian sediments. Ghost and Zinto Lakes, and a lake between Rebesca and Ingray Lakes, are large lakes underlain by granitic rocks. Nearly all large areas of small, highly irregular, and very closely spaced lakes are underlain by massive, granitic rocks. Lakes underlain by Palæozoic rocks are, for the most part, widely spaced and have comparatively well-rounded outlines.

Rock is obscured by drift throughout most of the Palæozoic area, but exposures are abundant in many parts of the Precambrian area. Most outcrops in the Palæozoic area occur along the easterly facing scarps or around the edges of Precambrian hills projecting through the Palæozoic cover. Within the Precambrian area, granitic rocks and porphyries are very well exposed. Exposures of sedimentary and volcanic rocks are abundant in Snare River area, although less so than in Yellowknife and Beaulieu River areas. In Ingray Lake area they become progressively less abundant towards the north, where they are relatively scarce. Outcrops of any kind are very scarce in the part of Ingray Lake area lying north of latitude 64° 30′ and east of longitude 115° 30′.

TIMBER

The Palæozoic area is well timbered with white and black spruce and there is some aspen, balsam poplar, white birch, jack pine, and tamarack. Butts of white spruce trees range up to 2 feet in diameter.

Most of the Precambrian area is fairly well timbered, especially areas underlain by sedimentary and volcanic rocks. Black spruce and white birch are the most plentiful and most widely distributed trees. A little white spruce occurs throughout the area. Aspen, jack pine, and tamarack are fairly common in the southern part of Snare River area, but are very rare in the northern part of Ingray Lake area. Barren grounds lie north of latitude 64° 30′ and east of longitude 115° 30′ and support only a few isolated stands of stunted black spruce.

WILD LIFE

Fish and caribou are the only game that occur in sufficient quantities to form reliable sources of food. Fish are plentiful in many of the lakes and rivers, the common varieties being lake trout, pike (jackfish), and whitefish. Other varieties noted are northern sucker, yellow pickerel (dore), grayling, and ling (burbot). Caribou were abundant in the barren grounds near Mesa Lake during the latter part of August 1940, and were probably abundant in that vicinity during the remainder of the summer. They are reported to be common in the areas during the winter, but none was seen during the field seasons in Snare River area or in timber in the north half of Ingray Lake area. A few moose, black bear, spruce grouse, ptarmigan, and waterfowl were seen. Ingray Lake area, and Snare River area, except that part west of Marian Lake and Marian River and south of La Martre River, lie within the Yellowknife Preserve wherein white men are forbidden to hunt or trap unless in dire need of game for food.

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CHAPTER II

GENERAL GEOLOGY

SUMMARY STATEMENT

The map-areas are underlain by Precambrian rocks except the south-west corner of Snare River area, which is underlain by Palæozoic rocks. The oldest rocks belong to the Yellowknife group of Archæan age. The oldest members of this group comprise mainly andesite, dacite, basalt, and altered equivalents. These rocks are commonly overlain by rhyolitic and fragmental rocks, which in turn are overlain by the youngest rocks of the group, including greywacke, slate, phyllite, and altered equivalents. So far as known the rocks of the Yellowknife group compose a conformable series. They have been folded, are cut by Archæan granitic rocks, and over wide areas have been altered to schists. They also form parts of areas of mixed granitic, schistose, and gneissic rocks.

Rocks of the Snare group, of Proterozoic age, were laid down on an eroded surface of Yellowknife rocks and Archæan granite. The basal rocks of this group include coarse, white, crossbedded quarzite, arkose, and a little conglomerate, but the most abundant rocks are thin-bedded, black slate, shale, and argillite. These rocks are cut by dykes and sills that were probably feeders of overlying andesite and dacite lavas. Snare and older rocks were folded and are cut by Proterozoic granitic rocks and porphyries. In places the Snare sedimentary rocks were altered to schists; elsewhere they became parts of areas of mixed granitic, schistose, and gneissic rocks, or were altered to thin-banded, cherty, grey, green, and red rocks. Dykes of strikingly fresh diabase and gabbro are probably the youngest Precambrian rocks.

In Ordovician time fossiliferous, dolomitic rocks were laid down on an irregular surface of the deeply eroded Precambrian rocks in the south-west part of Snare River area and, probably, to the east. So far as known no folding, faulting, or igneous activity has disturbed the Ordovician rocks, which are nearly flat-lying in most places. Erosion has completely removed any younger, consolidated, sedimentary rocks that may have been present, and has removed part of the Ordovician mantle and thus re-exposed the underlying surface of resistant Precambrian rocks. It is probable that this rock surface has remained in about its original form, though modified slightly by glacial scouring and now partly hidden by unconsolidated Pleistocene and Recent deposits.

Table of Formations

Cenozoic
- Pleistocene and Recent: morainal material, sand, gravel, clay, silt

Palæozoic
- Ordovician: dolomite, sandstone, conglomerate, arkose

Proterozoic (Late Precambrian)
- Diabase and gabbro
- Feldspar porphyry, feldspar-quartz porphyry
- Granite, granodiorite, and allied rocks
- Snare group:
  - Andesite, dacite, tuff, breccia
  - Meta-diabase, meta-gabbro, meta-diorite
  - Slate, shale, argillite, phyllite, cherty argillite, chert, tuff, agglomerate, greywacke, quartzite, dolomite, limestone, arkose, conglomerate, knotted quartz-mica schist, sedimentary gneiss

Archæan (Early Precambrian)
- Granite, granodiorite, and allied rocks
- Yellowknife group:
  - Division 4: knotted quartz-mica schist and sedimentary gneiss
  - Division 3: greywacke, slate, arkose, quartzite, phyllite
  - Division 2: rhyolite, tuff, agglomerate, breccia
  - Division 1: andesite, dacite, basalt, rhyolite, tuff, agglomerate, breccia, amphibole, and chlorite schist

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Precambrian
- Syenite, nepheline syenite, nepheline-sodalite syenite, and related rocks
- Mixed assemblage of granitic and metamorphic rocks

YELLOWKNIFE GROUP

GENERAL STATEMENT

The Yellowknife group of sedimentary and volcanic rocks includes the oldest known rocks in the map-areas. Because of their complex structure, the total exposed thickness of these rocks is not known. They lie mainly within an unbroken belt extending southerly from the northeast corner of Ingray Lake area through Mesa, Indin, and Ranji Lakes to Wijinnedi Lake; thence southwesterly through Basler and Kwejinne Lakes to Emile River; and thence southeasterly to Slemon and Russell Lakes. From Russell Lake branches of the belt extend northeasterly up Bousso and Wecho Rivers to near the east boundary of Snare River area. The belt of Yellowknife rocks is widest near Indin Lake in the southeast part of Ingray Lake area, and near Slemon, Russell, and Mosher Lakes in the southern part of Snare River area. It is bordered on the east by granitic rocks and on the west by granitic rocks and rocks of the Snare group. Yellowknife rocks underlie about 18 per cent of the map-areas and about 75 per cent are sedimentary rocks and 25 per cent volcanic rocks. In Ingray Lake area these rocks have not been recognized west of a line extending from Mattberry Lake to Arseno Lake and thence to a point about 7 miles west of the northeast corner of the area. In Snare River area they have not been recognized west of a line extending from Shoti Lake north to the south end of Saddle Lake and thence northeast to Mattberry Lake.

DIVISION 1: ANDESITE, DACITE, BASALT, RHYOLITE, TUFF, AGGLOMERATE, BRECCIA, AMPHIBOLE, AND CHLORITE SCHIST

Andesitic lavas (greenstones), with some dacite and basalt, are the oldest known rocks of the Yellowknife group. They include, especially in their upper part, a little interbanded rhyolite, tuff, agglomerate, and breccia, and near Indin Lake are overlain by large bodies of such rocks (Division 2), but elsewhere they are overlain by greywackes and associated sediments (Divisions 3 and 4). The andesites and associated lavas form bands that range up to 6 miles wide, but their stratigraphic thickness is not known. A few bands of andesitic lavas are probably interlayed with the overlying greywackes. The lavas are dense to medium-grained rocks, ranging from massive to schistose and from light green to black. Weathered surfaces are green or brown. They have been completely recrystallized; the massive varieties consist chiefly of amphibole, plagioclase feldspar, zoisite, epidote, and carbonate. The schistose lavas have much the same composition, but some contain chlorite instead of amphibole. In a very few places the massive lavas exhibit amygdules, or phenocrysts of feldspar.

Well-formed pillows are common in the unsheared lavas. They range in length from less than 1 foot to about 5 feet. A central core of normal, dark green lava commonly grades outwards to a narrow rim of finer grained, lighter coloured rock that changes abruptly to a peripheral rim, about ½ inch wide, of dark green, brown-weathering rock. Amygdules of carbonate, quartz, and other minerals occur in the fine-grained, light-coloured, inner rims of some of the pillows, and in places are most abundant in these rims near the tops of individual pillows. In many places pillowed lavas have been so strongly sheared that the outlines of individual pillows have been obliterated except for a slight banding of the rock due to original differences in colour and texture of the central and peripheral parts of the pillows.

Some sheared lavas contain abundant iron-bearing carbonate and weather rusty for as much as ½ inch below the surface. Elsewhere bands of sheared lava have a deeply pocketed surface, due to the weathering of irregular areas high in carbonate. In still other places the sheared rocks contain interlacing stringers or rhombs of carbonate partly altered to iron oxide. Other sheared lavas do not contain appreciable amounts of carbonate and are platy, finely banded, dark and light green amphibole schists, indistinguishable from sheared and recrystallized andesitic tuffs.

Most contacts between lavas and granitic rocks are sharp, and differ in this respect from the contacts between sediments of the Yellowknife group and granitic rocks. In most places where the contact is not sharp, the zone of mixed granitic rocks and lavas is less than ½ mile wide and the adjacent granitic rock is not noticeably contaminated. Some massive lavas near the granite have been recrystallized to a medium-grained rock of dioritic texture composed of about equal parts of black amphibole and greenish white plagioclase feldspar. Most sheared lavas near the granite have been altered from chlorite to amphibole schists.

A band of lava lies in the basin of Mosher Lake and extends from the granitic rock north of this lake to the south boundary of the area, a distance of 10 miles, and for an unknown distance farther south. This band may be interlayered with the adjacent sediments. Its maximum width is a little over ½ mile. It may be offset beneath Mosher Lake by a northwest-trending fault. The rock is dark to light green, fine-grained, pillowed andesite, but in many places, especially near the borders, the pillows have been stretched, and the lava is a banded grey and green schistose rock; this material may contain some sheared, andesitic tuff. The contact between the lavas and the sediments bordering them on the east was seen near the south end of Mosher Lake where the sediments lie parallel to the contact, which dips 80 degrees west. The greenstone is schistose and is separated from the sediments by a few inches of dark grey to black, rusty-weathering schist. At the north end the band of lava extends into the granitic rock for a mile beyond the bordering sediments, and although the granitic rock has intruded the lava the pillows are well preserved and the contact between the lava and granitic rock is sharp. The lavas both where they project into the granitic rock and farther south where they are bordered by sediments, are cut by a few pegmatitic and some granitic dykes, all of which have well-defined walls.

Two parallel belts of lava lie south of Slemon Lake and trend about northeast, parallel to the strike of bordering sediments. They range in width from about 1,000 feet to about 1 mile. To the southwest they end against granitic rocks and to the northeast they end against a fault that trends north to the east end of Slemon Lake. A single band of lava was found east of the fault and extends northeast about 1½ miles to where it ends in sediments. The two bands west of the fault may be outcrops of a single layer of lava outcropping in the opposing flanks of a northeasterly plunging anticline, and possibly the single band east of the fault may mark the axis of the anticline downfaulted and displaced about 4 miles north. In most places the lavas of these bands are dark to light green, dense andesites with perfectly formed pillows, many of which have amygdules and vesicles. Elsewhere the lavas are massive or have traces of pillow structures, and are dark greenish grey rocks of dioritic texture made up of about equal parts of black amphibole and greenish white, plagioclase feldspar; the individual grains range up to ¼ inch. In places this massive, dioritic variety of lava grades within 50 feet into the dense variety with well-formed pillows. A few bands of bedded, dark grey-green, andesitic tuff occur within the lava, and these range up to 10 feet in width; none of these bands is traced more than a few hundred feet. A few dykes and sills of quartz-feldspar porphyry and feldspar porphyry cut the lavas and weather chalky white. Some sill-like bodies are banded, and may be acid flow rocks. A very few chalky white bands are bedded and are probably acid tuffs.

The largest body of lavas in the map-areas lies south of Wijinnedi Lake and east of Snare River, and is 16 miles long with a maximum width of 6 miles. In most places the lavas dip north and strike about parallel to their contact with the bordering sedimentary and granitic rocks. Most of the rocks are andesite or basalt. Rhyolite, tuff, and agglomerate occur as thin bands throughout the body, but are most common in the andesites and basalts near the border with the sediments or lie between the andesites and basalts and the overlying sediments. The basalts are fine-grained, nearly black rocks and commonly contain pillows, many of which are 4 feet long. The andesites are fine-grained, greenish grey rocks interbanded with the basalts. Over wide areas they are massive, but elsewhere contain amygdules and pillows, and many of the latter are 2 feet long. The andesites contain more interlayered tuff and agglomerate than do the basalts, and some of the tuffaceous layers contain thin, limy bands. In many places near the granite and elsewhere the lavas have been altered to schists containing amphibole, chlorite, sericite, and garnets, or to massive rocks of dioritic texture. At one place on the south shore of Wijinnedi Lake rhyolite was observed in contact with greywacke of the overlying sediments. The rocks are sheared and rusty and contain disseminated pyrite and lenses of sugary quartz. The contact dips about 70 degrees south. Near the west end of Wijinnedi Lake, rhyolitic lavas are overlain by tuffs and agglomerates that grade upward into limestone and clastic sediments of the Yellowknife group without apparent unconformity.

A body of andesitic rocks, about 4 miles wide, commences southeast of Arseno Lake and extends northeasterly. East of the north end of Arseno Lake the body narrows abruptly to ½ mile or less and extends north-northeast with about the same width to the west end of Mesa Lake and beyond to a point about 7 miles west of the northeast corner of Ingray Lake area. South of Mesa Lake the east side of the band of these rocks is relatively sharply defined against granitic rocks that cut the lavas. North of Mesa Lake they are bordered on the east by sedimentary rocks of the Yellowknife group. They are overlain on the west by sedimentary rocks of the Snare group. Southeast of Arseno Lake where the body is widest, the rocks are mainly dense, fresh, dark green, blocky, andesitic lavas that contain abundant well-formed pillows. In places the lavas are massive, and fine-grained andesite is mixed with medium-grained andesite of dioritic texture. No evidence of the attitude of individual flows was noted near the middle of the body, but they may have comparatively gentle dips here, which would account for the great width of the band in this vicinity. Near the granite contact to the east the andesites are commonly schistose and platy and the foliation strikes parallel to the contact, and dips away from it. East of Arseno Lake, where the body is narrower, the andesites are commonly schistose and pillows are less common; the foliation trends about north and is commonly nearly vertical. Northeast of Arseno Lake, and thence to the north boundary of the map-area, the lavas are dominantly schistose and pillows occur only in a few places. The foliation strikes parallel to the strike of the band and everywhere dips steeply. The most common rocks are fine-grained, finely banded, dark green and black amphibole schists. Some of this rock has retained distorted outlines of pillows and is sheared and recrystallized andesitic or basaltic lava; in most places, however, its original character was not determined and it is sheared andesitic and basaltic lavas or tuffs, or both.

Greenish lavas are abundant near Indin Lake and north to latitude 64° 30′. They occur in several broad belts that trend about north-northeast parallel to the bordering sediments and are offset in many places by transverse faults. Areas underlain by lava commonly rise abruptly 200 feet above the adjacent sediments. In several places the tops of beds of the nearby sediments were found to face away from the lavas, indicating that the bands of lava may lie along the axial parts of complex anticlinal structures. The most common rocks are fine-grained, dark to light green, massive, andesitic lavas with pillows and amygdules in places, and fine- to medium-grained, dark green to black, amphibole and chlorite schists. Bands of dark green to light grey, banded, sheared and rusty, tuffaceous rocks occur throughout the lava areas, but are most common near their borders. In a few places the andesitic lavas are separated from the nearby sedimentary rocks by a narrow zone of interlayered lava and tuff, succeeded by a narrow zone of interbedded tuff and sediment. In a few other places the andesitic lavas give place to overlying, interbanded lavas and tuffs, and these rocks to overlying acid tuffs and rhyolite that occupy considerable sections and constitute Division 2, described below.

DIVISION 2: RHYOLITE, TUFF, AGGLOMERATE, AND BRECCIA

A little rhyolite, tuff, agglomerate, and breccia is, as already stated, interbedded with the basic lavas of Division 1 or occurs in narrow belts overlying these lavas. Near Indin Lake, rhyolite, tuff, agglomerate, and breccia (Division 2) form bands of considerable widths, separating the underlying lavas of Division 1 from the overlying sediments of Divisions 3 and 4. The bands range from less than ¼ mile to 2½ miles wide. In many places the various types of rocks in Division 2 were seen to grade into one another, and in fewer places were seen to grade into the underlying lavas or into the overlying sediments. Much light grey or green, rusty weathering, schistose and banded rock within the group is so highly sheared and contains so much carbonate that its original composition and origin are unknown.

Tuffs are probably the most abundant rocks. They are fine-grained, very thinly banded, grey-green and light grey rocks that weather grey, white, or buff. In many places they are highly sheared and are flaky or splintery, light grey, rusty weathering, carbonate-sericite schists. In a few places the carbonate occurs as ⅛-inch rhombs, but in most places it is finely disseminated. Most of the carbonate within an inch or so of the surface has weathered to chocolate-brown iron oxide. Possibly most of the tuffs were originally acid andesites and dacites but their original composition has been obscured by the shearing and the formation of abundant carbonate. In a few places tuffs are not sheared much and show distinct bedding and crystal fragments on the weathered surface. Many of the sheared and probably tuffaceous rocks are finely banded, but in most places it is not known whether this banding is due to shearing or to bedding.

Massive, porphyritic, streaked, and brecciated rhyolitic lavas are conspicuous, although probably less abundant rocks than the tuffs. Colours range from bright green, yellow, pink, red, and buff, through ashy white, light grey, and green, to black. Except for phenocrysts in the porphyritic lavas, all are very fine-grained, and some are hard and cherty and break with a splintery or conchoidal fracture. Most porphyritic rhyolites are pink, light grey, light green, or black and contain rounded, clear quartz phenocrysts up to $\frac{1}{8}$ inch in diameter; a very few contain feldspar phenocrysts. Some dense, pink rhyolites show flow lines and on the weathered surfaces are irregularly streaked and banded in shades of pale pink and ashy grey. Much rhyolite is composed of closely packed, subangular, elongated, pale pink fragments in a pink or red, cherty groundmass with a few quartz grains, and is probably a flow breccia. Other rhyolite breccia weathers light green and yellow and contains elongated fragments of dense, light grey rock. These fragments have rounded cross-sections and some of them are 2 feet across, but most of them are smaller; a few are streaked. Under the microscope most of the rhyolites are porphyritic and in some the phenocrysts constitute nearly half the rock. Feldspar phenocrysts are most abundant, but are commonly crushed and ragged and almost completely altered to carbonate; many feldspar phenocrysts are plagioclase and others, although untwinned, are probably acid plagioclase. Quartz phenocrysts are commonly rounded, but some are fractured and cemented with carbonate. The groundmass is commonly very fine-grained and made up of interlocking, nearly equidimensional, clear quartz grains, feldspar laths, and a little shredded white mica, carbonate, and chlorite. Feldspar laths in the groundmass are commonly nearly parallel to each other, probably due to flowage during the consolidation of the lava.

Much of the agglomerate is sheared and contains elliptical fragments of white, light green, or buff-weathering rock in a matrix that weathers dark green. Some agglomerate is strongly sheared and is a fissile, silvery, carbonate-sericite schist with a deeply pitted surface and greatly elongated fragments. Fragments are more plentiful in some bands than in others, and where most abundant constitute more than half the total volume of the rock. They are very fine-grained, and light green or grey on a fresh surface. On the weathered surface a very few show $\frac{1}{8}$-inch cavities filled with a white mineral and these may be amygdules; a few others contain phenocrysts of quartz or feldspar, or both. The matrix is probably tuffaceous; on a fresh surface it is commonly a dark green, schistose rock and on the weathered surface it shows many tiny grains of feldspar and a few of quartz. Irregular bands or lenses within the agglomerate are made up almost wholly of this tuffaceous rock and grade along and across the strike into agglomerate with abundant fragments.

Flow breccias of Division 2 include those with a matrix of light green, acid, vesicular lava grading into angular fragments of lighter green or grey lava. Some of these breccias grade into agglomerate with rounded fragments and a tuffaceous groundmass, which in turn grades into overlying slate. Other flow breccias have a dark green, andesitic matrix with poorly defined, lighter green patches or fragments and grade into underlying, massive andesites.

DIVISION 3: GREYWACKE, SLATE, ARKOSE, QUARTZITE, PHYLLITE

The upper part of the Yellowknife group consists of sediments that, where they are comparatively unaltered, compose Division 3. These rocks are greywacke, slate, arkose, quartzite, and phyllite. They occur mainly near the middle of wide belts of Yellowknife rocks. In Snare River area they underlie areas near Mosher, Russell, and Slemon Lakes, but are accompanied by some schist and gneiss (Division 4). They also occur on the north and west sides of Wijinnedi Lake and extend northerly into Ingray Lake map-area, where they occupy the central part of a broad belt of Yellowknife rocks and extend northerly through the central part of Indin Lake and grade into more highly altered sediments (Division 4) near the east boundary of the area at latitude 64° 30′.

The rocks of Division 3 are mainly greywackes and form a monotonous succession of grey to black, very well-bedded sediments that weather dark grey, greenish grey, or buff. On weathered surfaces the greywackes are sandy textured rocks with subangular and rounded grains of clear quartz and milky feldspar in a fine-grained, dark grey matrix. In the coarsest beds individual grains are as large as ⅛ inch. Grains are commonly well sorted and grade from coarse at the bottom of a bed to fine at the top. The tops of many beds are so fine that the rock is there a shale or slate. The greywackes are mainly quartz and biotite, with some plagioclase feldspar, white mica, and chlorite. Most of the quartz and feldspar grains are the original grains of the sediment, but the micas and chlorite are formed by the alteration of the fine sedimentary material between grains. A few beds contain more feldspar and less quartz than the greywackes and are impure arkoses; others contain mainly quartz and mica and are impure quartzites. The arkoses and quartzites are of a lighter colour than the greywackes. The slates are dense, black rocks and in many places well-developed cleavage crosses the bedding. In many places all the above-mentioned rocks are interbedded, but in most places either greywackes or slates predominate. The greywacke, arkose, and quartzite beds commonly range in thickness from a few inches to several feet, but a few beds are 12 feet or more thick. The thickest beds are commonly the coarsest. Cross-bedding is rare. Slate beds range in thickness up to a few inches. The most conspicuous feature of these greywackes and associated rocks is the remarkable persistence of individual beds. None has been observed to decrease in thickness and end, and in many places individual beds have been traced several hundred feet and in so far as known they extend many hundreds of feet without noticeable change in thickness or composition. In most places, however, individual beds are not distinctive enough to be traced through even small areas of overburden or water. A very few thin beds of quartz-magnetite iron formation are interbedded with the rocks.

In many places the sediments near the underlying volcanic rocks contain a few beds of thin-bedded, dark green, andesitic tuffs. About 6 miles southwest of the west end of Wijinnedi Lake the lowest sediments consist of about 90 feet of fine- to medium-grained, grey to white, crystalline, siliceous limestone that grades into tuff and agglomerate of the underlying volcanic rocks (Division 1).

DIVISION 4: KNOTTED QUARTZ-MICA SCHIST AND SEDIMENTARY GNEISS

The greywacke, slate, arkose, quartzite, and phyllite of Division 3 grade into knotted quartz-mica schists, and these in turn grade into gneisses. The schists and gneisses comprise Division 4. Commonly the gneisses lie next to granite, the schists beyond the gneisses, and the greywackes beyond the schists and farthest from the granite. This arrangement indicates that the alteration of the greywackes and associated rocks is a result of the intrusion of the granitic rocks.

Dark grey, knotted, quartz-biotite schists that weather light buff to rusty brown are the most widespread sedimentary rocks of the Yellowknife group. Nearly all Yellowknife sediments in Snare River area north of Slemon Lake are of this type. Near Indin Lake the schists form two, irregular, northerly trending belts that lie on either side of greywackes and associated rocks. These belts join at latitude 64° 30′, and most Yellowknife sediments north of this latitude are knotted schists.

The schists are only a little coarser grained than the rocks from which they were derived. They are well bedded and the size of grains within individual beds commonly grades from coarse at the bottom to fine at the top. They contain quartz, biotite, white mica, and a little plagioclase feldspar, some of which is oligoclase, and their composition differs from that of the greywackes and slates principally in the increased proportion of biotite. Some contain a little tourmaline. The mica flakes are commonly nearly parallel to the bedding. Much of the rock breaks into glistening slabs or flakes that about parallel the bedding. In a few places the mica flakes are oriented at random and the rock does not cleave into plates like the schist but breaks with an irregularly curved fracture and is a hornfels.

Rusty weathering nodules or knots are the most conspicuous features of these altered sediments. The knots commonly project above the weathered surface, but in a few places they have weathered more readily than the adjacent rock and are represented by pits. They range from small, rounded spots in the least altered schists to sharply bounded, rectangular crystals 1 foot long in the more highly altered schists. They are most abundant in slaty beds; many sandy beds within areas of knotted sediments contain no knots or only a very few, whereas adjacent, altered, slaty beds may contain many. Where they occur within beds of graded grain size they are commonly most abundant in the slaty tops of the beds. Some of the small, rounded spots are scarcely visible on fresh surfaces, although prominent on weathered surfaces; they are clusters of mica, quartz, chlorite, and other minerals, and differ only slightly in composition and texture from the enclosing quartz-mica schist. Other knots are probably cordierite with abundant inclusions of quartz and mica. Many of the larger nodules are poorly formed prisms of andalusite; in a few places the prisms are nearly perfectly formed, and the numerous minute inclusions are arranged in the form of a cross, and the mineral is the chiastolite variety of andalusite. Other prismatic nodules are probably staurolite. A few beds contain abundant dark red garnets. Most of the knotted schists contain only the small rounded spots or imperfect prisms less than 1½ inches long.

Knotted schists at some places are in direct contact with granitic rocks, and at most of these places the contact is sharply defined. More commonly, however, the schists are separated from the granite by bodies of coarser grained gneisses into which the schists imperceptibly grade. The gneisses consist of quartz, biotite, plagioclase feldspar, and a little cordierite, andalusite, sillimanite, microcline, tourmaline, garnet, white mica, spinel, and graphite. Bedding is still visible in many places as bands of different grain size, and in some beds original gradation in size of grains is still recognizable. Nodules are rare. Adjoining beds in the gneiss are not sharply separated from one another as they are in the greywackes and schists. Much of the gneiss is contorted and has been thoroughly injected by dykes, sills, veinlets, and highly irregular masses of granite, pegmatite, or quartz. The gneiss grades into granitic rock as the proportion of granitic material to altered sedimentary material increases. In many places the body of gneiss lying between the knotted schists and granitic rock is less than 1 mile wide, but in some places it is several miles wide. Gneiss also occurs as narrow bands within areas of granitic rock.

Extensive areas of gneiss occur in the northern and eastern parts of the areas of sedimentary rocks along and between Bôusso and Wecho Rivers, where some bands of gneiss are 2 miles wide. Much gneiss occurs in a band extending from the west end of Indin Lake to near Basler Lake, at latitude 64 degrees; in places this band is nearly 5 miles wide.

In Snare River area, bodies of gneissic rock containing less than 50 per cent granitic material have been mapped with the sediments; those containing more than 50 per cent granitic material have been mapped with the granitic rocks. In Ingray Lake area bodies of gneiss with less than 25 per cent associated granitic material have been mapped as sediments; those with from 25 to 75 per cent granitic material have been mapped as a mixed assemblage of granitic and metamorphic rocks; and those with more than 75 per cent granitic material have been mapped with the granitic rock.

SNARE GROUP

GENERAL STATEMENT

Before the close of Archæan time the Yellowknife rocks were intruded by granitic rocks, folded, and subjected to a period of erosion long enough to expose the granitic rocks. In Proterozoic time sedimentary and volcanic rocks of the Snare group were laid down on this complex and subsequently were intruded by granitic rocks, porphyries, and diabase.

The Snare rocks comprise: (1) a wide variety of variously altered sedimentary rocks; (2) a few small bodies of altered diabase, gabbro, and diorite that cut these sediments; and (3) a little andesitic and dacite lava. They underlie about 12 per cent of the map-areas and include almost all the Precambrian sedimentary and volcanic rocks in the western third of Snare River area and the northwestern two-thirds of Ingray Lake area.

Snare sedimentary rocks differ widely in appearance from place to place, due in part to variations in the degree and character of their alteration and this makes correlation of isolated areas uncertain. Relatively unaltered sediments, mainly shale, slate, argillite, greywacke, quartzite, and dolomite, outcrop 5 miles north of the west end of Slemon Lake, near Kwejinne and Basler Lakes, and in a belt extending 15 miles southwest from Basler Lake. In most places these sediments are not cut by granitic rocks. In nearly all other areas of Snare rocks, except near the west edge of the map-areas, the shale, slate, argillite, and greywacke have been variously altered by granitic rocks to phyllite, quartz-mica schist, knotted quartz-mica schist, and gneiss. Snare rocks west of a line from the head of Marian Lake through the west ends of Saddle and Grant Lakes have been cut by a variety of granitic rocks and porphyries, and in many places the most conspicuous changes within the shale, slate, argillite, and greywacke are due to the formation of fine-grained quartz, epidote, and feldspar. Rocks altered in this way were formerly included in the Marian group[1], but are now thought to be altered Snare rocks, and the term Marian group is discarded.

The relatively unaltered Snare rocks are lithologically similar to rocks of the Great Slave group in the East Arm of Great Slake Lake, described by Stockwell[2], and to the Nonacho series south of Great Slave Lake, described by Henderson[3]. Altered Snare rocks in the western parts of Snare River and Ingray Lake map-areas are lithologically similar to rocks of the Echo Bay group on Great Bear Lake, described by Kidd[4].

RELATION TO UNDERLYING ROCKS

Snare group sediments were seen resting unconformably on granitic rocks in several places in the northern part of Snare River area. About 5 miles west of the outlet of Basler Lake, nearly horizontal, thick-bedded, white quartzites and arkoses rest on a nearly horizontal surface of fresh, pink, medium-grained, porphyritic granite cut by a few pegmatite dykes holding tourmaline. The contact is well exposed in many places over a distance of several miles. Beds near the contact commonly contain abundant pink feldspar and in places hold numerous, rounded, quartz pebbles and a very few pebbles of granitic rock, some of which contain tourmaline. Most beds more than 10 feet from the contact are nearly pure quartzite. Pegmatite dykes in the granite end at the quartzite and arkose beds. About 7 miles west-northwest of the outlet of Basler Lake white quartzite and pink arkose with a little interbedded greenish and grey shales rest unconformably on granitic rock. The sediments trend north and dip 80 degrees east parallel to the granite contact. Ripple-marks indicate that beds face away from the granite contact. The basal bed is about 1 foot thick and is made up of unsorted, consolidated rubble, including fragments of granite, feldspar, quartz, white mica, and tourmaline. The underlying granitic rock is bleached and rusty for many feet from the contact and contains white mica and tourmaline. About 5 miles north-east of the south tip of Saddle Lake grey shales and feldspathic quartzites outcrop as a band about 100 feet wide on the west shore of a small lake, and granitic rocks lie west of them. The sediments trend about north and dip 80 degrees east. The tops of the beds face east. The sediments near the granitic rocks are coarse-grained, bedded arkose and pebbly arkose. These rest on about 10 feet of rock made up of irregular blocks and boulders of granite, from a few inches to several feet across, in a matrix of quartz, feldspar, and bleached mica. The rock represents a disintegrated, greatly weathered, old granite surface. On the east side of the north arm of Kwejinne Lake medium-grained to pebbly quartzite rests on rusty pink granite with white mica.

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[1] Lord, C. S.: Snare River Area, Northwest Territories; Geol. Surv., Canada, Paper 39-5, 1939.
[2] Stockwell, C. H.: Great Slave Lake-Coppermine River Area, Northwest Territories; Geol. Surv., Canada, Sum. Rept. 1932, pt. C, pp. 55-58.
[3] Henderson, J. F.: Nonacho Lake Area, Northwest Territories; Geol. Surv., Canada, Paper 37-2, 1937, pp. 8-13.
[4] Kidd, D. F.: Great Bear Lake Area, Northwest Territories; Geol. Surv., Canada, Sum. Rept. 1932, pt. C, pp .6, 7.

Snare group sediments were seen resting unconformably on sedimentary rocks of the Yellowknife group in several places in Snare River area and in one place in Ingray Lake area. On the north side of Snare River, 4½ miles upstream from Slemon Lake, red and white, coarse-grained, crossbedded quartzite rests on Yellowknife greywackes and slates. The quartzite beds trend about north, dip 15 degrees east, and range in thickness from 1 foot to 10 feet. Some beds within 20 feet of the base contain quartz pebbles, some of which are ¾ inch in diameter. The Yellowknife rocks trend about north and are nearly vertical.

About 8 miles southwest of the outlet of Basler Lake, comparatively gently folded Snare quartzites rest on an irregular erosion surface that crosses vertical Yellowknife sediments. The contact trends about north and is inclined at all angles up to 90 degrees, but in most places dips steeply west. Yellowknife shales and greywackes east of the contact are much fractured and sheared for as much as 50 feet from the contact. The overlying Snare quartzites in most places at the contact dip steeply west. They are coarse-grained, pink and white rocks. In places the basal beds are made up of ¼-inch, rounded grains of quartz and pink feldspar and contain a few rounded quartz pebbles, some of which are 3 inches in diameter. Beds a few feet from the contact are finer grained and are almost pure quartz.

Snare sediments rest on Yellowknife rocks on the north shore of Basler Lake about 5 miles southeast of its inlet. The Yellowknife rocks are knotted quartz-mica schists that grade into about 20 feet of soft, black, massive rock that was probably a black, sandy clay derived from the weathering of the schist or greywacke. The Snare rocks rest on it unconformably and the surface of the unconformity strikes about north and dips 35 degrees west. The Snare rocks dip 35 degrees west at the contact, but the angle of dip decreases westwards. The basal rock is conglomerate, a few feet thick, with scattered pebbles and cobbles of quartz and black argillite in a matrix of black, sandy argillite and impure quartzite. The cobbles are mainly quartz, and the largest are about 8 inches in diameter. The conglomerate is overlain by about 40 feet of feldspathic quartzite with many bands of quartz pebbles and a few thin beds of black greywacke. The feldspathic rocks grade upward to nearly pure white quartzites.

Snare quartzites rest on knotted, quartz-mica schists of the Yellowknife group on the east shore of Mattberry Lake, 8 miles from its head. The basal quartzite bed is about 6 inches thick and contains quartz pebbles. Pegmatite dykes cut the schists near the contact, but none was seen in the quartzites.

Snare sediments probably rest unconformably on Yellowknife volcanic rocks along a line extending from a point 6 miles southeast of Arseno Lake, northwest to the lake, and thence north-northeast to a point about 7 miles west of the northeast corner of the map-area. Rock outcrops are rare near the contact, and the contact was not seen. On the west side of a small lake 9 miles north-northeast of the north end of Arseno Lake, beds of conglomerate occur at intervals through about 1,500 feet of black, knotted, garnetiferous, quartz biotite schist or impure quartzite. These rocks strike about north, and dip steeply west. They are overlain to the west by dolomite, which at one place was seen in contact with conglomerate. Dark green, chloritic schist, probably altered Yellowknife group lavas, outcrops on a high ridge about 2,000 feet east of an exposure of conglomerate, and no outcrops were found between the schist and conglomerate. Pebbles form about half of the conglomerate beds and lie in a matrix of fine-grained, black, schistose, micaceous quartzite with abundant wine-red garnets, the largest of which are about ¼ inch in diameter. About half the pebbles are quartz and most of the others are medium-grained, equigranular, grey granite with about 35 per cent quartz. The pebbles in cross-section are well rounded and average 1½ inches in diameter, the largest being about 6 inches in diameter, but have been drawn out to form long rods that are nearly vertical or plunge steeply south. In many places they are indistinguishable from the matrix except where seen on suitably weathered surfaces.

No conglomerate was found in Snare rocks north of a place 9 miles north-northeast of the north end of Arseno Lake. Northward from there the base of the Snare group is assumed to follow the west side of a ridge of sheared andesitic rocks that probably belong to the Yellowknife group. The assumed course of the contact lies within the barren grounds, where conglomerate would very easily escape notice because outcrops are widely scattered and commonly blackened or covered with lichens.

A second area of conglomeratic rocks associated with greenish and grey schists lies east of the south end of Arseno Lake and extends 4½ miles southeast, where the schists are nearly surrounded by lavas lithologically similar to those of the Yellowknife group. No sharp break was found between the lavas and conglomeratic rocks. Some of the conglomeratic rocks may be agglomerates, but others are conglomerate and hold granite boulders. The age of the conglomeratic rocks and associated schists is not known, but they are tentatively classed as belonging to the Snare group because: (1) the northwest end of the belt adjoins typical Snare sediments; (2) conglomerate is present and has been found elsewhere near the base of the Snare group, but has not been found in the Yellowknife group; and (3) mixed granitic and gneissic rocks 8 miles south-southeast of Arseno Lake are probably a metamorphosed extension of the schist belt and contain dolomite typical of the Snare group.

The conglomerate at the south end of Arseno Lake is exposed at the shore and inland for about 3,000 feet. It strikes northerly and dips west at angles between 70 degrees and vertical. To the west it grades into a greenish grey schist, forming a narrow band in contact with dolomite of the Snare group. Most of the conglomerates examined appear to be unsorted. The matrix is a fine-grained, light grey to dark green, schistose to massive rock. The pebbles range in size from less than an inch to about 6 inches and average about 1½ inches. They include, in approximate order of abundance, white to greenish weathering, dark grey, very fine-grained, siliceous rocks, medium- to fine-grained, equigranular, grey granite, and white quartz. In places the pebbles are widely scattered, but elsewhere, especially near the east side of the conglomerate band, they make up more than half the rock. In cross-section they commonly are well rounded. In places they have been drawn out to form rods with rounded cross-section.

The conglomerate appears to grade easterly, through grey and green schists, to massive, pillowed, andesitic lavas. In places southeast of Arseno Lake the matrix of the pebble-bearing rock probably approximates andesite in composition and may be tuffaceous; granitic pebbles are present in places, but elsewhere all are dark grey or greenish siliceous rock that weathers grey to white.

North of the conglomerate outcrops on Arseno Lake the rocks become progressively more schistose. Near the north end of Arseno lake and beyond, westerly dipping dolomite is in contact, on its east side, with light to dark green, chloritic schist, some of which may be fragmental, and this grades easterly into dark green, sheared, andesitic lavas of the Yellowknife group. The contact between the Yellowknife lavas and Snare sediments was arbitrarily placed a short distance east of the dolomite, which is known to be of Snare age.

From Arseno Lake southward for 21 miles to Mattberry Lake, dolomite of the Snare group is separated from granitic rocks to the east of it by a deep, continuous valley. The rocks were not found in contact and the granite is not known to cut the dolomite. The topography suggests that the rocks are separated by a fault. If so, the fault probably extends northward along the steep, westerly facing scarp on the east side of Arseno Lake where some rock is highly schistose.

SEDIMENTARY ROCKS

The order in which the sedimentary rocks of the Snare group were laid down is not known in detail and it is believed to have varied somewhat from place to place. In most places where the basal rocks were observed they are coarse-grained, white quartzites, pink arkoses, and pebbly quartzite or conglomerate. At some places these rocks are overlain by dolomite, but elsewhere they contain a little interbanded argillaceous rock and grade upward into a thick series of interbedded argillaceous rocks, greywackes, crossbedded and ripple-marked white quartzites, and dolomite. Over wide areas the argillaceous rocks and greywackes, or their altered equivalents, are the most abundant rocks and have only a very few interbeds of white quartzite, pebbly quartzite, and dolomite.

Comparatively Unaltered Rocks near Slemon, Kwejinne, and Basler Lakes

Comparatively unaltered sediments of the Snare group, with a very little interbedded andesite and dacite, outcrop 5 miles north of the west end of Slemon Lake, near Kwejinne and Basler Lakes, and in a belt extending 15 miles southwest from Basler Lake.

The basal rocks are white to pink, rarely reddish, quartzites, arkoses, and conglomerates. The beds range in thickness from a few inches to 10 feet and many of them are crossbedded and ripple-marked. They are of all degrees of coarseness from fine-grained quartzites and arkoses to conglomerates made up of rounded pebbles 2 inches or more in diameter. The quartzite consists almost entirely of closely packed, rounded, clear quartz grains, whereas the arkosic beds contain, in addition, some pink weathering microline and plagioclase feldspar. Only a small part of the basal Snare rocks are distinctly arkosic, and in most places where the arkosic beds are present they are within a few feet of the base and many of them overlie granitic rock from which they were derived. In most places the conglomerates occur as bands not more than 2 feet thick, and they are probably lenticular. Most of the pebbles are quartz; a very few are pegmatite or granitic rock. Most of the matrix is quartzite or arkose like that of the finer beds, but some of it contains a little chlorite, mica, and water-worn grains of zircon. Quartzites a short distance above the base and those interbedded with greywackes and argillaceous rocks are mostly in beds ranging from a few inches to 2 feet thick, and crossbedding and ripple-marks are very common. Some ripple-marks are 2 feet or more from crest to crest; many are of the symmetrical type produced by wave action. In many places on lake shores differential erosion through wave action has made the crossbedding very conspicuous.

Near the centre of Basler Lake and thence to the north end of the lake, quartzite grades into overlying dolomite through a few feet of interbedded quartzite, dolomite, and dolomitic quartzite. This dolomite is in the south end of a band that extends northerly for 67 miles along the east sides of Mattberry, Norris, and Arseno Lakes to a point 16 miles southwest of the northeast corner of Ingray Lake area. The band ranges from about 25 feet to about 1½ miles wide and no gaps or offsets were found in it. Another band of dolomite, in places more than ½ mile wide, extends 15½ miles south-southwest from a point about 13 miles southwest of the inlet of Basler Lake. The dolomite is commonly a dense to finely crystalline, grey rock that weathers buff to light grey. A little is coarsely crystalline. In a few places the weathered surface shows thin bedding laminations, but in most places no bedding is visible. Much of the dolomite is cut by numerous parallel or linked veinlets of quartz and carbonate that project above weathered surfaces as jagged seams. A little dolomite is a light grey, chalky weathering rock with well-defined crossbedding. It is made up of angular to rounded, closely packed, dolomite grains, and a very few quartz grains, in a dolomite matrix. Most of the fragments are between $\frac{1}{16}$ and ¼ inch long, but a few are 3 inches long.

Thin bands of intraformational conglomerate or breccia were noted in several places between quartzite and dolomite, and in some of these places the dolomite overlies the quartzite. The matrix of the rock is quartzite and dolomitic quartzite. The fragments are mainly dolomite and most of them range in size from 1 inch to 1½ feet, but a few are larger. The smallest fragments are rounded or angular; most of the larger fragments are angular slabs. Conglomerates of this type do not represent an important break in deposition and are probably the result of wave or current action that crumbled dolomite beds laid down on sand. The resultant jumble of fragments and sand was later cemented by dolomite.

A variety of structures, some of which may be algal growths, were found in many parts of the dolomite, and in places appear to be confined to a favourable bed or group of beds. They are best seen on weathered surfaces. Some are closely packed groups of rounded, concentrically banded, dolomite masses that are commonly a few inches in diameter. Others are isolated, rounded masses of lumpy quartz surrounded by concentrically banded dolomite and range up to several feet in diameter. Others are roughly spherical masses set in massive dolomite and range from about 2 inches to 1 foot in diameter; they contain closely packed, rounded to ellipsoidal, quartz-carbonate granules about ⅛ inch in diameter. Still other algal-like structures were found within thin bands of dense, grey, buff-weathering dolomite that occur within extensive areas of crossbedded, coarse-grained quartzites and argillaceous rocks. The dolomite bands are commonly between 1 and 5 feet thick, and some are composed almost exclusively of closely packed, bun-shaped structures. The base of the "bun" in each case is at or near the base of the bed and parallel to it. The structures are concentrically banded about a centre near or at their base. Some of them are 2 feet high, but many are smaller. The upper surface of these beds is commonly lumpy, whereas the lower surface approximates a plane and parallels underlying beds. Algal-like structures, probably similar to some of those described above, have been described by Stockwell[1] and Jolliffe[2] from Great Slave Lake.

Thin-bedded, dark grey to black shales, argillites, slates, phyllites, and greywackes occur as minor interbeds within areas of quartzite or dolomite. Elsewhere they predominate and with them are only minor amounts of interbedded quartzite or dolomite, or both. Where nearly flat-lying, the argillaceous rocks are commonly hard shale and argillite that break into flat sheets several feet long and a fraction of an inch thick. Most of the beds range in thickness from a small fraction of an inch to about 1 inch. Where the rocks have been folded they have been altered to slate with good cleavage or to black phyllites with satiny fracture faces. In a few places the shales and argillites are light grey, soft, and calcareous. In many places they are slightly sandy or are interbedded with greywacke beds ranging from about 1 inch to 6 inches thick. Greywacke beds are commonly fine-grained or slaty at the top, or are markedly crossbedded and ripple-marked.

Andesitic and dacitic lavas occur interlayered with quartzites and argillaceous rocks near the base of the Snare sediments in a few places 6 miles north of the west end of Slemon Lake and near Kwejinne Lake. One lava band is about 40 feet thick and lies about 75 feet above the base of the sediments. No band more than 40 feet thick was seen. The lava is a fine- to medium-grained, green to grey-green rock, made up of a felt of plagioclase laths accompanied by carbonate, chlorite, quartz, and other minerals. Some of it exhibits pillows or amygdules, or both. The amygdules range up to an inch in diameter and contain quartz, rusty weathering carbonate, and a hard, dense, black mineral.

Altered Rocks East of a Line Through the Head of Marian Lake and the West Ends of Saddle and Grant Lakes

Phyllite, quartz-mica schist, knotted quartz-mica schist, and sedimentary gneiss compose nearly all the bodies of sedimentary Snare rocks east of a line extending from the head of Marian Lake through the west ends of Saddle and Grant Lakes except the comparatively unaltered

[1] Stockwell, C. H.: Great Slave Lake-Coppermine River Area, Northwest Territories; Geol. Surv., Canada, Sum. Rept. 1932, pt. C, pp. 56-57 (1933).
[2] Jolliffe, F.: Yellowknife River Area, Northwest Territories; Geol. Surv., Canada, Paper 36-5, p. 2 (1936).

assemblages near Slemon, Kwejinne, and Basler Lakes. With the more highly altered rocks is some partly altered dolomite, quartzite, arkose, and conglomerate. The phyllites, schist, and gneiss are cut by granitic rocks and in most places the most highly altered rocks occur next to the granitic rocks. The relatively unaltered shales, slates, argillites, and greywackes near Basler Lake may be traced northerly along their strike through slates, phyllites, and fine-grained, fissile schists to coarse-grained, fissile, knotted schists and gneisses north and west of Arseno Lake.

The slates and phyllites are grey, but commonly contain pyrite seams parallel to the bedding and weather buff or rusty. The schists retain traces of the thin bedding of the rocks from which they were derived and commonly break into thin, glistening sheets and weather rusty. They contain various proportions of quartz, biotite, white mica, and feldspar, and in places hold a few wine-red garnets. More highly altered schists exhibit knots or nodules. Many of these are rounded aggregates of fine-grained, micaceous minerals and range in size from a small fraction of an inch to about $\frac{3}{4}$ inch. In a few places they are prismatic crystals, about an inch long, of a brown to pinkish mineral that may be andalusite. The cleavage planes of the knotted schists are wavy.

The schists and knotted schists grade into gneisses, which in turn grade through a mixture of gneisses and granitic material to granitic rock. The gneisses are thin-bedded, rusty weathering rocks without knots and are coarser grained than the schists. They consist mainly of quartz, biotite, and feldspar. They are commonly crumpled and have been injected parallel to the bedding by veinlets and lenses of granitic material. Gneiss containing less than 25 per cent granitic material has been mapped as sedimentary rock; that containing from 25 to 75 per cent granitic material has been mapped as a mixed assemblage of granitic and metamorphic rocks; gneiss containing more than 75 per cent granitic material has not been differentiated from granitic rock.

Carbonate rocks associated with the schists and gneiss are commonly finely crystalline, grey to white rocks that weather buff, grey, or black, but some are dense, grey rocks with thin seams of quartz. Most of them are dolomite, but some are limestone. Some beds of white, crystalline limestone or dolomite contain abundant, pale green, fibrous tremolite laths that weather brown, project above the weathered surface, and range up to about 2 inches long. Here and there, calcareous, pebbly quartzite and sandy dolomite or limestone have been altered to a coarse aggregate of fibrous, pale green tremolite and prismatic crystals of a pale greenish grey pyroxene, near diopside in composition. Some of the pyroxene crystals are 18 inches long.

Quartzites, arkoses, and conglomeratic quartzites occur as narrow bands throughout the schists and gneisses, and in most places the quartzites and arkoses are nearly as unaltered as those near Basler Lake but some are more altered and contain a little black mica. In places interstratified with the quartzites are beds holding abundant rounded pebbles of glassy quartz or of about equal quantities of quartz and of fine- to medium-grained, equigranular, grey to pink, granitic rock. Some of these conglomeratic beds have been squeezed and crumpled and the pebbles have been slightly elongated and the matrix has been altered to slightly schistose, biotite quartzite.

Altered Snare sediments near Saddle, Ingray, Rebesca, Little Crapeau, and Grant Lakes, and east of Exmouth Lake are much like those north and west of Arseno Lake, but differ in some ways. In places schists and knotted schists are in fairly sharp contact with granitic rocks. Most of these areas contain only a little interbedded quartzite and dolomite. Some of the dolomite bands are very coarsely crystalline and contain lumps of rusty weathering, waxy green serpentine. The central parts of some areas consist of thin-bedded argillite, slate, phyllite, and greywacke that grade into schists and gneisses near the granite contacts. The rocks east of Exmouth Lake are highly altered quartz-mica schists and gneisses and no quartzite or dolomite was found in them; possibly they do not belong to the Snare group.

The schists, knotted schists, and gneisses of the Snare group are very much like those of the Yellowknife group. In many places, however, they have more gentle dips, and are more thinly bedded than the Yellowknife rocks, and in places they contain a greater proportion of white mica or are associated with beds of dolomite, white quartzite, or pebbly quartzite.

Altered Rocks West of a Line Through the Head of Marian Lake and the West Ends of Saddle and Grant Lakes

Snare rocks west of a line through the head of Marian Lake and the west ends of Saddle and Grant Lakes have been cut by a variety of granitic rocks and porphyries, and some of the thin-bedded shales, slates, argillites, and greywackes have been altered by the introduction of silica, epidote, and feldspar so as to form hard, splintery, black, grey, green, and pink banded, cherty argillites. This alteration is possibly related to the porphyries and associated border phases of the granitic rocks and was not recognized in other areas of the Snare sediments. Besides cherty argillites, the following rocks are present: quartz-mica schist, knotted quartz-mica schist, chert, tuff, quartzite, arkose, limestone, fine-grained, pink rocks of uncertain origin, and gneiss.

Comparatively unaltered argillaceous rocks appear to grade into thoroughly silicified, grey and black, cherty argillite that commonly weathers pink and contains thin bands rich in epidote that parallel the bedding. Still more highly altered phases are fine-grained, thinly banded, pink, green, and grey gneisses, the bands of which contain various proportions of quartz, feldspar, epidote, and amphibole. Seams of pink, granitic rock parallel the bedding of the gneiss, and as they become increasingly abundant the gneisses grade into granitic rocks.

Some of the argillaceous rocks are calcareous and are interlayered with numerous thin beds of limestone. This assemblage alters to a complex composed of layers of: (1) splintery, dense, dark grey and brown banded rocks formed of fine-grained quartz, garnet, chlorite, pyroxene, and epidote; (2) medium-grained, epidote rocks; and (3) medium-grained, greenish grey, crystalline limestone with a little amphibole, pyroxene, and feldspar. Outcrops of the altered calcareous rocks are deeply ribbed and pocketed due to comparatively deep weathering of the limestone layers.

Thin-bedded, black greywackes or impure quartzites have, in places, been altered to compact, quartz-feldspar-biotite rocks. Elsewhere they and associated argillaceous rocks have been altered to dark grey phyllite, quartz-biotite schist, and knotted quartz-biotite schists that commonly are finer grained and contain fewer and smaller knots than the altered Snare sediments elsewhere in the map-areas.

Very thin-bedded, pale green and grey, dacitic or rhyolitic tuffs and tuffaceous sediments outcrop on the west side of a lake about 11 miles north-northwest of the west end of Rebesca Lake.

Medium-grained, thick-bedded, white quartzites, thinly bedded, black quartzites, and pink, feldspathic quartzites and arkoses outcrop in several places in a northwesterly trending belt about 7 miles east of the outlet of Hislop Lake. The quartzites and arkoses are ripple-marked and cross-bedded in places. A few bands of well-bedded, crystalline limestone occur with them, and much of the limestone contains a little, pale pink and green weathering feldspar, pyroxene, amphibole, and other minerals and is finely streaked or mottled. Small amounts of thin-bedded, dark green, chloritic schist with interbedded, white, cherty rock outcrops within the same belt of sediments and may be altered andesitic tuff. In the same general area, fine-grained, pink to red, crystalline rocks, mostly of uncertain origin, are common about 10 miles northeast of the outlet of Hislop Lake, and near the head of Marian Lake. They are cut by dykes of granitic rock, feldspar porphyry, and feldspar-quartz porphyry in many places and are included in the Snare group because they are intimately associated with Snare sediments. They are of granitoid texture and consist mainly of quartz, microcline, orthoclase, and plagioclase feldspar. The quartz content ranges from about 30 to 60 per cent. Potash feldspars are commonly more plentiful than plagioclase feldspars. Some of the rocks are markedly banded and may be sediments altered to feldspathic gneiss, but some are dykes or sills with a very few tiny phenocrysts of feldspar and quartz in a granitoid matrix and probably are phases of granitic rocks or of feldspar porphyries and feldspar-quartz porphyries. Still others may be rhyolitic flows, and are tabular bodies that parallel the enclosing altered sediments and commonly range in width from a few feet to 50 feet. They are streaked parallel to their borders and some contain a few grains of feldspar and quartz that may be phenocrysts. In places they are associated with bands of fragmental rock that may be agglomerate.

META-DIABASE, META-GABBRO, META-DIORITE

Elongated bodies of dark green to black, medium- to coarse-grained, massive, altered diabase, gabbro, and diorite cut sediments of the Snare group in many places near Grant and Little Crapeau Lakes and northwest of Rebesca Lake to Wopmay River. They commonly form high ridges with abrupt sides. Water-worn surfaces are fresh and hard, but the rock on tops of the ridges is commonly weathered to a rusty rubble. Some of these rocks are black, heavy, and compact, and seem to be entirely made up of black, amphibole-like minerals. Others are fine- to medium-grained, have a dioritic texture, and are formed of about equal quantities of black, ferromagnesian minerals and dull white to greenish grey feldspar. Some varieties are medium- to very coarse-grained rock with diabasic texture wherein crystals range up to 1½ inches long. Magnetite and pyrrhotite are common constituents, and in a few places comprise about 15 per cent of the rock. Thin sections of the various types consist largely of fresh to altered labradorite, pale brown pyroxene, and green and brown pleochroic amphibole.

In places the basic rocks are dykes crossing the bedding of the sediments, but in many places they trend parallel to the enclosing sediments and may be dykes or sills. The outcrops range in width from a few feet to about 2 miles, but the true thickness of the bodies is not known because in most places their dip is unknown. They are commonly fine-grained and chilled over widths ranging from a few inches to several feet where they are in contact with sediments. They have not noticeably altered the sediments. Granitic rocks that cut the Snare sediments also cut the dykes and sills, and in places have formed breccias of angular fragments of dark green meta-diabase and related rocks in a matrix of pink or grey, granitic rock. The dykes and sills are most numerous in sediments that are close to and stratigraphically below bodies of andesitic and dacitic lava, and some of them appear to become fine-grained and to grade into the lavas and may be feeder bodies.

ANDESITE, DACITE, TUFF, BRECCIA

Fine- to medium-grained, dark to light green lavas that weather dull grey, green, or brown, outcrop northwest of Rebesca Lake near Wopmay River, south of Little Crapeau Lake, west of Grant Lake, and north of Grant Lake near the north border of the map-area. Adjacent sediments commonly dip towards the lavas and probably pass beneath them. The lavas are in part massive, and in part contain pillows or amygdules, or both. Most of the rock is andesite and contains plagioclase feldspar, colourless pyroxene, chlorite, carbonate, and other minerals. In some specimens the pyroxene and feldspar are only slightly altered and the feldspar is probably andesine. Some lava contains small phenocrysts of plagioclase and is andesite porphyry, and some contains numerous, rounded, microscopic quartz grains and is probably dacite. Pillows with dense, light green borders are common in places and range in size from about 6 inches to 2 feet. Some lava contains abundant rounded amygdules that range from microscopic dimensions up to ½ inch; they are filled with quartz, chlorite, carbonate, and probably other minerals, in concentric bands. Elsewhere massive lava contains scattered ⅛-inch grains of white carbonate. A few thin bands of very fine-grained, black, slaty rock within the lavas may be tuffs. A little schistose, fragmental andesite was seen in a few places and is probably sheared flow breccia. Irregular carbonate veinlets and seams cut the lavas in many places, especially where they are much fractured. The lavas are cut by a few feldspar porphyry, feldspar-quartz porphyry, and diabase dykes, and by many granitic dykes, which are especially numerous near contacts of the lavas and granite. Lava near granite contacts commonly contains irregular patches and seams of epidote, but otherwise is not much altered. Some of the lavas of the Snare group are fresher than those of the Yellowknife group, but most of them are altered to about the same degree.

OTHER SEDIMENTARY ROCKS

Chocolate brown, reddish, and grey conglomerate, breccia, grit, arkose, quartzite, slate, and argillite outcrop in a belt about ½ mile wide extending 15 miles southerly from a point 8 miles southwest of the inlet of Grant Lake. These rocks though mapped with the Snare rocks may not belong to this group. The strata strike about north and commonly dip between 70 degrees west and 70 degrees east, as do the more typical Snare sediments in the vicinity. In a few places they dip at low angles or are horizontal. In some ways the sediments resemble those of the Cameron Bay group, on Great Bear Lake, as described by Kidd.[1] They differ from typical Snare sediments in: (1) their predominant red and brown colours; (2) the greater amount of conglomerate and breccia; and (3) the composition of the conglomerate and breccia. In several places they adjoin dark green, andesitic rocks that are cut by granitic rocks and resemble andesites that elsewhere overlie Snare sediments. In other places they are bordered by granitic rocks. The sediments appear to rest unconformably on the andesitic and granitic rocks, but this relation has not been established. These sediments are not known to be cut by granitic rocks, but they are cut, in a few places, by buff-weathering, brown and reddish brown feldspar porphyry and quartz-feldspar porphyry dykes with micro-crystalline groundmass.

The sedimentary belt may be separated from the granitic rock that lies west of it by a northerly trending fault; if so the prevalent steep dips of the sediments may be due to the drag of the fault. The contact with the granite strikes north and is about in line with a long fault that lies to the south and trends north towards the contact. In places the granitic rock next to the contact contains abundant chlorite and appears to have been crushed.

The conglomerate beds range in thickness from about a foot to about 10 feet, but commonly are less than 5 feet thick and are interlayered with finer grained sediments. The pebbles commonly constitute more than half the rock; they are rounded to subangular and range in size from less than an inch to about 1 foot, and average about 1 inch. They include, in approximate order of abundance: (1) red, brown, and purplish, porphyritic rocks with phenocrysts of feldspar, or quartz, or both, in a very fine-grained to cherty groundness; (2) medium-grained, equigranular, pink granite made up of about one-third white quartz and two-thirds pink feldspar; (3) a variety of very fine-grained to cherty, red, purple, grey, and green rocks, a few of which are banded; and (4) quartz. The matrix is a greenish grey to brownish grey grit composed of smaller fragments of the pebble-forming rocks. Thin beds of breccia and grit are similar to the conglomerate except that the fragments are smaller and angular. Some beds contain nests of specular hematite.

The quartzites and arkoses are pink or brown rocks that are cross-bedded in places, but elsewhere constitute beds wherein the grains are well sorted and grade from coarse at the bottom to fine-grained and slaty

[1] Kidd, D. F.: Great Bear Lake Area, Northwest Territories; Geol. Surv., Canada, Sum. Rept. 1932, pt. C, pp. 4, 5 (1933).

at the top. Some coarse-grained arkoses are almost indistinguishable from nearby granitic rocks and contain red feldspar and milky white quartz. Some examples of medium-grained, red-brown, arkosic rock when examined under the microscope are found to hold abundant, rounded fragments of rock and fewer grains of clear quartz and feldspar. The rock fragments are very fine-grained; some are probably siliceous, others contain minute feldspar laths and show flow structures. The red-brown colour of some quartzites is due to very fine, red-brown mica. Some arkosic beds carry a few angular fragments of red slate or argillite and are probably intraformational breccias.

Most of the slates and argillites are very thinly bedded and dark chocolate-brown or red-brown. In places thinly bedded, brown, slaty and arkosic rocks have been altered to compact, hard, pink, green, and brown banded rock wherein the slaty layers have been silicified and the arkosic layers epidotized and otherwise altered.

GRANITE, GRANODIORITE, AND ALLIED ROCKS OF ARCHÆAN AND PROTEROZOIC AGE

Archæan and Proterozoic granite, granodiorite, and allied rocks underlie about 65 per cent of the map-areas. They vary widely in composition and texture, but granodiorite is probably the most common type. No granitic rocks older than the Yellowknife rocks were recognized either in place or as pebbles within Yellowknife rocks. All are assumed to be younger than the Yellowknife strata. They are believed to be pre-Ordovician because Ordovician strata rest unconformably on granitic rock. Some of the granitic rocks that cut the Yellowknife rocks are unconformably overlain by the Snare rocks and are called Archæan. Other granitic bodies cut the Snare rocks and and are called Proterozoic. The Archæan or Proterozoic age of the greater part of the granitic rocks has not been established. The ages of a few types of granitic rocks are fairly well established in some places, but it is not known that lithologically similar rocks are everywhere of the same age. In many places the granitic rocks within relatively small areas exhibit a great variety of textures and compositions and do not conform to any of the types whose ages have been determined. No general difference was noted in the freshness of Archæan and Proterozoic granitic rocks.

ARCHÆAN ROCKS

Archæan granitic rocks immediately underlie Snare sediments about 6 miles west of the outlet of Basler Lake and include: (1) fresh, pink, medium-grained, porphyritic, granitic rock cut by pegmatite dykes with tourmaline; (2) bleached, whitish to rusty weathering, medium-grained, equigranular, granitic rock consisting of about 30 per cent quartz, 60 per cent weathered feldspar, 10 per cent white mica, and a very little tourmaline; and (3) slightly sheared, pink to grey weathering, granitic rock composed of about 30 per cent quartz, 50 per cent pink feldspar, and 20 per cent biotite and other minerals, with some pink feldspar phenocrysts ¾ inch and less long.

Pink to rusty weathering, medium-grained, equigranular or slightly porphyritic, muscovite granite of Archæan age was observed overlain by Snare sediments on the north arm of Kwejinne Lake.

Pink to grey, medium-grained, equigranular, granitic rock that closely resembles granitic pebbles found in Snare conglomerates outcrops over wide areas in the eastern parts of the map-areas, and may, at least in part, be of Archæan age. The rock ranges in composition from granite to granodiorite, but probably is mainly a quartz monzonite. It contains 15 to 40 per cent quartz, 2 to 15 per cent muscovite and biotite, and, in addition, albite-oligoclase, microcline, and orthoclase in various proportions. The biotite contains numerous pleochroic haloes. Nearly all the granitic rock north of latitude 64° 30′ and east of a line from Norris Lake to a point 7 miles west of the northeast corner of the map-area is of this type. Other large areas of similar rock, and of gneissic rock probably derived from this rock by the assimilation of small amounts of sedimentary or volcanic rock, occur in the east half of Snare River map-area as far south as latitude 63° 15′. Two small bodies of lithologically similar rock outcrop about 14 miles north and 7 miles north-northwest of the west end of Arseno Lake and are in contact with gneisses probably derived from Snare rocks and may intrude them. No other areas of similar granitic rocks are known west of a line running from the head of Marian Lake to the south end of Saddle Lake, and continuing thence northeast to Mattberry Lake, and on through Norris Lake to a point 7 miles west of the northeast corner of the map-area.

PROTEROZOIC ROCKS

Much of the granitic rock west of the above defined line running from Marian Lake to near the northeast corner of the map-area is of the four types described below, or is gneissic varieties derived from them by the assimilation of sedimentary or volcanic rocks of the Snare group. In many places these granitic rocks seem to grade into each other. Similar rocks are found in a few places farther east.

The most widespread type is quartz monzonite or granite and is a medium- to very coarse-grained, pink or grey, porphyritic rock wherein the phenocrysts are of pink feldspar and range from about ¼ inch to about 3 inches in length, but are commonly 1 inch to 1½ inches long. The rock contains about 25 per cent clear, white, or bluish quartz, 20 per cent biotite and amphibole, and 55 per cent feldspar. Smaller, blocky grains of greenish white to chalky weathering plagioclase feldspar lie between the tabular, pink phenocrysts of potash feldspar, and the two types of feldspar are present in about equal quantity. In a few places the rock contains less than 5 per cent quartz and grades into monzonite. Probably most of the very coarse-grained, porphyritic rocks are granites in which most of the feldspar is potash feldspar and forms the large pink phenocrysts that in some places lie parallel to each other and in the southwest part of Snare River map-area commonly trend about north.

A second type of Proterozoic granitic rock is coarse-grained, equigranular, red microline granite and is accompanied by a little red, quartz monzonite and syenite. It occurs as small bodies that appear to grade imperceptibly into coarse-grained, porphyritic quartz monzonite and granite.

The red granite contains 25 to 45 per cent cloudy to milky white quartz, 40 to 60 per cent red feldspar, in grains ranging in size from $\frac{1}{8}$ inch to $\frac{3}{4}$ inch, and 15 per cent amphibole, biotite, and chlorite. Microcline is the most common feldspar. Small amounts of apatite, zircon, and a brown mineral (probably allanite) are present. In a few places the granite grades into red syenite made up of blocky, red feldspar crystals with a little interstitial chloritic material, probably derived from amphibole and biotite.

A third type of Proterozoic granitic rock is amphibole granodiorite or amphibole quartz monzonite. It is a medium-grained, equigranular, dark reddish grey rock that contains more plagioclase relative to potash feldspar, more amphibole, and less quartz than the coarse-grained, porphyritic, quartz monzonite and granite into which it grades. It characteristically holds conspicuous, greenish weathering, blocky plagioclase crystals, as does the feldspar porphyry and feldspar-quartz porphyry into which it grades in many places. The plagioclase crystals range in size from $\frac{1}{8}$ to $\frac{1}{4}$ inch and form phenocrysts in the porphyritic facies.

A fourth type of Proterozoic granitic rock is mostly quartz diorite or granodiorite. It forms small, irregular bodies of massive, equigranular, medium-grained, dark grey, reddish, or red and black speckled rocks that occur in many places in granitic rocks near sedimentary rocks in the western parts of the map-areas. Such bodies are particularly common immediately southwest of Slemon Lake, about 4 to 10 miles northwest of the west end of Slemon Lake, and in a belt extending from Emile River at latitude 63° 30′ to the northeast end of Saddle Lake. Most of the bodies are only a few square miles in area. On weathered surfaces the rocks commonly appear to contain about equal parts of dull, greenish grey to red feldspar and black minerals, but in places the proportions of these minerals vary widely. In a few places plentifully visible quartz is present. In other places rock grades into a nearly black, coarse-grained variety with only a little visible red feldspar. The specimens of the fourth type examined in thin section range in composition from granite with 20 per cent quartz to diorite; most of them are quartz diorite or granodiorite. The black minerals are biotite, amphibole, pyroxene, and chlorite. Some bodies of these rocks intrude Yellowknife sediments, others intrude coarse white quartzites and pink arkoses that undoubtedly belong to the Snare group. Other bodies are surrounded by coarse-grained, pink or grey, granitic rocks. In several places the dioritic rocks are in sharp contact with coarse-grained, pink, porphyritic and pegmatitic, granitic rocks and are cut by a few pink, aplitic and pegmatitic dykes. In most places the age of the dark grey and reddish, dioritic rocks relative to that of the adjacent granitic rocks is not known, but most of the dark grey and reddish rocks are thought to be of Proterozoic age and to be genetically related to Proterozoic granitic rocks. This opinion is held because: (1) some of the dioritic rocks were observed to cut Snare sediments; and (2) they occur most commonly as isolated, irregular bodies near the borders of granitic rocks within an area in which, in so far as known, all granitic rocks are of Proterozoic age. In places they are lithologically similar to quartz-mica diorite and granodiorite near Great Bear Lake, as described by Kidd[1].

[1] Kidd, D. F.: Great Bear Lake Area, Northwest Territories; Geol. Surv., Canada, Sum. Rept. 1932, pt. C, p. 10 (1933).

MIXED ASSEMBLAGE OF GRANITIC AND METAMORPHIC ROCKS OF ARCHÆAN AND PROTEROZOIC AGE

In Ingray Lake map-area areas of altered sedimentary and volcanic rocks that include 25 to 75 per cent intimately associated granitic material have been mapped as mixed assemblages of granitic and metamorphic rocks. Similar assemblages occur in Snare River map-area, but are less extensive and they have not been separately mapped. Instead, those areas that include more than 50 per cent granitic material have been mapped with the granitic rock and those including more than 50 per cent sedimentary or volcanic rocks have been mapped as sedimentary or volcanic rock.

The mixed assemblages in many places separate bodies of sedimentary and volcanic rock from bodies of granitic rocks. Such intermediate zones are commonly less than 1 mile wide, but in a few places are as much as 8 miles wide. They border both Yellowknife and Snare rocks, but are most extensive about areas of Snare rocks.

The rocks of the mixed assemblages are mainly quartz-mica schist cut by dykes of granitic rock, or coarse-grained quartz-mica schist and gneiss traversed by seams and lenses of granitic material that for the most part parallel the bedding planes. Much of the gneiss is highly contorted and weathers rusty. It consists of quartz, biotite, and plagioclase feldspar, and in places a little cordierite, andalusite, sillimanite, microcline, tourmaline, garnet, white mica, spinel, or graphite. Bedding is fairly well preserved. In places schist or gneiss derived from Snare sediments can be differentiated from that derived from Yellowknife sediments; the Snare schists and gneisses in such places being more thinly bedded than the Yellowknife rocks, and also in some such places being associated with dolomite, quartzite, or pebbly quartzite.

FELDSPAR PORPHYRY, FELDSPAR-QUARTZ PORPHYRY

Feldspar porphyry and feldspar-quartz porphyry form widely scattered bodies in a belt about 15 miles wide that lies at the west border of the map-areas and extends from La Martre River to latitude 65 degrees. In most places the porphyry forms prominent hills that rise several hundred feet above adjacent areas of granitic rocks. The porphyry commonly forms bodies a few square miles in extent. The largest body constitutes a nearly continuous range of hills extending from a point about 5 miles east of the outlet of Hislop Lake northwesterly to Mazenod Lake and thence northerly nearly to the northwest corner of Snare River area; it is about 34 miles long and ranges in width from less than 1 mile to nearly 5 miles. An isolated group of hills of porphyry lies 2 to 9 miles south of Tumi Lake, where they project through Palæozoic rocks that rest unconformably on them. Lithologically similar porphyritic rocks are reported to occur near Great Bear Lake, and between Great Bear Lake and Snare River and Ingray Lake map-areas.[1]

In most places the porphyries are massive and weather reddish brown, reddish purple, pink, grey, or chalky white. Large masses of the rock

[1] Kidd, D. F.: Great Bear Lake Area, Northwest Territories; Geol. Surv., Canada, Sum. Rept. 1932, pt. C (1933); Rae to Great Bear Lake, Mackenzie District, N.W.T.; Geol. Surv., Canada, Mem. 187 (1936).

are markedly jointed and break into innumerable small blocks. In places nearly horizontal joints are particularly prominent and there the hills of porphyry rise in a series of steps ranging from a few inches to several feet in height. Seams of epidote are numerous. The composition of the porphyry ranges from rhyolite to dacite; quartz latite is probably the most common variety. Phenocrysts are mainly rectangular to rounded, greenish weathering, plagioclase feldspar, and red weathering orthoclase or microcline. Phenocrysts of strongly pleochroic, green and brown, shredded amphibole occur in most places, but are less abundant than those of feldspar. Rounded or embayed grains of clear quartz form phenocrysts in places. The groundmass is commonly very fine-grained to flinty, but some of it, especially near the borders of the porphyry bodies, is visibly crystalline. In most places it is a fairly fresh, equigranular aggregate of quartz, potash feldspar, and plagioclase feldspar. In a few places the groundmass is an aggregate of feldspar laths and interlocking, equidimensional grains of quartz and feldspar. In a few of the thin sections examined the matrix is streaked as if it had flowed around the feldspar grains, some of which are fragments of once larger grains.

Probably most of the feldspar porphyry and feldspar-quartz porphyry is intrusive and genetically related to the Proterozoic granitic rocks. Most of the porphyry bodies occur near the contact of granitic rocks with strata of the Snare group, and most of those that lie well within the bodies of granitic rocks contain small masses of altered sedimentary rock as if, at one time, they had been overlain by sedimentary rock. Dykes and sills of porphyry, of the same grain size, texture, and composition as that found in adjacent larger bodies, cut Snare sediments in many places.

So far as known all the granitic rocks near the porphyry bodies are of Proterozoic age. In places the porphyry seems to grade, by increase in grain size of the groundmass, to medium-grained, equigranular or slightly porphyritic, pink to reddish grey, amphibole granodiorite and amphibole quartz monzonite. Elsewhere granitic rocks cut the porphyry with sharp contacts. Bodies of coarse-grained, equigranular, red granite with abundant milky white quartz are of medium grain for a few feet next to the sharply defined contact, and in places as much as 20 feet of adjacent porphyry has been bleached and the phenocrysts almost obliterated. In other places unaltered porphyry is cut by dykes of pink, equigranular, granitic rock containing about 20 per cent quartz. In a few places about 2 miles east of the mouth of Emile River, red-weathering, dark brown feldspar-quartz porphyry dykes, from 5 to 20 feet wide, cut coarse-grained, pink, porphyritic granite or quartz monzonite.

In a very few places the porphyritic rocks exhibit structures characteristic of extrusive rocks. What may be vesicles and amygdules occur in finely crystalline porphyry about 9 miles east-southeast of the outlet of Mazenod Lake; some of these are angular cavities partly filled with very finely crystalline, white quartz; others are irregular blobs of glassy quartz and range in size from ¼ inch to 2 inches. In other places nearby, pink to white weathering, massive porphyry grades into similar porphyritic rock with elliptical structures that range up to 1 foot long and average 3 inches. The rims of these structures resemble the porphyritic rock in which they lie, except that they weather white. The centres of the structures contain coarse-grained, glassy quartz, black mica, and crystals of a black mineral with a red-brown streak. Elsewhere in the same porphyry body dense, dark grey rock with a few, indistinct, grey to pink phenocrysts contains abundant angular to rounded fragments of pink weathering, felsitic rock and resembles agglomerate or flow breccia. A feldspar-quartz porphyry mass 4 miles south of the south end of Rabbit Lake contains, in a few places, a very few rounded fragments of feldspar-quartz porphyry almost identical with the rock that encloses them. Some red to brown feldspar porphyry intimately associated with sedimentary rocks about 5 miles east of the outlet of Hislop Lake is banded and may occur as flows or as banded sills or dykes.

About 3 miles west of the first rapids on Wopmay River below Grant Lake, several dykes of reddish brown feldspar porphyry cut chocolate-brown and red slate, arkose, and grit, whereas lithologically similar sediments nearby are accompanied by conglomerate beds with abundant pebbles of porphyritic rock indistinguishable from that of the dykes.

SYENITE, NEPHELINE SYENITE, NEPHELINE-SODALITE SYENITE, AND RELATED ROCKS

A complex of syenite, nepheline syenite, nepheline-sodalite syenite, and related rocks outcrops near Bigspruce Lake as an oval body 5½ miles long. It is bordered along the southeast side by massive, medium-grained, equigranular, granitic rock with a little biotite and muscovite. Along the other sides it is bordered by coarse-grained, porphyritic, grey, biotitic, granitic rock wherein feldspar phenocrysts range up to 1½ inches long and average about ½ inch long. The area occupied by the complex is well timbered, whereas the surrounding granitic area is very sparsely timbered.

The rocks vary widely in composition and texture. East of the north end of Bigspruce Lake a medium- to coarse-grained, black, dioritic rock is the most common variety. Some of it appears to consist only of amphibole, magnetite, and brassy metallic minerals, and in places the magnetite comprises nearly half of the rock. Thin sections of the dioritic rock contain abundant, blue-green to yellowish, pleochroic amphibole and smaller amounts of altered plagioclase feldspar, metallic minerals, apatite, epidote, chlorite, and carbonate.

Elsewhere in the complex, the rocks are medium- to very coarse-grained, grey and buff syenites and light-coloured diorites that commonly weather with a deeply pitted surface due to the relatively rapid weathering of nepheline that is abundant in many places. The nepheline-bearing varieties consist of the following minerals in widely varying proportions: perthitic feldspar, plagioclase feldspar, nepheline, deep green and brown, pleochroic aegerite, aegerite-augite, blue and blue-green to yellowish, pleochroic amphibole, deep brown mica, sodalite, an unidentified zeolite, carbonate, sphene, apatite, and metallic minerals. Dark minerals commonly constitute 10 to 40 per cent of the rock. In coarse-grained varieties the feldspars commonly occur as buff to pink plates consisting of an intimate intergrowth of two varieties of feldspar, some of which is twinned plagioclase. The nepheline in thin sections occurs in clusters of small, clear grains, many of which are hexagonal in outline. Some of the nepheline clusters have hexagonal outlines. The pyroxenes and amphiboles are deeply coloured varieties rich in soda and iron, and commonly occur with deep brown mica (probably lepidomelane) and metallic minerals. Bright blue sodalite is conspicuous in some outcrops as irregular veinlets and patches.

A very little coarse-grained rock consists of perthitic feldspar and a very little interstitial quartz, sodic amphibole or pyroxene, and brown mica, and is a nordmarkite. Some of the coarse-grained rock carries no nepheline and is an alkali syenite, but nepheline is abundant in most of the syenitic rock. Some of the rock contains about equal amounts of nepheline and aegerite, with minor brown mica, sodalite, and carbonate, and is ijolite. In one place a dyke of medium-grained alkali syenite cuts ijolite. One rock variety in the complex is a nepheline porphyry with hexagonal prisms of grey, waxy nepheline in a fine-grained, dark green or black matrix consisting of about equal parts of nepheline and aegerite with a little brown mica; the prisms of nepheline range in length from a small fraction of an inch to about 1 inch.

The rocks of the complex intrude a small body of white, crystalline banded limestone of probably Snare age on the northwest shore of Bigspruce Lake, about ½ mile south of the point where Snare River enters the lake. The action of the intrusive rocks on the limestone has resulted in the formation of abundant purple fluorite.

The age of the complex relative to the adjacent granitic rocks is not known. In places granitic rock is separated from syenitic rock by a fault zone from 4 to 40 feet wide. So far as known no granitic dykes cut the complex and no dykes of syenitic rock cut the granitic rocks. Dykes of fine-grained, dark green and black rock, some of which contain abundant brown mica, cut the rocks of the complex and adjacent granitic rocks.

DIABASE AND GABBRO

Diabase and gabbro are probably the youngest Precambrian rocks in the map-areas. They occur as dykes and cut Snare rocks and Proterozoic granitic rocks. They are assumed to be of Precambrian age because none is known to cut Ordovician rocks in the area. Their age relative to the syenite, nepheline syenite, nepheline-sodalite syenite, and related rocks is not known. Most of them are medium-grained, brown weathering, fresh black rocks that commonly show diabasic texture. A very few contain feldspar phenocrysts. They are in sharp contact with adjacent rocks and have fine-grained, chilled borders as much as 6 inches wide. The chilled rock commonly weathers grey and is splintery and black with abundant minute feldspar needles that become progressively smaller and less abundant towards the contact. In most places rock next the dykes has not been appreciably altered, but in a few places granitic rocks are slightly reddened for as much as 25 feet from the contact. Many of the dykes are almost perfectly fresh and contain about 45 per cent euhedral labradorite, 45 per cent pale brown, non-pleochroic, monoclinic pyroxene, 5 per cent metallic mineral (probably magnetite) in irregular grains with a very little brown mica, and 5 per cent interstitial micrographic quartz and clear feldspar (probably orthoclase). In places the metallic mineral or the micrographic quartz and feldspar constitute 15 per cent of the rock. Elsewhere pyroxene is partly altered to green and brown, pleochroic amphibole or chlorite, or both.

Many of the dykes are vertical or nearly so. A long diabase dyke extending from near the southwest tip of Rebesca Lake to the west border of the area dips gently south in most places. A large, irregular, diabase body at the east end of Rebesca Lake dips gently south in places and elsewhere is nearly horizontal. The large body on the south side of Castor Lake may be a gently dipping sheet. The thickness of the steeply dipping dykes ranges from less than 1 foot to more than 200 feet. The maximum thickness of the gently dipping dykes may be more than 200 feet. Most of the steeply dipping dykes trend about northeast or northwest and a few trend about north. They are probably especially numerous within the sedimentary and volcanic rocks between Wijinnedi Lake and the north end of Indin Lake, where they occupy parts of many of the faults.

In general the diabase and gabbro is much fresher, less fractured, and more uniform in texture and composition than the meta-diabase and associated intrusive rocks of the Snare group. The diabase and gabbro cut the Proterozoic granitic rocks, whereas the same granitic rocks cut the Snare meta-diabase and associated rocks.

ORDOVICIAN

Nearly flat-lying dolomite, sandstone, conglomerate, and arkose occupy the southwest corner of the map-area and are the youngest rocks recognized. Their eastern border is a highly irregular line extending from the west side of Marian Lake to the southeast side of Mazenod Lake. They probably dip very gently west or southwest. Over wide areas no outcrops were found and the presence of Ordovician rocks is inferred from topography. The total thickness of these nearly flat-lying rocks is not known, but is probably not more than a few hundred feet. They were deposited on an erosion surface of Precambrian rocks that probably had a relief of more than 350 feet, because in places Ordovician rocks rest on the sides of hills of Precambrian rocks that rise 350 feet above them. The sandstone was seen to rest on granitic rocks, and the dolomite on granitic rocks, on large quartz veins, on feldspar porphyry, and on feldspar-quartz porphyry. The rocks immediately below these contacts are fresh, or weathered only a little more than they are on the present surfaces where they are glaciated. No dykes, veins, or faults are known to cut the Ordovician rocks.

Medium-grained, grey and buff, crumbly sandstone, grading locally to arkose, lies at the base of the flat-lying rocks. The sandstone is ripple-marked and crossbedded in places and the quartz grains in it are well rounded. It weathers readily to a sand, and in most places outcrops as scattered or loosely piled slabs a few inches thick. Some of it contains streaks wherein the sand grains lie in a dark brown ferruginous cement.

Some loose slabs of dolomitic sandstone on Shoti Lake contain algal-like and worm-like markings and probably came from beds interbanded with the sandstone. The sandstone was not seen in contact with the fossiliferous, Ordovician, sandy dolomite and dolomite that probably overlie it, and the nature of the contact is not known. The sandstone may grade upward into these rocks, or it may be separated from them by a disconformity.

Buff-weathering, grey, sandy dolomite and dolomite probably overlie the sandstone where it is present, but sandstone was not seen on the higher parts of the old erosion surface, and in such places sandy dolomite or nearly pure dolomite rests directly on Precambrian rocks.

The sandy dolomite is a fine-grained, thin-bedded rock that is commonly ripple-marked and crossbedded and contains casts of salt crystals. Many of the ripple-marks are of the symmetrical type produced by wave action. A little thin-bedded, green shale is interbedded with these rocks. A few fossils were found in sandy dolomite on the south side of La Martre River about 11 miles from its mouth. The beds in which they occur directly underlie fossiliferous beds of dolomite described below. The fossils[1] in the sandy dolomite are of Ordovician age and include:

Alga? cf. *Chartocladus* sp.
Vermes?
Trilobites *Asaphid* type.

The sandy dolomite grades upward into finely crystalline, buff-weathering, grey dolomite that contains abundant Upper Ordovician (Richmond[1]) fossils on the south side of La Martre River about 11 miles from its mouth. The dolomite beds range in thickness from a few inches to several feet. In places the rock is mottled or contains chert nodules. It is the youngest rock recognized, but slightly younger Palæozoic rocks may underlie the area south and west of the fossiliferous outcrops. In places a little conglomerate or pebbly impure dolomite rests on the sides of old hills and grades abruptly upward into dolomite. The beds in these basal rocks commonly parallel the surfaces of the Precambrian rocks on which they rest and in places dip away from hills at angles of about 25 degrees. About 10 miles west of the mouth of La Martre River over 20 feet of conglomerate rests on granitic rock and on a large quartz stockwork, and grades upward into dolomite. Some of the boulders at the base of the conglomerate are as much as 6 feet in diameter, and most of them are of granitic rock or of quartz derived from the underlying stockwork. The matrix is soft and grey and probably dolomitic or limy. The conglomerate lies on the side of a hill and dips away from it, and is a mixture of rounded, water-worn boulders and angular talus boulders. In two other places in the same vicinity dolomite was observed resting unconformably on large quartz stockworks cutting granitic rocks. In several places on the sides of hills of feldspar porphyry and feldspar-quartz porphyry a few feet of dolomite contains scattered pebbles of similar porphyry that range up to 2 inches in diameter, and this pebbly dolomite grades upward into nearly pure dolomite.

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[1] Communication from Palæontological Section, Geol. Surv., Canada.

Fossils collected from the Upper Ordovician (Richmond) dolomite on the south side of La Martre River about 11 miles from its mouth are described[1] as follows:

Spongiae cf. *Calathium* sp.
Incertae sedis
- *Stromatopora* sp.
- *Beatricia* sp.

Anthozoa
- *Streptelasma* cf. *prolongatum* Wilson
- *S.* cf. *fragile* Wilson
- *S.?* sp. A. of *S. poulseni* Cox
- *S.?* sp. B
- *S.?* sp. C
- *S.* fragments
- *Zaphrentis* sp.
- *Halysites* nr. *H. delicatulus* Wilson
- *H.* sp.
- *Calapoecia canadensis* Billings
- *C. canadensis antincostiensis* Billings
- *C.* sp.
- *Columnaria alveolata* Goldfuss
- *Columnaria halli* Nicholson
- *Syringopora* sp.
- *Paleofavosites asper* d'Orbigny
- *P.* cf. *capax* Billings
- *P.* sp. A.
- *P.* sp. B.
- *Labyrinthites* ? sp.
- *Protrochis colithus* cf. *kaeri* Troedsson

Echinodermata
- cf. *Glyptocystites* (plates)
- Crinoid disks (3 species)

Bryozoa
- cf. *Chasmatopora* sp.
- 2 unidentified sp.

Vermes
- *Cornulites* sp.

Brachiopoda
- *Leptaena* ? *nitens* (Billings)
- *Hebertella* sp.
- *Dinorthis* sp.
- *Orthis* sp.
- *Rhipidomella* sp.
- *Rafinesquina* sp.
- *Rhynchotrema capax* (Conrad)
- *R. anticostiensis* (Billings)
- *R.* cf. *janeum* (Billings)
- *R.* cf. *windermerensis* Wilson
- *R.* sp. A.

Pelecypoda
- One identifiable form

Gastropoda
- *Hormotoma* sp.
- *Maclurea* sp.
- *M.* opercula

Pteropoda ?
- New form

Cephlapoda
- *Armenoceras* sp.
- *Kochoceras* sp.

[1] Communication from Palæontological Section, Geol. Surv., Canada

PLEISTOCENE AND RECENT

The region was glaciated and the ice moved from east to west. Post-glacial weathering has obliterated striæ over wide areas of high ground. The average trend of striæ at one hundred and seventy-five localities between latitudes 64° and 64° 30′ is south 69 degrees west.

Pleistocene deposits are not widespread except in areas underlain by Palæozoic rocks and in the barren grounds. A few boulders transported by ice occur almost everywhere, and many of them have been transported less than 20 miles from their source. Eskers, outwash sand plains, and moraines are common in the barren grounds and probably become progressively less common to the west and south. Most of the longest eskers trend about west or a little south of west and approximately parallel the direction of ice movement; some are more than 5 miles long. Extremely rugged, hummocky, morainal areas of an unsorted jumble of boulders, gravel, and sand are commonly associated with long eskers, or groups of eskers and outwash sand plains. Some of the largest morainal areas trend about west. Numerous, tiny, rounded lakes and muskegs fill the depressions between the hummocks, and some morainal areas are readily recognized by an inspection of a topographic map. Such areas occur: (1) as a belt about 10 miles long that trends west and lies 2 miles north of the north end of Mesa Lake; (2) as a belt of similar length and trend 2 miles south of the south end of Mesa Lake; and (3) as a rounded area about 5 miles in diameter with its centre about 10 miles south-southwest of the south end of Mesa Lake.

Small cobble beaches, some of which are terraced, are common on Precambrian rocks within a belt about 15 miles wide along the western border of the map-areas. They lie at various elevations and the highest noted are close to the tops of the highest hills. The cobbles are well rounded and are commonly between 3 inches and 1 foot in diameter. Many of the beaches lie in gullies and small embayments on the sides of the hills. They were probably formed by wave action in an extensive sea that in post-Pleistocene time extended south to Great Slave Lake, and from which the beach-fringed hills projected as islands. Beaches were found about 300 feet above adjacent lakes in several places between a point about 9 miles northwest of the mouth of La Martre River and a point about 16 miles west-southwest of the southwest end of Rebesca Lake. Some of the rock above the highest beaches is more weathered than that below them. In places in the southwest part of Ingray Lake map-area glacial drift is fairly plentiful above the highest beaches, but is nearly absent on slopes below them; these lower slopes may have been swept clean by wave action on the shores of the sea. The elevation of the highest beaches is not known, but Kidd[1] reports beaches immediately west of the map-areas at an elevation of about 1,050 feet. The eastern limit of the sea is not known.

Post-glacial lake and stream silts and clays are common near the west sides of the map-areas and extend into the eastern part of the map-areas along some of the rivers. These deposits are grey and brown, and

[1] Kidd, D. F.: Rae to Great Bear Lake, Mackenzie District, N.W.T.; Geol. Surv., Canada, Mem., 187, p. 17 (1936).

are rudely banded in many places, but the banding is not as regular or as sharply defined as in varved clays. They are covered with a little peat in most places. Over wide areas they have been heaved by frost action and the surface is a jumble of small clay hummocks. The deposits probably cover, in the aggregate, several hundred square miles wherein only a few rocky hummocks project above the flat silt and clay mantle. They are most common: (1) in the lowest parts of the area near Russell and Slemon Lakes (elevation 495 feet); (2) along Marian River from its mouth to Hislop Lake (elevation 685 feet); (3) in the extreme southwest corner of Ingray Lake map-area near Faber Lake (elevation 753 feet); and (4) east from Wopmay River at longitude 117 degrees, to near the head of Rebesca Lake (elevation about 885 feet). In places along Marian River they occupy a belt 10 miles wide and on Wopmay River occupy a belt about 5 miles wide. Smaller deposits of similar material occur in places along Emile and Snare Rivers within Snare River map-area. The silts and clays were probably deposited in broad, shallow lakes during the retreat of the post-Pleistocene sea.

CHAPTER III

STRUCTURAL GEOLOGY

FOLDING

The Yellowknife rocks almost everywhere dip steeper than 65 degrees, and in places are overturned as much as 25 degrees. The sedimentary members occur as a series of tight, nearly isoclinal folds, and commonly strike nearly parallel to the border of the enclosing, granitic rocks. In a few places beds were seen to bend around the ends of folds. The schistose rocks commonly cleave about parallel to the bedding. No evidence of an important stratigraphical or structural break was recognized between the sedimentary and volcanic rocks. Near Wijinnedi and Indin Lakes the volcanic members outcrop as broad bands within the sedimentary rocks, and probably in part at least occupy the central parts of complex anticlines. On the Pa group[1] of claims on the north shore of Indin Lake axes of folds in sediments are much more closely spaced than axes of adjacent folds in nearby volcanic rocks, although all rocks are believed to comprise a conformable group. The weaker sedimentary rocks may have been crumpled during folding, whereas the comparatively competent volcanic rocks folded in a less complex manner. The strike of the volcanic rocks, the least altered sediments, and the schists, is fairly regular over wide areas, but the gneiss is commonly crumpled. Only a few shear zones were seen, but others may follow some of the numerous, nearly straight, drift-filled depressions. Only a little shearing was seen along the contacts of the volcanic and sedimentary members, but these contacts were only observed in a few places.

The Snare rocks were deposited on an erosion surface developed on the Archæan granitic rocks as well as the folded sedimentary and volcanic members of the Yellowknife group. A second period of folding affected the Snare and older rocks and the erosion surface beneath the Snare strata now dips vertically in some places. The angle of dip of the Snare rocks in most places is less than 65 degrees and dips of less than 45 degrees are common. In a few places the beds are vertical or overturned as much as 10 degrees. In general the least altered rocks are most gently folded. Dips of less than 20 degrees are common near Basler and Kwejinne Lakes, and there the quartzites commonly form rounded arches and troughs and are not noticeably sheared, but the argillaceous rocks are commonly much sheared on the flanks of these folds. Most of the Snare rocks in the area of these rocks 6 miles north of the west end of Slemon Lake dip at angles of less than 15 degrees and are comparatively unaltered. More highly altered rocks extending from the north end of Basler Lake through Mattberry, Norris, and Arseno Lakes and the schistose rocks north of Arseno Lake commonly dip at angles of about 65 degrees.

[1] Data from geological map by W. L. Brown, Territories Exploration Company, Limited.

Many areas of Snare rocks are elongated basins in granitic rocks, and most of these basins, and the rocks within them, trend between north-northeast and northwest.

Dykes of diabase and gabbro cut straight through folded Snare rocks and were intruded after these rocks were folded.

The Ordovician rocks are nearly horizontal except where they rest on the sides of old hills.

FAULTS

Many faults have been recognized. They are marked by nearly straight topographic features such as rivers, lakes, valleys, scarps, or by diabase dykes or large quartz stockworks. In most places the faults are concealed by drift or water. Faults were seen in a few places and there the rock is brecciated, or crushed to a gouge. Most of the known faults strike about northwest, north, or northeast, and so far as known all are nearly vertical. Faults have been mapped only where geological features are offset or are inferred to be offset. Offsets of more than half a mile are common, and the greatest inferred offset is 7 miles. Straight topographic features are common elsewhere in the map-areas and some of them may mark other faults.

Faults that trend about northwest cut members of the Yellowknife group near Indin Lake and the northeast side of the faults has been displaced northwest relative to the southwest side. The maximum displacement noted is about 3 miles. The faults were not traced far into the granitic rock northwest of Indin Lake, and although they strike towards a northerly trending belt of Snare rocks near Arseno Lake they are not known to offset the Snare rocks. Pegmatite dykes southeast of Mosher Lake are offset an unknown distance by a fault that trends northwesterly towards the centre of the lake.

The longest known faults trend about north and in most places the east side has been displaced north relative to the west side. The maximum known displacement is about 2 miles. A fault was traced 63 miles north to Wopmay River from a lake about 10 miles east of the outlet of Mazenod Lake and follows a very well-defined trench throughout this distance. Snare rocks on the west side of the fault near its north end appear to have been displaced north relative to their equivalents on the east side.

Three faults near Russell Lake strike north or a little west of north and the rocks on the east side of each fault have been displaced north relative to those on the west side. The fault through the northwest arm of Russell Lake is probably much longer than shown on the accompanying map (No. 690A) and probably follows a line of lakes and rivers that extends from the mouth of Stagg River, 15 miles southeast of Rae, through Russell and Bigspruce Lakes to near the head of Kwejinne Lake, a distance of about 80 miles. At Bigspruce Lake the fault probably lies in the south arm of the lake and passes northerly through the middle of the lake to Snare River at the north end of the lake. Crushed syenitic and granitic rock was found near the fault on a small island near the north end of the lake, and at several places in the south arm of the lake where some granitic rock has been crushed and sheared to a streaky pink and green, fine-grained, mylonitic rock. Well-defined valleys, in places with high escarpment-like cliffs, suggest that the fault branches north of Bigspruce Lake and that these branches pass through Kwejinne Lake and join again near the head of Basler Lake. A deep valley from the head of Basler Lake suggests that the fault extends northerly along the east side of Mattberry Lake and beyond to Emile River at latitude 64° 30′.

A fault that lies approximately along longitude 115° 12′ has been traced 46 miles from a point 2 miles south of Ghost Lake, through Ghost, Wijinnedi, and Indin Lakes, to a point 9 miles north of Indin Lake.

Faults that trend about northeast occur east of Hislop Lake and in the northeast corner of Ingray Lake map-area. Where the direction of offset is known the northwest side of the faults has been displaced northeast relative to the southeast side. East of Hislop Lake six faults strike northeast across high hills that trend northwest. The valleys in which the faults lie, and the displacement of some of the northwest trending ridges at the faults, are readily seen on aerial photographs or from an aeroplane. In most places the offset is less than ½ mile, and most of the faults were not traced far into the adjacent granitic rocks. At the southeast end of the hills the Snare rocks end against a large fault that trends southwest. Seven miles southwest similar Snare rocks lie southeast of the fault and may be the offset continuation of the rocks underlying the hills. If so, this is the greatest displacement recognized in the map-areas. About 7½ miles west of the mouth of Emile River the fault follows sheeted and reddened granitic rock on the east slope of a ridge that rises about 300 feet above the adjacent country. The sheeted rock forms a gully about 20 feet wide and in places the west wall of the gully, about 50 feet high, is strongly sheared. The fault may dip east.

A fault that trends about east-northeast offsets two ridges of andesitic rock near the northeast corner of Ingray Lake map-area. A parallel fault lies 5 miles south; about 4 miles west of Emile River it offsets a contact between granitic rocks and a mixture of granitic and metamorphic rocks; and 14 miles west of Emile River granitic rocks near the fault have been thoroughly shattered.

Some faults cut Proterozoic granitic rocks, but none is known to cut the Ordovician dolomite. About 10 miles west of the mouth of La Martre River undisturbed Ordovician rocks rest unconformably on a large quartz stockwork that probably occupies a fault that trends northeast. Parts of many of the northwesterly faults between Wijinnedi Lake and the north end of Indin Lake are occupied by diabase dykes. So far as known none of the diabase in the faults has been sheared, but some of the diabase is altered a little and some movement may have occurred after the emplacement of the dykes. A fault that trends north probably offsets a large dyke of diabase 6 miles west of the southwest end of Rebesca Lake. Faults striking about north and northeast cut Snare rocks and Proterozoic granitic rocks, but only one northwesterly trending fault is known to cut these rocks although many northwest faults cut Yellowknife rocks and adjacent granitic rocks near Indin Lake.

CHAPTER IV

ECONOMIC GEOLOGY

GENERAL STATEMENT

Deposits that contain gold, or that were thought to contain gold, are the only mineral occurrences on which much work has been done. A little diamond drilling is reported to have been done on Au, Pa, and Dingo groups. All other known exploratory work has been confined to stripping and trenching (May 1941). About 83 fine ounces of gold was recovered from ore shipped by aeroplane from the Ann group during the winter of 1938-39 and no other metal or mineral is known to have been produced from the map-areas.

Reported and observed gold deposits are most numerous: (1) near Indin Lake; (2) near Mosher, Russell, and Slemon Lakes; and (3) east of Arseno Lake. All these areas are underlain by Yellowknife rocks.

Ten deposits were examined and are here described. Gold occurs, or is reported to occur, in quartz veins at all these deposits. The country rock at six deposits is andesitic rock of the Yellowknife group, at three it is schistose or comparatively unaltered sedimentary rock of the Yellowknife group, and at one it is slate of the Snare group. Most of the veins dip at very high angles and strike about parallel to the foliation of the enclosing andesitic rocks or to the bedding of the enclosing sediments.

The Galena vein on the Dingo group has an average width of 2½ feet for a known length of 850 feet, and is the largest known gold-bearing vein in the map-areas. The largest reported ore shoot occurs in another vein on the Dingo group and is reported (March 1941) to be 110 feet long, 5 feet wide, and to contain about 0·60 ounce of gold a ton. These veins are examples of veins in andesitic rock.

A vein on the Au group is more than 240 feet long, averages 2 feet wide, contains plentiful visible gold in places, and is an example of a vein striking across the bedding planes of enclosing sedimentary strata. Other deposits consist of groups of small veins following zones of shearing that approximately parallel the bedding of sedimentary rocks. Examples of this type occur on the Midas and Deloro groups. A fourth type of deposit consists of groups of small veins that follow bands of crumpled slate and greywacke; the deposit on the Corinne group is an example.

The gold-bearing quartz is white or grey. In places white quartz forms veinlets within grey quartz. The following minerals occur in the quartz or in country rock near the quartz: pyrite, galena, sphalerite, chalcopyrite, arsenopyrite, pyrrhotite, a soft, grey, fibrous, bismuth mineral, native copper, malachite, cobalt bloom, graphite, fluorite, calcite, iron-bearing carbonate, and pink-weathering feldspar. Metallic minerals commonly constitute less than 2 per cent of a vein, but in a very few places they constitute as much as 30 per cent of a vein. In most places carbonates make up only a very small proportion of a vein, but in the Barker vein on the Ann group they comprise about half the vein material. Gold is commonly visible and may be readily obtained by panning. It occurs in white and grey quartz and in carbonate. Most gold in the ore shoot in the Barker vein occurred in fine-grained calcite. The gold is distributed so unevenly in some veins that representative samples are very difficult to obtain.

Deposits of blue cordierite, some of which may be of gem quality, occur in the northeast corner of Snare River area and the southeast corner of Ingray Lake area.

GOLD DEPOSITS

DINGO GROUP (MERCURY GOLD MINES, LIMITED)

The Dingo group is owned by Mercury Gold Mines, Limited. It consists of about thirty claims located about 2 miles east of Arseno Lake and about 350 feet above it. The claims were staked by J. D. Mason in July 1939. Probably more than 85 per cent of the bedrock in the vicinity is covered by drift or muskeg. The claims have been explored by more than one hundred pits and trenches, most of which are on claims Dingo 2, 3, 4, 12, and 15. A few men were employed on the property during the summers of 1939 and 1940. The following description is based mainly on the examination made by the writer in 1939.

The rock near the principal known quartz veins is mostly fractured and sheared greenstone of the Yellowknife group. Much of it is fine-grained, but some of it has a medium-grained, dioritic texture. The dip and strike of the greenstone is not known. Granite outcrops about ½ mile east of the principal veins and cuts the greenstone. A few dyke-like bodies of feldspar porphyry occur in the greenstone near the veins, trend about northwest, and may average 20 feet wide.

Many narrow quartz veins occur on the claims. Most are in shear zones and some contain gold. Most of the shear zones are in greenstone, but parts of some[1] may be feldspar porphyry bodies. Most of the shear zones and veins strike about north 40 degrees west and dip 70 to 85 degrees northeast. Those on which most work has been done lie within a rectangle about 4,200 feet long from northwest to southeast and about 2,000 feet wide. One vein has been traced for 850 feet and may be longer. Many other veins have been traced for shorter distances, but because of heavy overburden none has been thoroughly explored. The exposed parts of most veins are between 6 inches and 5 feet wide and may average 2 feet. In most places the quartz has sharp walls against the enclosing greenstone or chloritic schist. In many places metallic minerals constitute a few per cent of a quartz vein, but here and there they form as much as 30 per cent. The following minerals are abundant in places: pyrite, pyrrhotite, chalcopyrite, galena, and sphalerite. Smaller quantities of the following minerals also occur in the quartz: native copper, gold, pale violet fluorite, and a soft, fibrous, grey, metallic mineral that contains bismuth, sulphur, and possibly other constituents.

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[1] Mason, J. D.: Personal communication.

Most work has been done on the Galena vein on Dingo 4 claim. This vein has been traced about 850 feet by nineteen trenches. It strikes north 40 degrees west and dips 80 degrees northeast. At the northwest end of the trenches the vein branches and passes under drift; at the southeast end of the trenches the vein passes under muskeg that borders a lake. The vein is in a shear zone in greenstone. The shear zone ranges from 2 to 6 feet wide and may branch in places. The width of the quartz vein ranges from 1 foot to 4½ feet and averages about 2½ feet. The vein branches in places. In the most northerly trench the shear zone is 6 feet wide and encloses 2½ feet of quartz in two veins. The vein is one foot wide in the most southerly trench. In many places the walls of the vein are sharp and free, but in some places the vein grades into the enclosing schist through a few inches of schist and quartz stringers. The quartz is milky white and contains pyrite, pyrrhotite, chalcopyrite, galena, sphalerite, gold, and native copper, and many irregular inclusions of chloritic schist. In many places metallic minerals constitute less than 1 per cent of the vein, but in one trench they constitute about 30 per cent. A sample across 2 feet of vein in this trench is reported to have contained: gold, 0·99 ounce a ton; silver, 5·50 ounces a ton. Fourteen samples from 825 feet of vein are reported to have averaged 0·25 ounce of gold a ton over an average width of about 2½ feet.

MIDAS GROUP

The following description is from notes by J. T. Wilson, who visited the property in August 1939.

The Midas group of claims was staked by Victor Stevens and Malcolm Norris near the north end of Norris Lake in July 1938. On the south side of a bay that forms the northeast corner of the lake eleven pits and trenches have been cut in rock so as to crosscut, at intervals, a rectangular area about 55 feet wide and extending about 325 feet along a line trending south 20 degrees west. The northern end is about 80 feet south of the bay at Norris Lake. The corner common to the claims Midas 3, 4, 5, and 6 lies within the explored area. No work was done on the group in 1940.

The country rock is rusty weathering, black slate of the Snare group. The slate cleaves along planes commonly spaced less than ¼ inch apart and the cleavage planes strike from north to north 60 degrees east and the angle of dip varies from 40 to 75 degrees west. Many cleavage planes are stained with iron oxide or are followed by seams of earthy iron oxide.

The four northern trenches and pits lie from 80 to 180 feet south of the lake and expose slate cut by a few quartz stringers about 1 inch wide and a seam of rusty gouge about 18 inches wide. The quartz contains a little galena and pyrite in places.

Metallic minerals are most plentiful in the next three trenches, which lie from 220 to 320 feet south of the lake. These trenches expose bands of slate, and bands of sheared, rusty slate with thin gouge seams. Quartz veins and lenses occur parallel to the cleavage in the unsheared and in the sheared slate, but are most plentiful in the latter. The veins are commonly about 1 inch wide, but range up to 18 inches wide. Most quartz is white and sugary and some contains fragments of slate. Quartz is probably most plentiful in the northern trench where it constitutes about 30 per cent of the rock over a width of 25 feet. Metallic minerals are plentiful in places and occur in quartz and slate. Galena is most plentiful and sphalerite, pyrite, and arsenopyrite occur in smaller quantities. No gold was seen.

The four southern trenches are from 370 to 405 feet south of the lake. Much of the rock exposed here is unsheared slate, but a little is sheared slate with quartz. Quartz occurs in seams and lenses up to 2 feet wide and constitutes about 10 per cent of the exposed rock. Gouge seams occur in a few places and there is a little chalcopyrite.

A picked sample of quartz, arsenopyrite, galena, sphalerite, pyrite, and chalcopyrite taken from the most heavily mineralized parts of most of the trenches contained [1]: gold, 0·7 ounce a ton; silver, 0·73 ounce a ton.

GOLD DEPOSIT NORTH OF INDIN LAKE

A gold deposit about 9 miles north of the most northerly bay of Indin Lake was found by prospectors of Territories Exploration Company, Limited, during the summer of 1939 and was examined by J. T. Wilson.

The rock near the occurrence is greenish, medium-grained, acid andesite of the Yellowknife group and contains disseminated pyrrhotite. It is sheared in places and the foliation strikes north 50 degrees east. Numerous veinlets of white quartz occur in a zone 50 feet wide that trends north 50 degrees east. They contain a very little pyrrhotite, iron-bearing carbonate, and unidentified minerals that probably include arsenopyrite, pyrite, chalcopyrite, and graphite. Three feet of the 50-foot zone is strongly sheared and contains gouge and quartz stringers, some of which contain visible gold. Coarse reddish gold was panned from the gouge.

PA GROUP

The Pa group of claims is on the north shore of Indin Lake and about 8 miles east of the west end of the lake. The claims were staked for Territories Exploration Company, Limited, in August 1938. Most work has been done on the Brown veins of gold-bearing quartz. No work was done on these veins during the latter part of the summer of 1939, when visited by the writer, or during 1940. The veins are reported to have been explored by diamond drilling during the winter of 1940-41. Pa 1 claim adjoins Pa 2 claim on the north and the veins cross the boundary between these claims about 15 feet from the west side of the claims.

The rock near the west side of Pa 1 and Pa 2 claims is soft, fissile, grey, sericite-carbonate-chlorite schist that is an altered volcanic rock of the Yellowknife group. The foliation strikes about north 10 degrees east and the dip ranges from 75 degrees east to vertical. These rocks are probably cut by a fault that strikes north 35 degrees west. It lies beneath a channel in Indin Lake and the channel trends about parallel to the fault and is about 1,200 feet wide. The veins outcrop on the north side of the channel, strike towards the fault, and pass beneath the channel. The

[1] Assay by Bureau of Mines, Department of Mines and Resources, Ottawa.

exact position of the fault is not known, but it is probably near the north shore of the channel. The relative ages of the fault and veins are not known.

The so-called Brown veins are two parallel quartz veins that are separated by about 12 feet of schist. They strike about north 10 degrees east and dip between 75 degrees east and vertical. They are nearly parallel to the foliation of the enclosing schist, but in places may cross the foliation at very small angles. The east vein is stripped for 145 feet and the width of the exposed part of the vein ranges from 1 foot to 5½ feet and averages 2½ feet. At the south end of the stripped part the vein passes under Indin Lake. At the north end of the stripped part the vein ends on the surface, but the end of the vein plunges north beneath the schist. About 110 feet north a lens of quartz about 27 feet long and up to 2½ feet wide outcrops on the strike of the east vein. No gold or other metallic minerals were seen in the lens. No quartz or shear zone is known to occur north of the lens or between the lens and the east Brown vein.

The west vein is stripped for 145 feet, and throughout most of its length its width ranges from 6 inches to 3½ feet and averages 1½ feet. At the south end of the stripped part the vein tapers to a point and may end at the edge of the lake. At the north end of the stripped part the vein passes under drift, but probably ends a few feet beyond.

The east and west veins are broken into three approximately equal lengths by two faults. These faults are nearly vertical and trend about northwest. The veins on the north side of each fault are offset about 4 feet northwest relative to the veins on the south side.

The walls of the veins are sharp and in many places are bordered by about 3 inches to 2 feet of rusty schist. Most of the quartz in the veins is much fractured and grey and includes a few seams of schist, which are parallel to the walls. Some quartz is white and vuggy and contains an iron-bearing carbonate. The white quartz occurs as veinlets and irregular masses, and some is separated from the grey quartz by sharp walls and some appears to grade into the grey quartz. Locally the grey and white quartz occurs in about equal quantities. Metallic minerals constitute less than 1 per cent of the veins and include pyrite, arsenopyrite, chalcopyrite, pyrrhotite (?), and gold. Visible gold occurs in both types of quartz, but is probably most common in the grey quartz. Fifty feet of the east vein is reported[1] to average 35 inches wide and to contain 1·42 ounces of gold a ton.

MA GROUP

The Ma group of claims is about 7½ miles east of the west end of Indin Lake and adjoins the Pa group on the south and west. The claims were staked for Territories Exploration Company, Limited, in August 1938, and visible gold was discovered in the Johnson quartz vein on the north-east quarter of Ma 5 claim on July 31, 1939. The vein is on a small island and 2 miles south-southwest of the Brown vein on the Pa group. It was examined by the writer on August 3, 1939.

[1] Johnston, A. W.: Personal communication.

Rock outcrops are scarce near the Johnson vein. Volcanic rocks of the Yellowknife group underlie the Ma 5 claim near the Johnson vein. Over wide areas the rock is a soft, grey, fissile schist that weathers buff in places. Near the vein about 30 per cent of the schist is a fine-grained, light grey rock that occurs in elliptical areas ranging up to about 6 inches long. Foliation trends about north 45 degrees east and dips northwest at steep to vertical angles. The rocks probably strike about northeast and dip nearly vertical.

The Johnson vein strikes about north 40 degrees east and was exposed for 100 feet by three trenches and an outcrop. It is hidden by muskeg northeast of the 100-foot section and probably extends less than 100 feet southwest of that section. The dip of the vein is not known, but may be steep northwest. The width of the exposed part may range from 2 to 4 feet. The walls are sharp in places. A few inches to 2 feet of rock next the quartz is a little more sheared than elsewhere and some of the rock next the quartz is rusty, probably due to the oxidation of iron-bearing carbonate. Most of the quartz is grey. A little, white, vuggy quartz with iron-bearing carbonate occurs as veinlets that cut the grey quartz. The vein contains a very little pyrite, and probably arsenopyrite. Gold was seen in grey quartz in one trench.

ANN GROUP

The Ann group of claims is on the east shore of Indin Lake about 8 miles north-northeast of the outlet. The claims were staked for Territories Exploration Company, Limited, on September 11, 1938. Most work was done on the Barker vein, which was explored by nine trenches. About 1,600 pounds of selected ore containing about 83 fine ounces of gold was sent to Yellowknife by aeroplane for treatment. In so far as is known no ore remains in the vein. No work was done on the vein in the summer of 1939, when visited by the writer, or in 1940.

The rock near the vein is mostly massive, dark green, andesitic lava of the Yellowknife group. Much of it is uniformly fine-grained, but some of it contains a few white phenocrysts or amygdules that range up to ½ inch across. The strike and dip of the lavas is not known. Feldspar-quartz porphyry cuts the lavas and outcrops 50 feet east of the vein and in several places about 225 feet northeast of the vein. A granitic body about ½ mile in diameter outcrops 2 miles southwest of the vein and another body about 2½ miles in diameter outcrops 5½ miles southeast of the vein. A fault cuts the lavas about ¼ mile west of the vein and strikes north 10 degrees west.

The Barker vein is on Ann 10 claim and about ¼ mile east of Indin Lake. Most rock near the vein is covered with drift, muskeg, or moss. The vein is 40 feet long at the surface and strikes north 25 degrees west and dips 50 degrees east. It is about 1 foot wide near the south end and gradually widens towards the north. The northern half of the vein ranges from 3 to 6 feet wide and ends abruptly in soft, grey, flaky schist. In places the rock next the walls of the vein is strongly sheared for about

1 foot. The outcrop of the vein ends to the south against a fissure that strikes north 35 degrees west and dips 70 degrees southwest. The fissure contains a few inches of sheeted rock and gouge and may be a fault. The vein and fissure meet along a line that plunges about 35 degrees south-easterly and a pipe-like body of ore with abundant coarse gold occurred along this intersection. The pipe-like body was about 1 foot in diameter and was followed down the intersection of the vein and fissure for about 10 feet to where it ended at the intersection of the fissure and a vertical fracture that strikes north 75 degrees west. All ore shipped from the vein came from this body. The vein is not known to have been located south of the fissure or south of the vertical fracture. The vein material is a mixture of grey and white quartz, black and white, coarse-grained carbonate, fine-grained white carbonate, and irregular fragments of chloritic wall-rock. Carbonate and quartz are present in about equal proportions and the carbonate is probably calcite. Metallic minerals may constitute 2 per cent of the vein material; chalcopyrite is most plentiful and there is some galena, sphalerite, pyrite, arsenopyrite, and gold. A little cobalt bloom is reported[1] to have occurred at the surface. Practically all known gold occurred in the pipe-like ore shoot at the south end of the vein, and the gangue in this shoot was mostly carbonate. Most of the gold is reported[2] to have occurred in the fine-grained carbonate.

BET GROUP

The following description is from notes by J. T. Wilson, who visited the property in September 1939.

The Bet group of claims is owned by the Bar-bet Mining Development Company, Limited, of Yellowknife. The claims lie about ½ mile west of the southwest end of Damoti Lake and adjoin the Ann group on the south. The trenches examined are near the northeast corner of Bet 4 claim.

Six trenches cross a line trending north 25 degrees east. They average about 20 feet long and are about at right angles to this line. They expose dark grey, siliceous argillite and fine-grained, dark green andesite of the Yellowknife group. The rocks are sheared in places and the foliation trends north 25 degrees east. Feldspar-quartz porphyry outcrops in many places nearby and some of it cuts the Yellowknife rocks. White quartz with numerous inclusions of country rock is exposed in the trenches as irregular stringers and lenses, most of which are nearly vertical and parallel the foliation of the rock. Six feet of one trench contains about 40 per cent quartz and 15 feet of another trench contains about 30 per cent quartz. One quartz lens is 2 feet wide in one place. Most quartz occurs as stringers less than 6 inches wide. It contains a little pyrite, galena, sphalerite, chalcopyrite, pyrrhotite, and malachite, and is reported to contain arsenopyrite and gold. The country rock contains pyrite and pyrrhotite in places.

[1] Johnston, A. W.: Personal communication.
[2] Johnston, A. W.: Personal communication.

DELORO GROUP

So far as known no work has been done on this group since 1938 when it was examined by the writer.[1] The claims are on a small lake on Snare River about 14 miles upstream from Slemon Lake. The camp and trenches are on the east shore of the lake.

". . . . . A crew of six men was employed on surface work when the property was visited in July 1938, but was withdrawn before the end of the summer. Most work has been done on Deloro 1 and Deloro 5 claims in nodular quartz-biotite schist, on the east shore of (the) lake about one-half mile east of the main body of granitic rock. The schist belongs to the Yellowknife group and strikes about south 10 degrees east and dips about 65 degrees northeast. On Deloro 1 claim eight pits and trenches have been put down on the east shore of (the) lake, over a distance of 275 feet and along a line trending south 10 degrees east. They do not expose a well-defined shear zone or quartz vein, but in a few places the schist contains some lenses and veinlets of glassy and milky quartz with a very little arsenopyrite, pyrite, and green copper stain. Several specimens reported to have come from these pits contained a little free gold. A pink aplite dyke is exposed in some of the northern pits and contains a little arsenopyrite and pyrite. Six trenches have been dug on Deloro 5 claim on the east shore of (the) lake about 2,100 feet southeast of the trenches on Deloro 1 claim. In one trench biotite schist is sheared and rusty for a width of 8 feet, and this zone trends southeasterly and dips 60 degrees northeast but is not exposed in the other trenches. The sheared rock contains a little quartz with a very little arsenopyrite and white mica".

AU GROUP

The Au group of twelve claims lies about 2½ miles northeast of where Snare River enters Slemon Lake. Boats with a draught of about 2 feet can navigate from Great Slave to the head of Slemon Lake. The claims were staked by John Lundmark and Waino Lahti on August 24 and 25, 1939, and were prospected by four men for several weeks during the summer. The property was visited on September 6, 1939. Most work was done on a quartz vein on Au 4 claim, and this vein is about 2 miles from the nearest point on Slemon Lake. Rocks underlying the claim are black slate and greywacke of the Yellowknife group. Near the vein on Au 4 claim they strike about north 25 degrees west and dip about 85 degrees east. Many of the beds are less than 6 inches thick. The nearest granitic rocks outcrop about 4 miles north and south of the vein, and intrude the slate and greywacke.

The vein on Au 4 claim strikes north 35 degrees west, dips from 55 to 70 degrees east, and is traced 240 feet. At the northwest end it passes under drift. At the southeast end it dies out in a fractured zone from 1 to 5 feet wide, which is visible on the strike of the vein for 60 feet before it passes under drift. The width of the vein ranges from 4 inches to 4 feet and averages 2 feet. The quartz contains no country rock. It is bordered in most places by a few inches of fractured rock. Most of the

[1] Lord, C. S.: Snare River Area, Northwest Territories; Geol. Surv., Canada, Paper 39-5, pp. 15, 16 (1939).

quartz is fine-grained and grey and in places is ribboned by seams that are parallel to the walls and contain chlorite and pyrite. A little quartz is coarse-grained and white, and some of this occurs as veinlets cutting the fine-grained quartz in which most of the metallic minerals and visible gold occur. Minerals other than quartz constitute less than 1 per cent of the vein and include pyrite, pyrrhotite, chalcopyrite, gold, possible arsenopyrite, and feldspar. A little violet quartz is reported to surround some of the grains of visible gold on the surface.

Considerable surface work and about 2,500 feet of diamond drilling are reported to have been done on this vein, and on other deposits in the vicinity, by Cambrae Exploration Company, Limited, during the summer of 1940.

CORINNE GROUP

So far as known no work has been done on this group since 1938 when it was examined by the writer.[1]

"The Corinne group of twenty-one claims was staked on Mosher Lake early in the summer of 1938 and the claims are registered in the names of A. C. Mosher of Haileybury, Ontario, H. Lajeunesse, V. J. Mosher, and H. Grozelle. The claims are underlain by Yellowknife group rocks, which are greywacke, nodular quartz-biotite schist, and greenstone. The principal discovery is on a small island near the centre of the lake about one-half mile east of its outlet. A northwesterly-trending fault probably passes close to this island. Stripping on the northeast shore of the island has exposed a stockwork of quartz in fresh slate and greywacke. This stockwork trends about south 30 degrees east, is exposed for a length of about 120 feet, and passes under the lake at each end. It contains about 10 per cent quartz. Its exposed apparent width is about 90 feet, but it passes under the lake on the northeast side and may be wider. Its true width may be much less than its apparent width because the quartz stockwork follows the beds, which may be drag-folded in the area that has been stripped. The greywacke and slate are crumpled within the quartz stockwork. The quartz is mottled grey and white and contains a little rusty weathering carbonate, pink feldspar, pyrrhotite, pyrite, chalcopyrite, arsenopyrite, and free gold, and is reported to contain some sphalerite."

LARGE QUARTZ STOCKWORKS (GIANT QUARTZ VEINS)

Quartz stockworks, locally known as "giant" quartz veins, outcrop in many places in the western parts of the map-areas. They do not resemble the gold-bearing quartz bodies found elsewhere in the map-areas, or in Yellowknife Bay, Beaulieu River, and Gordon Lake areas to the east. Most of them outcrop as ridges from 100 to over 250 feet high. Some of the stockworks probably average more than 100 feet wide. Most of them do not outcrop continuously for more than 1 mile, although stockworks outcrop at intervals along a line extending 25 miles southwesterly from a point 9 miles east of Rabbit Lake to near the west boundary of the area. Most stockworks trend between north-northwest

[1] Lord, C. S.: Snare River Area, Northwest Territories; Geol. Surv., Canada, Paper 39-5, p. 16 (1939).

and northeast, and many of them appear to lie in faults. The quartz is of more than one age and many veinlets contain rhythmically banded comb quartz. The enclosing rocks have been reddened, silicified, or otherwise altered for many feet. Some of the quartz contains specular hematite, and similar stockworks north of the map-areas are reported[1] to contain a little chalcopyrite and pitchblende. Some of those within the map-areas may contain these minerals, but commercially important mineral deposits are not known to occur in the stockworks in or near the map-areas. The stockworks cut Snare rocks and Proterozoic granitic rocks, and probably cut the feldspar porphyries and feldspar-quartz porphyries. Their age relative to the diabase and gabbro is not known. Some, and probably all, of them are older than the Ordovician (Richmond) dolomite rock because at least three stockworks with rhythmically banded comb quartz are overlain unconformably by these rocks about 10 miles west of the mouth of La Martre River, and no quartz veins of any kind were seen in the Ordovician rocks in that vicinity or elsewhere.

CORDIERITE DEPOSITS[2]

Cordierite, some of which may be of gem quality, was found 7 miles south of Ghost Lake on longitude 115 degrees. It superficially resembles fractured, transparent to translucent, blue quartz, but fragments of crystals, when held up to the light and rotated, vary in colour from intense blue to dull yellow. The mineral is the variety of cordierite (or iolite) known as dichroite. The rock near the occurrence is contorted and banded gneiss, porphyritic biotite granite, and fine-grained, equigranular granite. The gneiss is intruded by numerous seams and lenses of granitic and pegmatitic material and grades into the granitic rocks. The outlines of the body of gneiss are not known. In a few places it contains abundant amphibole or chlorite and displays a few recognizable pillows, indicating that it is derived from volcanic rocks; in other places it is well-banded and probably has been derived from sedimentary rocks; elsewhere its origin is unknown.

The gneiss is made up of quartz, biotite, sillimanite, reddish almandite garnet, cordierite, microline, andesine, tourmaline, spinel, and fine-grained graphite, in widely varying proportions. Garnets are commonly abundant and vary in abundance from band to band. They occur as crystals, and as aggregates of garnet and quartz that range up to about 4 inches in diameter. Pegmatitic stringers and lenses in the gneiss contain quartz, feldspar, biotite, garnet, cordierite, graphite, and other minerals. Cordierite is abundant in places, but less so than garnet. It occurs as irregular masses and as prismatic crystals. The largest observed crystals are about 4 inches long and 2 inches in diameter. Much of it is thoroughly fractured, but a few fragments collected were sufficiently free of fractures to be cut into small gem-stones. Some of it is partly altered to a micaceous mineral, probably pinite.

In so far as known relatively pure cordierite is most plentiful at the above locality, but bluish cordierite and fine-grained graphite occur in similar deposits at several places between this deposit and Ranji Lake, and also about 3 miles northwest of the west end of Ghost Lake.

[1] Kidd, D. F.: Rae to Great Bear Lake, Mackenzie District, N.W.T.; Geol. Surv., Canada, Mem. 187 (1936).
[2] Folinsbee, Robert E.: Gem Cordierite from the Great Slave Lake Area, N.W.T., Canada; Am. Min., vol. 25, p. 216 (1940).

PROSPECTING NOTES

Parts of the areas warrant much more careful prospecting than they have received. Most prospecting has been done in areas underlain by rocks of the Yellowknife group and most known and reported gold deposits occur within areas of these rocks. A little prospecting has been done in areas underlain by rocks of the Snare group, and in so far as known only one gold deposit and a few deposits of other minerals have been found in these rocks.

Nearly all known gold deposits north of Great Slave Lake are in quartz bodies within rocks of the Yellowknife group. Bodies of ore or near-ore occur in quartz within andesitic rock (greenstone), knotted schists and gneisses ("hot sediments"), and comparatively fresh greywackes and slates ("cool sediments") of this group. Prospectors should, therefore, pay particular attention to the 1,500 square miles of the map-areas underlain by Yellowknife rocks and should examine them regardless of their composition or degree of metamorphism. All quartz bodies in these rocks should be carefully examined for gold, irrespective of their colour, texture, form, or content of sulphide minerals, because none of these features is known to be a reliable indicator of the gold content of veins over large areas.

Bodies of gold-bearing quartz should be sought along faults, shear zones, drag-folds, crests and troughs of tight folds, or in weak, slaty beds or bands that have been squeezed between stronger beds of greywacke. The richest specimens of gold-bearing quartz, the largest known gold-bearing quartz vein, and the largest known body of near-ore in the map-areas occur in greenstone.

Drift and muskeg cover a greater proportion of Yellowknife rocks in Snare River and Ingray Lake map-areas than in Beaulieu River and Yellowknife Bay areas near Great Slave Lake. Drift and muskeg are particularly widespread over Yellowknife rocks in the barren grounds, north of latitude 64° 30′ and east of longitude 115° 30′.

Several areas of Yellowknife rocks appear to warrant particularly close prospecting. One of these includes a large body of greenstone south of Wijinnedi Lake and extends north of this lake for 40 miles, including all Yellowknife rocks near Ranji, Damoti, and Indin (locally known as Wray) Lakes. This is a strongly faulted area of alternating bands of sedimentary rocks and a variety of volcanic rocks. Several gold deposits, including one with spectacularly rich ore, have been found in this area near a line corresponding approximately with longitude 115° 13′. A second area includes all Yellowknife rocks near Mosher, Russell, and Slemon Lakes and extends a few miles north of Slemon Lake. This area is readily accessible from Great Slave Lake. It is cut by several large faults and contains three known gold deposits, one of which contains abundant visible gold. Many other occurrences of gold are reliably reported from the area. A third area includes a body of greenstone east of Arseno Lake wherein several gold-bearing quartz veins of medium grade occur on the Dingo group, now being actively explored by Mercury Gold Mines, Limited.

Rocks of the Snare group contain only one known gold deposit, but they are cut by granitic rocks and quartz veins in many places and may contain gold deposits or deposits of other metals or minerals. They contain seams of pyrite in many places and weather rusty over wide areas. In several places small deposits of galena, sphalerite, pyrite, and chalcopyrite were seen in quartz or in slaty rock. Altered Snare sedimentary and volcanic rocks and associated porphyritic rocks west of a line through the head of Marian Lake and the west ends of Saddle and Grant Lakes in part comprise a complex of rocks lithologically similar to rocks between Echo Bay (Great Bear Lake) and Beaverlodge Lake where deposits of pitchblende and silver occur. Similar deposits might occur within the map-areas. The highly faulted complex of Snare rocks and porphyritic rocks east of Hislop Lake, and the Yellowknife rocks near Emile River that lie on the extension of these faults, warrant prospecting.

The Palæozoic rocks are not likely to contain commercial quantities of oil, gas, or gold.