GEOLOGY OF THE RENCONTRE EAST AREA

By Bennett L. Smith and D.E. White

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JAN 26 1971
GEOLOGICAL SURVEY,
OTTAWA

I N T R O D U C T I O N

By Bennett L. Smith

Location

The Rencontre East area is located on the northern shore of Fortune Bay, which is on the south coast of Newfoundland. It includes the area between longitudes 55°00' west and 55°30' west and latitudes 47°35' north and 47°50' north. Long Harbour is near the eastern boundary of the map area while Corbin Bay and Bay du Nord are near the western boundary.

Means of Access

There are no roads and few trails; travel is almost entirely by water. Other than by chartered aircraft, there are two principal means of reaching the area. One is by coastal steamer from Port au Basque or Argentia, involving a trip of several days; the other is by motor road to Terrenceville at the head of Fortune Bay or to Baie de l'-Argent and thence by chartered transportation or by the mail boat that runs once a week.

Settlement of the area is confined to the fishing villages of which the largest, Rencontre East, has a population of 305 according to the 1956 Dominion census. Wireless stations are operated by Canadian National telegraphs at Pools Cove, Bay du Nord, Rencontre East, Stones Cove and Andersons Cove. Coastal steamers call at each of these places at intervals of a little less than a week, and mail service is provided weekly. There are general stores, carrying a wide range of items, in most of the villages. A refrigeration plant is operated at Rencontre East for the purpose of freezing bait. Power boats are available for hire at several villages.

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Previous Geologic Work and Basis of this Report

Prior to 1940, the only published geologic comment from the Rencontre East area was that of Howley (1888) who made a brief visit to Bay du Nord in 1887. Widmer (1950) and Bradley (1954) each have described in some detail other early geologic work in the general vicinity of Fortune Bay.

D.E. White carried out field work during 1937 and 1938. He studied in detail molybdenite prospects, particularly in the vicinity of Rencontre Pond, and mapped by plane table and alidade the margin of the Ackley granite with which the showings were associated. His work was later extended to regional mapping of the Rencontre East map area. The results of this work were described in a doctorate dissertation at Princeton University and in an unpublished report submitted to the Newfoundland Department of Mines. Detailed information concerning the molybdenite showings and the Ackley granite were set forth in a separate publication (White, 1940). Kemble Widmer, who had assisted White in 1940, continued mapping to the west of the Rencontre East area. Interrupted by World Way II, this field work was completed in 1946. Widmer's doctorate dissertation includes a revision of some of the stratigraphy in the area mapped by White as well as a comprehensive discussion of problems in the Fortune Bay region as a whole.

D.A. Bradley began field work in 1947 east of the Rencontre East area. The work of White, Widmer and Bradley had been carried out under the auspices of the Newfoundland Geological Survey; in 1949 when Newfoundland entered confederation with Canada, the Geological Survey of Canada assumed responsibility for the publication of the work of White and Widmer as well as that of continuing the work of Bradley. The latter completed his field work in 1951.

Bennet L. Smith spent about six weeks in 1952 for the Newfoundland Department of Mines and Resources in a study of fluorite occurrences in the vicinity of Long Harbour (Smith, 1953). In 1954, Smith was asked by the Geological Survey of

Canada to re-study the Rencontre East area in the light of information obtained by Widmer and Bradley in the adjoining areas.

Most of the major geological features on the accompanying map are shown approximately as mapped by White. Smith has mapped some units in greater detail, particularly the Belle Bay and Rencontre groups, and has revised certain stratigraphic interpretations. About 40 thin sections were examined. In the areas not traversed by this author, the geological features shown on White's map have been adjusted to conform to information from aerial photographs. The base map with contours at intervals of 50 feet was prepared by the Geological Survey of Canada from aerial photographs. Revisions suggested by Widmer concerning the Cinq Isles group and the Pools Cove conglomerate have been adopted.

Acknowledgements

Laurence Hammell, a graduate student at Rutgers University, capably assisted the author and carried out a considerable amount of independent mapping. Men employed locally acted as dorymen and as assistants in traversing. The hospitality and friendly interest of residents helped to make the field work pleasant.

Discussions with Bradley and with Widmer have been very helpful and L.J. Weeks, Chief of the Post Pre-Cambrian section of the G.S.C., visited the author briefly in the field.

In 1937, White was assisted by George Hobbs and in 1938 by Kemble Widmer. His work was supported by grants from Princeton University. Edward Sampson, A.F. Buddington and G.F. Howell of the Princeton faculty all received credit from White in his thesis for aid and advice.

Physiography

On the granite of the northern part of the map-area, a rather flat erosional surface has developed which rises to

about 600 feet to 800 feet above sea level. The relief is much greater in the southern part and some felsite hills are 1,000 to 1,100 feet above sea level. The coast is rugged but there are sandy beaches in most coves and across the mouths of the smaller bays. Remnants of marine terraces, twenty to thirty feet above present sea level, are found along parts of the coast; the village of Rencontre East is built upon one terrace.

The upland is practically devoid of vegetation except for stunted growths of conifers and shrubs in valleys. There is almost no tillable soil and the only planting is in some of the sand and gravel terraces along the coast. A very high percentage of bedrock is exposed and the aerial photographs show much intimate detail of bedrock structures.

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Chapter II

General Geology

By B.L. Smith

GENERAL STATEMENT

In most of the southern part of the Rencontre East area, the bedrock consists of a thick assemblage of folded volcanic, pyroclastic and clastic rocks. Felsite predominates in most of this section, the total thickness of which is estimated at more than 15,000 feet. The top of the exposed sequence is made up mostly of conglomerate and sandstone derived from the erosion of volcanic rocks. Although these rocks have been divided into the Belle Bay group and the Rencontre group which are separated by an unconformity, they are believed to be the products of a more-or-less continuous sequence of volcanic activity and crustal unrest. For reasons given below they are believed to be of Ordovician and/or Silurian age.

Shales which have been dated as Upper Cambrian by good fossil evidence occur in two relatively small localities in the southwestern part of the map-area. Red micaceous sandstones underlie the shales with gradational contact. The Great Bay de l'Eau conglomerate in the southwestern part of the area is known to be of Upper Devonian ages on the basis of fossil evidence from the adjacent Hermitage Bay map-area. The Cinq Iles group (sandstone, siltstone, and limestone) and the Pools Cove conglomerate, which are exposed along the shores of Bay du Nord and Bay d'Est are older than the Great Bay de l'Eau conglomerate and younger than Upper Cambrian rocks but cannot be dated more precisely than this.

All of the sedimentary and volcanic rocks have been folded along northeasterly trending axes. Broad open folds are characteristic and the only regional metamorphism of consequence is the development of cleavage in some of the finer grained clastic rocks.

Granite and related plutonic rocks underlie the north-

ern part of the map-area. These have intruded the Cambrian, Belle Bay and Cinq Isles rocks and from evidence in the Hermitage Bay area, are known to be younger, at least in part, than the Upper Devonian Great Bay de l'Eau conglomerate.

Molybdenite has been found in several localities along the southern contact of the granite between Belle Bay and the eastern boundary of the area and fluorite occurs near Long Harbour and Conne Cove. Prospecting of these deposits has not been very rewarding.

Table of Formations

Era	Period	Formation or group and thickness (feet)	Lithology
Cenozoic	Pleistocene and Recent		Terrace gravel and sand
Palaeozoic	Late Devonian (?)		Dikes ranging in composition from basalt to rhyolite
		Ackley granite	Biotite granite, alaskite; minor aplite
		Intrusive contact (?)	
		Bay du Nord	Granodiorite, alaskite; quartz diorite and diorite (?) locally abundant
	Relationship unknown		
	Upper Devonian	Great Bay de l'Eau conglomerate	Red conglomerate; minor red sandstone
	Relationship unknown		
		Pools Cove conglomerate	Conglomerate; minor red sandstone
	Relationship unknown		
	Ordovician and/or Silurian	Rencontre group	Felsite conglomerate and lithic sandstone; grey slaty shale; red and purple sandstone and siltstone; basalt and andesite; felsite
	Angular unconformity		
		Belle Bay group	Mainly felsite; some andesite, basalt (?); and pyroclastic rocks; minor sandstone and slaty shale or tuff
	Relationship unknown		
	Ordovician or Silurian	Cinq Iles group	
	Relationship unknown		
	Middle Cambrian	Youngs Cove group	Slate, slaty shale and quartzite; minor fossiliferous siltstone
		Doten Cove group	Mainly red micaceous sandstone; minor shale
Relationship unknown			
Proterozoic ?		Garrison Hills gneiss	Granite gneiss, paragneiss

CAMBRIAN ROCKS

DOTEN COVE FORMATION

Name and Distribution. The name Doten Cove formation is proposed for red micaceous sandstones that are well exposed on the northern side of Corbin Bay, where they underlie with angular unconformity the conglomerate of the Great Bay de l'Eau formation. Doten Cove is a small cove on this shore. Reddish and greyish sandstones on the south shore of Corbin Bay and red and grey micaceous sandstones east and northeast of Bay d'Est are also assigned to this formation. The minimum thickness of the Doten Cove formation is probably about 2,000 feet but the base of the unit has not been recognized.

Lithology and Structural Relations. The typical rock is a well-stratified red, arkosic, micaceous sandstone, commonly in beds one foot or less in thickness, separated by thinner beds of deeper red, micaceous, fine-grained sandstone or siltstone. Crossbedding is present in places. The lowest known beds of the Corbin Bay section consist in part of light red, medium to course grained sandstones which are commonly crossbedded and which grade into purplish grey and greenish-grey, coarse, arkosic sandstones.

The upper contact is gradational over a distance of ten feet or more into typical slates and quartzites of the Youngs Cove group. The beds grade upward from red to deep purple, to grey to greenish grey. Both quartzites and slaty siltstones are present through out the gradation but the slates become more abundant within the overlying Youngs Cove formation.

Origin, Age and Correlation. The red colour, the abundance of clastic mica and the presence of relatively fresh grains of feldspar seem to indicate a terrestrial, rather than marine, origin.

The relationship with the fossiliferous Youngs Cove group suggests early Cambrian age for the formation. In the adjoining Hermitage Bay map-area, however, Widmer (1951) recognized two units which intervene between the Youngs Cove shale and Doten Cove sandstone, namely the Chapel Island formation and the Blue Pinion quartzite. It is possible that these units might be recognized in the area east of Bay d'Est with more detailed study. On the Rencontre East map, the Doten Cove is shown merely as older than the Youngs Cove group.

There does not seem to be enough information available to warrant correlation with other areas in Newfoundland.

YOUNGS COVE GROUP

Name and Distribution. The name Youngs Cove group is proposed for interbedded slates and quartzites which occur in a belt running northeasterly from Bay d'Est and also on the south shore of Corbin Bay. The cove from which the name is derived is located on the southeastern shore of Bay d'Est. The minimum thickness of the rocks in this group is estimated at about 2,000 feet.

Lithology. The group consists mostly of interbedded slates and quartzites. Individual beds are mostly less than a foot thick but there are some thicker massive layers of quartzite. The latter is fine-grained, grey to greenish grey or dark purplish-grey. Most of it contains abundant fine-grained mica, particularly near the top of the section and it appears to be of clastic origin. The slates are black, dark grey and dark greenish-grey.

With more detailed study, it is possible that the group could be divided into two or more formations on the basis of slight lithologic variations or additional fossil evidence. Grey siltstone containing limestone concretions was found in one locality just south of Youngs Cove. This unit is several hundred feet thick but has not been recog-

nized elsewhere.

Structural Relations. These rocks have undergone moderate regional metamorphism and have been the least competent unit in the Rencontre East map-area.

The lower boundary of the group is believed to be gradational with the Doten Cove group. The upper limit of the group has not been recognized. The Belle Bay volcanics overlie the Youngs Cove group with angular unconformity west of Belle Bay.

Age and Correlation. On the south shore of Corbin Bay, about one-half mile northwest of the settlement of Corbin and about 750 feet west of the southern head of Corbin Bay, fossils were found in grey siltstone. According to Howell[x], who very kindly investigated and identified this fauna, the following are present:

x, personal communication.

Paradozides eteminicus (Matthew)

Paradozides bennetti (Slater)

Bailiella ornata (Resser)

Liostracus ouangondianus (Hartt)

Acrothele matthewi (Hartt)

Howell states that all of these species are characteristic members of the Paradozides eteminicus fauna of the upper part of the Paradozides bennetti zone of early medial Cambrian age. All have been reported previously from the Chamberlins Brook formation of Conception Bay, Newfoundland.

Near the middle of the north shore of Youngs Cove in Bay d'Est, fragments of Paradozides eteminicus were found in a slaty siltstone.

Rocks which are probably equivalent in age and which are similar in lithology to those of the Youngs Cove group have been described from Conception Bay, southeastern Newfoundland[1],

1. Howell, B.F., Cambrian-Ordovician Stratigraphic Column in Southeastern Newfoundland, Princeton Univ., Contributions to the Geology of Newfoundland, No, 8.

from Cape Breton Island, Nova Scotia[2], and from St. John[3],

2. Matthew,G.F., Cambrian Rocks of Cape Breton, Geol. Surv. Can., Bull. 797, 1903.

3. Hayes, A.O., And Howell, B.F., Geology of St. John, New Brunswick, Geol. Soc. Am., Special Paper 5, p.58, 1937.

New Brunswick. The slaty shale rocks which de al Rue[4] described

4. de al Rue, E. Aubert; Premiers Resultats d'une mission geologique aux iles Saint Pierre et Miquelon' Revue de Geol. Phys. et de Geol. Dynam., Vol. X, fasc. 4, pp.417-453, 193?.

on the island of Little Miquelon are at least in part equivalent to the Youngs Cove group.

Other Cambrian or Cambro-Ordovician Rocks

About 2,500 feet southwest of Shine Cove, on the south shore of Cinq Isles Bay, fossils were collected and of these Howell writes (Personal communication):

> "One of these specimens contains no fossils except worm burrows; the other holds three brachiopods which resemble in form Lingulella laevic Matthew, but are smaller than that species and are probably an indescribed form. They may be late Cambrian age, but are probably younger, since no such brachipods have been found in Upper Cambrian to Tremadocian rocks elsewhere in Newfoundland".

Two specimens of brachiopods were also found in a boulder of limy sandstone within the Great Bay de l'Eau conglomerate about one-half mile northeast of Shine Cove; this boulder was probably derived from the Cinq Isles group. According to Howell (personal communication) one species is perhaps Lingulella bella (Walcott), which is known to occur in the Arenigian beds of Little Bell Island and Bell Island in Conception Bay. The other species is referable to the subgenus Westonia of the genus Obolus. It resembles Obolus (Westonia) escasoni (Matthew) but is larger than that species and is probably new. Howell adds that Ololus (Westonia) escasoni

is a Cape Breton species, which Matthew considered to be of late Cambrian age. The similarity of the Lingulelle which accompanies it to Lingulella bella, however, argues for a Canadian age for both species.

Southerly-dipping shales on the southwestern shores of Cinq Isles Bay were originally regarded as part of the Youngs Cove group but are now placed in a separate catagory, without formal name, as being of uncertain age. With the benefit of additonal fossil and structural evidence in the Hermitage Bay map-area, Widmer (1950) has described the Cambro-Ordovician sequence of that area in considerable detail.

ORDOVICIAN AND/OR SILURIAN AND DEVONIAN ROCKS

By B.L. Smith

BELLE BAY GROUP

Name and Distribution. The name Belle Bay volcanics was proposed originally by White (1940) for a thick sequence of rocks which outcrop in most of the southern part of the Rencontre East map-area. The term "group" is proposed in this report because of the diverse lithology and because the aseemblage can be subdivided into three mappable units in a large part of the map-area. The thickness of the group in the eastern part of the map-area is calculated at more than 15,000 feet unless there is unsuspected repetition by faulting. Just west of Belle Bay the thickness is calculated at about 12,000 feet. Near Corbin, it is not clear where the boundary should be drawn between the Belle Bay and the Rencontre groups but the Belle Bay is much thinner there than elsewhere in the map-area.

Lithology and Structure. Between Belle Bay and the Long Harbour fault there are three separable units dipping more or less homoclinally in a southerly direction. The lower one consists almost entirely of felsite; the middle one is a heterogeneous assemblage of silicic and gasic lavas, pyro-

clastic and clastic rocks; the upper unit consists entirely of felsite.

The lower part of the group north of Mal Bay, is a monotonous sequence of felsite. Most of it is reddish-purple to chocolate-brown in colour and lacking obvious foliation although a structure interpreted as flow-banding can be recognized in some outcrops. Tiny phenocrysts of quartz and feldspar are characteristic of the more massive phases. Megascopic spherulites are rare. There are minor occurrences of banded rocks which might be welded tuffs.[1] D.A. Bradley (oral communication) states that, in field work subsequent to that of the writer, he has mapped discontinuous occurrences of dark slaty rocks along the contact between the Ackley granite and the Belle Bay group west of Rencontre Pond and northeast of Mal Bay. He believes these to be equivalent to the Nine Mile Hill formation of the Terrenceville area for which there is strong circumstantial fossil evidence of Upper Cambrian age.

As exposed on the shores of Mal Bay, the rocks of the middle part of the group include medium to dark greenish-grey andesite and/or basalt, andesite (?) agglomerate, pale to medium grey, thinly laminated slaty tuffs (?), reddish and purplish sandstones, minor pale grey rhyolite and one thin unit consisting of cross-bedded, well sorted quartzose sandstone. The dark-coloured flows and some of the clastic rocks are similar to rocks found in the lower part of the Rencontre group and which are described in more detail below. In the field and on aerial photographs, the sets of dark flows can be traced with considerable lateral continuity but the clastic rocks seem to be of more local extent.

The felsite of the upper part of the group is pink in colour and exhibits well-developed columnar jointing in every large cliff exposure which was examined.

The lower felsite part of the group is much thinner west of Belle Bay but the middle section is somewhat thicker

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1. White (1940) presents considerable petrographic detail concerning the felsites of the Belle Bay group.

than at Mal Bay and includes relatively more felsite intercalated with fragmental rocks.

Near the settlement of Corbin, the section begins with amygdaloidal, dark coloured flows, followed in turn by felsite, a thin conglomerate unit, dark coloured flows, reddish to greyish clastic rocks and more felsite. It is not clear where the boundary between the Belle Bay and Mal Bay groups should be drawn in this part of the map-area; it is possible that the thin conglomerate unit referred to in the previous sentence marks the base of the Rencontre group.

East of the Long Harbour fault, the major structure is a broad syncline, the acial plane of which trends northeasterly from about the mouth of Long Harbour. Just east of the Rencontre East map-area, Bradley's map (the Terrenceville-Gisburn Lake map area) shows that the plunge of this structure is to the southwest but it reverses direction between Conne Cove and Long Harbour (Smith, 1952, pp.) but is probably again southwesterly or nearly flat west of Long Harbour. In the central part of this structural basin, the rocks of the Belle Bay group are pink and purple felsites; there are no basic flows or coarse clastic rocks. These are probably the approximate equivalent of the upper unit of the group at Mal Bay although thicker and more heterogeneous with respect to varieties of felsite. Columnar pink felsite on the northeast shore of Conne Cove is identical in appearance to that at Mal Bay.

The rocks exposed along the shore east of Conne Cove are similar to those of the middle part of the group at Mal Bay; they include amygdaloidal andesite and clastic and pyroclastic rocks. Andesite, pyroclastic rocks and felsite north of the Long Harbour syncline seem to belong to the middle unit of the group while the lower felsite unit has been cut out by granite in the area east of the Long Harbour fault.

Thin sections of felsite of various kinds from widely distributed locations in the Belle Bay group yield little pet-

rographic information because the matrix is in nearly all cases a very fine grained aggregate that cannot be resolved under the microscope. Tiny phenocrysts which are characteristically present in the more massive varieties are quartz, orthoclase and silicic plagioclase. Microspherulites are found in most thin sections of all types. Banded structures appear to be the result of flow in most cases but some banded felsites may be welded tuffs. No chemical analyses have been made.

During a detailed study of fluorite occurrences in the area between Long Harbour and Conne Cove (Smith, 1952) the author was able to obtain structural information by mapping varieties of felsite distinguished by slight differences in colour and texture, but as noted by White, it is very difficult to distinguish between individual flows and structural mapping of these rocks is a very time-consuming affair.

Structural Relations and Age. White (1940, p.968) states that an angular unconformity separates the rocks of the Belle Bay formation from fossiliferous Upper Cambrian rocks. Three places were found by the present author where the contact between the Belle Bay group and Cambrian rocks is exposed. About one mile west of the foot of Belle Bay, reddish and greyish micaceous sandstones of the Doten Cove group strike about north and dip about 45 degrees to the west. Tracing these beds to the south, the strike swings to the southeast as the contact with the Belle Bay group is approached, and the dip swings to the southwest. On a steep slope, just south of a Y-shaped lake, the sandstones are overlain by rocks containing fragments of felsite in a matrix that is too fine-grained to be resolved under the microscope and, in turn, by amygdaloidal dark coloured flows and by felsites. Thin sections show a considerable amount of epidote and other alternation products in these rocks. The sandstones are slaty to schistose, with the secondary foliation developed about parallel to the bedding.

Slickensides on foliation planes are approximately horizontal.

South of Youngs Cove, near the southeast corner of Bay d'Est, a fault contact between slate and volcanic rocks is exposed in a brook near the crest of a prominent slope. The fault dips about vertically; slickensides plunge about 60 degrees westerly. The cleavage of the slates dips 55 degrees southerly at the fault and 45 degrees northerly near the base of the slope. The volcanic rocks on the south side of the fault are greenish and thin-sections show much epidote and other alteration minerals. Less than an inch of gouge and breccia occurs along the fault surface and the slates are not notably more crumpled near the fault than elsewhere in the area.

On the south shore of Corbin Bay, just west of the village of Corbin, fossiliferous Upper Cambrian shale is overlain by volcanic rocks believed to belong to the Belle Bay group. The lava sequence begins with a columnar andesite (or basalt) flow, above which are silicic pyroclastics and flow-banded felsite (or welded tuff). The shale and the volcanic units are more or less conformable. The upper 25 feet of the shale is a sheared zone with traces of pyrite but the volcanic rocks do not appear to have been sheared. The contact is irregular in detail suggesting an erosional surface.

In brief, there is evidence of some displacement at the contact between Belle Bay and Cambrian rocks but it might be expected that the latter would be relatively incompetent during regional deformation so this is not surprising. A fault or fault zone of very great displacement would have to be present if the Belle Bay rocks were older than the Youngs Cove and Doten Cove formations and the contact is interpreted as an unconformity and as an angular unconformity west of Belle Bay.

In the Terrenceville-Gisburn Lake area, Bradley reports that the Grand le Pierre formation (crystal lithic tuff, felsite, greywacke, chert and basalt) overlies with apparent conformity the beds of the Nine Mile Hill formation

for which there is some fossil evidence of Upper Cambrian age. He states also that the Belle Bay volcanics overlie the Grand le Pierre formation and the Nine Mile formation with angular unconformity in both cases.

The weight of evidence indicates that the rocks of the Belle Bay group are post-Cambrian. They are certainly older than the Upper Devonian Great Baie de l'Eau conglomerate but there is no present means of dating these rocks more precisely except by comparison with other areas. In this report they are regarded as being of either Ordovician or Silurian age.

It is quite possible that some of the felsite assigned to the Belle Bay group in the Rencontre East map-area might be equivalent to the Grand le Pierre formation of the Terrenceville-Gisburn Lake area.

RENCONTRE GROUP

Name and Distribution. The name Rencontre formation was proposed by White (1939, 1940) for certain volcanic and clastic rocks which, near the village of Rencontre East, are separated from rocks of the Belle Bay group by an unconformity. Two units, the Andersons Cove slate and the Mooring Cove volcanics, which White believed to be older than the Rencontre formation, are now thought to be at least partly contemporaneous with the lower part of his Rencontre formation. The term Rencontre group is here proposed to include the rocks of all three of White's formations (Rencontre, Mooring Cove and Andersons Cove) and the formation names are abandoned. These rocks form most of the outer coastline west of Long Harbour and they occur also in synclinal structures on the east shore of Long Harbour and north of Conne Cove.

Lithology. Between Mal Bay and Belle Bay the group could be divided into a lower, prediminantly volcanic, unit and an upper sedimentary unit but this distinction cannot be extended throughout the map-area. At the entrance to Mal Bay, the lower

part of the group is made up mainly of basalt and/or andesite. This is typically very fine-grained and pale greenish-grey on the freshly broken surface, weathering to a dark greenish-grey with a purplish cast in places. Individual flows are 10 to 20 feet thick and both tops and bottoms are abundantly amygdaloidal. In thin sections it is difficult to recognize the original minerals because of alteration to epidote, zoisite, chlorite and other minerals. Microlites in one section examined are andesine but probably most of the rock is altered basalt as reported by White but was not seen by this writer. Some flows show columnar jointing. There is a thin conglomerate at the base of the group on both shores of Mal Bay and, about 1,000 feet above the base of the group, 300 feet of greenish-grey slaty shale. Reddish and purplish sandstones and siltstones, similar to rocks found in the middle part of the Belle Bay group, occur near the top of the volcanic part of the group on the west shore of Mal Bay. Figure 2 gives information concerning sections measured or estimated in several localities.

The upper part of the group, near Rencontre East and on Rencontre Island, consists of an estimated 1000 feet of conglomerate followed by about 300 feet of greenish slaty shale and at least 2000 feet of interbedded sandstone and siltstone. The conglomerate consists of well-sorted, rounded pebbles of felsite with minor quartz and slate in a minimum of matrix. The greenish shale is thinly bedded and similar to that found in the lower part of the group. The sandstone of the upper part of the exposed section is a distinctively layered rock. It is made up of beds of coarse lithic sandstone

1. By this is meant a rock made up mostly of rock fragments, rather than mineral grains.

or fine conglomerate alternating with beds of very fine grained lithic sandstone or siltstone. The coarser beds are reddish to pinkish light grey in colour, one to four feet thick and

commonly exhibit crossbedding. The finer beds are a deep brick red colour and generally only about one fourth as thick as the coarser beds although some sections are as thick as four or five feet.

In thin section, both rock types show fragments of felsite and less than five percent of quartz and feldspar. The matrix is mostly an opaque aggregate. The transition between beds is abrupt and the beds are quite uniform in thickness over considerable distances.

To the west, near Belle Bay, there is relatively more clastic material and less basalt in the lower part of the section. The basal conglomerate is about 100 feet thick where exposed in a cove about three miles west of Rencontre East. The sandstone me bers near Lally Cove and near Corbin contain 20 percent or more quartz and some beds are of relatively pure quartzite.

In the Stones Cove syncline, the stratigraphic sequence is similar to that at Mal Bay except that slates occur just above a basal conglomerate and the basalt flows occur in six sets separated by reddish and purplish clastic rocks. The upper part of the group is represented here only by rather homogeneous felsite conglomerate, the rest of the section being concealed by water.

In the syncline north of Conne Cove, slates and sandstones overlie a basal conglomerate. A single amygdaloidal dark flow 25 feet thick occurs about 500 feet above the base of the group, with conglomerate above and below it. A felsite flow has been reported by Bradley just outside the Rencontre East map-area still higher in the section. The conglomerate in the higher part of this section shows a greater variety of pebbles than observed elsewhere; felsite predominates but dark coloured volcanic rocks and slate are well represented.

The rocks exposed along the eastern shore of Long Harbour which have been mapped with the Rencontre Group include sedimentary rocks ranging from conglomerate to shale. Silty

shales predominate; these are greenish grey, thinly bedded and tend to be slaty. The sandstones range from pinkish-grey to red and purple in colour. Basalt (or andesite) occurs near the base of the exposed section. Conglomerate beds seem to mark the base of the group clearly on the northern limb of the Long Harbour syncline but the base of the unit is not clearly defined on the southern limb. There is a possibility that these rocks belong in the Belle Bay group; the lithology of the lower part of the Rencontre group is similar to that of the middle part of the Belle Bay group.

On both limbs of the Andersons Cove syncline there are basalts and intercalated clastic rocks. These are overlain by greenish slaty shale and felsite, which were described by White as the Andersons Cove slate and Mooring Cove felsite. The slate is probably the stratigraphic equivalent of the unit which is about 1,000 feet above the base of the group at the entrance to Mal Bay and is almost certainly the equivalent of the slate and sandy slate of the Long Harbour syncline and the thinner slate unit at the base of the group north of Conne Cove. The felsite is local in extent (it pinches out on the south limb of the syncline) and seems to occupy a stratigraphic position equivalent to that of the basic flows in the Stones Cove syncline. Resting on the felsite on the northern limb of the syncline is conglomerate of the upper, sedimentary part of the group. On the southern limb, the base of the conglomerate is partly on felsite, partly on basic flows.

Structural Relations. Sections that have been measured or estimated are illustrated in Fig. 2. Rather sharp lateral variations in lithology must occur if the rocks of the Andersons Cove, Conne Cove and Long Harbour syncline have been properly assigned to this group.

Conglomerate which marks the base of the group is exposed at Corbin village, in several places between Belle Bay and Mal Bay, on the trail between Stone's Cove and Anderson's

Cove, on the north shore of Conne Cove and at a point about miles northwest of Conne Cove. At the two latter places flow banding in the underlying felsite dips almost vertically and the contact appears to be an angular unconformity. However, flow banding in the silicic lavas strikes and dips at rather irregular angles and it is quite possible that erosion of a few tens of feet of felsite would result in the structural relations observed. On the whole, individual units of the Belle Bay group tend to be conformable with those in the Belle Bay group and there is no clear evidence of any intervening major orogenic event.

Origin. The most important facts bearing on the mode of origin of the sedimentary rocks of this group seem to be as follows: the repeated layering of shaly rocks with cross-bedded sandstones, and the great lateral continuity of individual beds, the good sorting within individual beds, the relatively fresh nature of feldspar as seen in thin section, the opaque matrix and the reddish colours. The interlayering of sandy and silty beds in the upper part of the group could be the result of seasonal deposition. Mudcracks were reported by White in the lower part of the group near Lally Cove and he was of the opinion that the slates north of Anderson's Cove might be of lacustrine origin.

Age. Bradley and Widmer have both presented evidence that the Rencontre group is older than the Upper Devonian Great Bay de l'Eau formation. Although there is an unconformity at the base of the Rencontre group, the similarities of lithology between the lower part of this group and the Belle Bay group and the overall structural concordance between the two groups indicate that they are closely related in time. There is no present way of dating the Rencontre group more accurately except by comparision with other areas and in this report they are regarded as being of either Ordovician or Silurian age.

Connaigre Bay Volcanics.

In the extreme western part of the Rencontre East map-area, north of Bay du Nord, there is a thin sliver of a unit which has been mapped by Widmer (1950) as the Connaigre Bay volcanics. These rocks form a large unit in the adjacent Hermitage Bay map area and reference should be made to Widmer's thesis for a detailed account. He stated that the rocks are felsites of various kinds together with agglomerate and, possibly, highly metamorphosed slates. He regarded them tentatively as equivalent in age to the Belle Bay volcanics but they are separated from all other formations by faults or intrusive rocks and they are unfossiliferous.

CINQ ISLES GROUP

Name and Distribution. White (1904) applied the term Cinq Isles series to sandstones, shales, and calcareous sedimentary rocks that are exposed on the shores of Bay du Nord, Bay d'Est, and Cinq Isles Bay. He subdivided the series into five formations: (1) the oldest Spoon Cove red sandstone, (2) the Bay d'Est formation consisting of limestone, siltstone, sandstone and minor conglomerate, (3) the Pools Cove conglomerate, (4) the Tilt Point formation, similar in lithology to the Bay d'Est formation and (5) the Spyglass Cove quartzite and conglomerate. A fault separates the third and fourth of these units but the contacts between the others appear to be conformable where exposed on the shores in the Rencontre East map-area. Following the completion of White's work, Widmer found an angular unconformity on Salmonier Brook, just west of the map-area, separating the Pools Cove conglomerate and the Bay d'Est formation. Widmer has suggested that the second and fourth unit listed above should be correlated and that the Pools Cove conglomerate should be regarded as younger than the Cinq Isles series. This suggestion is here adopted. Since the other units have not been mapped separately in the adjoining Hermitage Bay map area, the formation names suggested by White are abandoned and the

term Cinq Isles group is applied to all of these rocks except for the Pools Cove conglomerate.

Lithology. The lower part of the group is best exposed on the northwestern shore of Bay du Nord. It consists of at least 500 feet of well-indurated, medium to coarse grained red arkosic sandstone with minor conglomerate and siltstone. According to White, thin sections show quartz together with relatively unaltered orthoclase, microcline, plagioclase, muscovite, carbonate and opaque material. The upper part of the section on the west shore of Bay du Nord consists of an estimated 650 feet of sandstone, shale and limestone. White observed that the limestone occurs in three circumstances: (1) in a ramifying network of veinlets and nodules in red siltstone beds, (2) as a matrix to sand grains and pebbles, and (3) as relatively pure limestone in intraformational beds in siltstone and sandstone. He concluded that the nodules were at least partly of diagenetic origin because microscopic studies showed that mica flakes tended to be oriented parallel to the periphery of the nodules. About fifteen percent of this upper part of the section consists of limestone in beds up to about two feet thick; a similar percentage is shale and siltstone containing limestone nodules; the rest is mostly red sandstone in sections ranging from a foot or two to twenty or thirty feet thick[1].

1. The peculiar lithology has been discussed in some detail by Widmer (1950).

On the northern and northwestern shores of Cinq Isles Bay, about 300 feet of sandstone and limestone are in faulted contact with the Pools Cove conglomerate. There is a greater proportion of limestone in this section than at Bay du Nord, including one series of limestone beds about 100 feet thick. Calcareous boxwork structures and nodules also occur here. These rocks are overlain by about 200 feet of light greenish grey and light grey quartzites with minor conglomerate. The upper

contact is also a fault.

Age. Widmer (1950) reported that in the Hermitage Bay area, the Cinq Isles group rests unconformably upon fossiliferous Upper Cambrian rocks and is unconformably overlain by fossiliferous Upper Devonian rocks. There is no other positive evidence as to age available.

POOLS COVE CONGLOMERATE

Name and Distribution. The Pools Cove conglomerate is exposed as a broad band which crosses Bay du Nord and Bay d'Est. The term was first proposed by White (1939, 1940) and his thesis (1939) included much petrographic detail. The formation is at least 3,000 feet thick.

Lithology. As seen on the western shore of Bay du Nord, the lower part of the formation is a coarse conglomerate with a deep red matrix and is somewhat similar in appearance to the Great Bay de l'Eau conglomerate at Corbin Head. About 700 feet stratigraphically above the base, the rock becomes a pebbly and bouldery arkose, light tan or beige in colour in the weathered surface and pinkish on freshly broken surfaces. The pebbles and boulders consist mostly of felsite, granite and clastic sedimentary rocks. There is a tendency for the coarse material to occur in small beds within the arkose. Crossbedding is common in the arkose.

Counts were made of pebbles over two inches in diameter in three separate small areas on the west shore of Bay d'Est; they showed that about 40 percent were felsite of various types, about 30 percent were granite and granite gneiss of at least three different kinds, and the rest included red sandstone, grey siltstone, minor limestone and dark grey hornfels or meta-andesite.

Structural Relations, Age and Origin. This formation seems to

be conformable with the Cinq Isles group on the shores of Bay du Nord and Bay d'Est but Widmer reports an angular unconformity separating the Pools Cove conglomerate from the Cinq Isles just west of the Rencontre East map-area. The Cinq Isles group is known to be unconformable on fossiliferous Cambrian rocks in the Hermitage Bay map-area. Apart form these facts, little can be done to date the Pools Cove conglomerate at this time. The low degree of induration relative to that of other sedimentary rocks in the area, the colour and lithology indicate a possible correlation with the Upper Devonian Great Bay de l'Eau formation but Widmer has pointed out in some detail certain differences in primary structures which seem to indicate somewhat different environments of deposition. In this report, the relative age is left open although the formation is given a probable Silurian or Devonian age in the table of formations and the legend of the accompanying map.

An alluvial fan origin is indicated, probably associated with sharp uplift.

GREAT BAY DE L'EAU CONGLOMERATE

The Great Bay de l'Eau conglomerate was named by Widmer (1950) from very extensive occurrences in the Heritage Bay map-area[1]. In the Rencontre East area, the formation occurs only on the peninsula between Corbin Bay and Cinq Isles Bay. The excellent cliff exposures on these shores show red conglomerate made up of a considerable variety of rock types. An angular unconformity at the base of the formation is exposed on the north shore of Corbin Bay and there the basal part of the conglomerate is made up mostly of blocks of the underlying red micaceous sandstone. On the south shore of Cinq Isles Bay, blocks of limestone, similar to that of the Cinq Isles group. are abundant in places near the base of the formation[2].

1. Originally this unit was named the Smiths Hole conglomerate by White (1939).

2. For additional description, reference may be made to Widmer's report.

The formation is the least folded of any of the sedimentary or volcanic units in the map-area.

Widmer (1950) described a fossil occurrence at Coombes Cove on the south shore of Great Bay de l'Eau in the Hermitage Bay map-area. This consisted of two tree stumps and shaly to sandy rock with leaf impressions and indicated an Upper Devonian age for the formation. Since the conglomerate is known to overlap nearly every sedimentary group in the Hermitage Bay and Rencontre East map area, it appears that the formation once formed a very extensive alluvial fan.

PLEISTOCENE

Remnants of terraces between 20 and 40 feet above present sea level occur in several parts of the map area, notably in Long Harbour, at Rencontre East village and in Baie d'Est. These are composed of stratified sand, gravel and boulders. Their origin has been described in considerable detail by White and similar marine terraces are discussed in the report of the Hermitage Bay area by Widmer. Apart from these and other shore deposits there is very little surficial material except in valleys.

PLUTONIC ROCKS

By

D.E. White

BAY DU NORD BATHOLITH

Name and Distribution

The name Bay du Nord is proposed for a mass of granite and granodiorite which occupies most of the Rencontre East map area.

Lithology

This pluton consists mostly of granodiorite and alaskite. Intermediate phases such as quartz-diorite and possibly diorite are locally abundant. Partly digested inclusions of femic composition with relict pyroxenes suggest the possible existence of basic phases such as gabbro. A few pegmatite and aplite dikes also occur. The following rock types were recognized but not mapped separately.

Alaskite and granite. The typical alaskite is medium to coarse-grained. Both potash feldspar and plagioclase are present and both are red in hand specimen. Modal analysis of a typical thin section showed 33 percent quartz, 34 percent albite, 28 percent orthoclase and perthite and five percent chlorite, leucoxene and opaque minerals.

Oligoclase granodiorite. The mafic minerals are actinolitic (?) hornblende, (pleochroic from olive green to blue green to almost colourless), brownish biotite which extensively replaces hornblends, and greenish chlorite. Modal analyses showed 12 percent quartz, 51 percent albite-oligoclase, 16 percent potash feldspar and 21 percent hornglende, biotite, chlorite and opaque material.

Quartz-diorite. In hand specimen this has a mottled light green colour. Thin sections show that it has a hypidiomorphic medium-grained texture and is composed of euhedral to subhedral hornblende (light yellow-olive green-blue green pleochroism), together with calcic oligoclase, quartz, minor micro-

cline and orthoclase. Biotite, chlorite, apatite, sphene and magnetite as accessories. Modal analyses showed 18 percent quartz, 60 percent oligoclase, four percent orthoclase and microcline and 18 percent mafics.

Structural Relations and Age

The Bay du Nord granodiorite has intruded rocks of the Cinq Isles group and the Pools Cove conglomerate; contact metamorphism of these rocks has been reported by Widmer (1950) west of Bay du Nord near the margin of the Rencontre East map-area. According to Widmer the Bay du Nord intrusive does not seem to affect the Late Devonian Bay de l'Eau and he suggested that the most probable age for the intrusive is early Devonian or Silurian.

Bradley (1954) distinguishes three batholithic intrusives in the Terrenceville area; (1) a hornblende-biotite granite which is regionally metamorphosed and interpreted as older than the Terrenceville and Great Bay de l'Eau conglomerate, (2) a heterogeneous intrusive which includes biotite-hornblende granite, aplite, quartz monzonite, gabbro, diabase and diorite, and which is correlated with the Bay du Nord intrusive and (3) the Ackley granite.

Widmer distinguished an additional granite mass which he termed the Belleoram granite. It clearly intrudes the Upper Devonian Great Bay de l'Eau conglomerate and Widmer stated that it also intrudes the Ackley granite.

For a detailed discussion of the structural relationships between these various plutonic rocks, the reports by Bradley and Widmer should be consulted.

ACKLEY GRANITE

Name and Distribution

The name Ackley has been proposed (White 1940) for a batholith of granite that occupies most of the northern part of the Rencontre East map-area.

Lithology

Granite predominates in the pluton as a whole but alaskite is more abundant near the southern contact; the two phases appear to be gradational for the most part but sharp contacts and local cross-cutting relationships have been observed. Basic and intermediate rock types are completely absent. Aplite is present in an irregular zone adjacent to the southern contact for a distance of about two miles west and three miles east of Rencontre Lake and is most abundant in embayments into the intruded volcanic rocks. The aplite is fine-grained with a mineral and chemical composition similar to the medium-grained alaskite; the two phases are generally gradational over a distance of a few inches to several feet. Cross-cutting dikes are rare; although aplite has been observed cutting alaskite, no example of the reverse relationship was seen. The aplite is believed to be a slightly later phase that crystallized after the alaskite[1].

(The evidence for this is presented in detail in White 1940, pp.972-3.)

The granite is rather coarse-grained. A modal analysis of a typical specimen showed 27 percent quartz, 40 percent perthitic orthoclase, 25 percent albite-oligoclase, 7 percent biotite and chlorite and 1 percent miscellaneous.

The texture is hypidiomorphic; the mafic minerals and occasionally some of the feldspars are in euhedral or subhedral crystals. The potash feldspar has been albitized in every thin section examined and in some sections there is evidence of extensive replacement. The original rock may have contained twice as much orthoclase as plagioclase.

The alaskite is medium grained, with a granitoid texture and a pink colour. A modal analysis showed about 40 percent quartz, 34 percent perthite, 26 percent albite together with traces of biotite, chlorite, muscovite, magnetite, allanite, sphene, apatite and zircon. Both the perthite and albite are pink and cannot be distinguished megascopically.

As in the case of the granite the thin sections indicate rather extensive albitization.

Chilled contacts with the Belle Bay volcanics are rare but were observed.

The Bay du Nord intrusive contains much more abundant femic constituents than the Ackley granite; miarolitic structure is absent in the former and thin sections show a higher degree of alteration.

GRANITE GNEISS

The extreme northeastern part of the Rencontre East map-area is occupied by granite gneiss which is an extension of the unit described by Widmer (1950) in the Hermitage Bay map-area, and which he stated is the unit first described and named the Garrison Hills gneiss by Jewell (1939) around Baie d'Espoir.

Coarse grained augen gneisses predominate in the area examined. The rock which seems to be most typical is a biotite-quartz-microcline-oligoclase gneiss, consisting of large porphyroblasts of microcline and smaller porphyroblasts which are aggregates of oligoclase with a little biotite, surrounded by finer grained aggregates of strained quartz and biotite. Epidote and chlorite are common; some green hornblende and a comparatively small amount of sphene and apatite are accessories. There are minor amounts of fine-grained rocks interpreted as paragneiss which were probably impure quartzites originally.

Medium-grained and fine-grained gneissic granite and granodiorite were found intruding the other gneisses. The granite is only slightly foliated. This structure is best developed near contacts, and is quite indistinct in the centres of the granite masses.

In the Rencontre East map-area, the contact between the gneisses and other rock types is a fault. A Precmabrian age is suggested because of the high degree of metamorphism. The Ackley granite is quite unmetamorphosed by comparison with

the gneissic granite; strained quartz is characteristic of the latter, even in the unfoliated phases.

DIKE ROCKS

Four main types of dike rocks occur in the area; basalt and diabase, andesite and dacite, quartz-trachyte, and rhyolite. Their distribution is illustrated in figure ?. The trend of nearly all dikes observed is within 10 or 20 degrees of N 18°W, a direction which is approximately at right angles to the axis of the Ackley batholith. The abundance of dikes in the southwestern part of the map-area is notably greater on the projection of the batholith axis than elsewhere in the area.

The rhyolite dikes are younger than the other types. Dacite has been observed which is both younger and older than quartz-trachyte. The dike rocks are the youngest rocks of the area and post-date the major folding and faulting. Minor faults displace some dikes but the major Spyglass Cove fault is cut by several rhyolite dikes.

Basic Dikes

Diabase dikes are most abundantly associated with the Bay du Nord batholith and are particularly common along the shore of the Northwest Arm of Bay d'Est. As a rule, augite ophitically includes andesine, with the augite partially or wholly altered to an actinolitic (?) blue-green amphibole, and with the andesine somewhat saussuritized. A light brown biotite and minor orthoclase suggest a lampryphyric nature, which is also indicated by the close association of the dikes to the Bay du Nord batholith, thus, the association may be genetic. The average mineral composition is aobut 40% plagioclase, 45% pigeonitic augite, with varying degrees of alteration to actinolitic hornblende and chlorite, 10% biotite, 5% orthoclase, magnetite, limonite, pyrite, and apatite. Minor amounts

of bowlingite may be replacements of olivine.

The only basic dike which cuts the Ackley batholith is on the east shore of Long Harbour, at the alaskite contact with volcanics and is of a similar type, but is more extensively albitized anc choritized.

Amygdular basalt dikes have been observed, but these may not be related to the diabase. Several small olivine basalt dikes cut the Pools Cove conglomerate, on the west shore of Bay d'Est. Another basalt dike intrudes the Tilt Point formation, on Long Harbour Island, just south of Simmons Brook, Cinq Isles Bay.

Dacite Dikes

Fine-grained, greenish-grey, amygdalur dacite forms the early phase of seven composite dikes. In all seven examples, the later phase was probably intruded before the dacite was cold, or, possibly completely crystallized. True dacite border zones of equal width bound the later phase, with non-chilled contacts, but the outer dacite contacts are chilled and amygdular. In six of the seven composite dikes, red porphyritic rhyolite forms the later phase. One of these six dikes, south of Doten Cove (~~Plate XVI, fig.~~ 2) shows the additional feature of an abrupt change in dip, where it crosses the unconformable contact of the Great Bay de l'Eau conglomerate, overlying the Doten Cove formation.

Trachyte forms the narrow centre of the seventh composite dike, about 1½ miles southwest of Doten Cove; the dacite almost certainly was not completely solid when the trachyte was intruded.

All three rock types are present in a composite dike on the south side of Cinq Isles Bay; the order of intrusions is trachyte, dacite and rhyolite.

All seven composite dikes are located on the Ackley batholith-Old Womens Cove stock axis (~~Plate XVII~~), and all are oriented approximately at right angles to this axis.

Quartz-trachyte Dikes

Six quartz-trachyte dikes have been observed in the southwestern corner of the map area, near Corbin and Corbin Head. The rock is brown, with small phenocrysts of orthoclase and oligoclase in a trachytic-textured groundmass consisting mostly of feldspar laths, with interstitial chlorite and quartz (5%+). The average width of these dikes is about 25 feet.

Other intrusives which may be related genetically to the quartz-trachyte dikes are (1) a thick trachyte sill, with flow orientation of the feldspar laths, on the north shore of Magraths Cove. (2) Trachyte plug of Tickle Beach (Long Harbour), and of the Femme Harbour area. (3) Several small irregular trachyte bodies in the Corbin area.

Rhyolite Dikes

Red, porphyritic dikes are more abundant and widespread than any other type. Commonly, these dikes exhibit chilled border facies, from 10 to 100 feet wide, and have a hackly-platy jointing adjacent and parralel to the contacts.

The phenocrysts, all showing rounded resorption borders, are about one-half quartz-, and one-half orthoclase and albite in about equal proportions. The groundmass is a fine-grained aggregate of quartz and feldspar, but commonly phenocrysts are bordered by a zone approximately one-half the width of the phenocrysts, consisting of an intergrowth with one of the constituents in parallel position to the phenocrysts. Femic constituents are absent, with the exception of abundant iron oxide dust. Microlitic cavities, lined with quartz crystals, iron oxide, and green epidote chlorite are rather common. The Crow Cliff dike shows abundant miarolites, about 200 feet south of the aplite contact.

Table IV is the chemical and normative analysis of a rhyolite dike outcropping on the shore of Rencontre Lake south of the batholith contact.

Table IV

Analysis #3		Norm	
SiO_2	77.73	Q	28.9
Al_2O_3	11.90	Or	30.0
Fe_2O_3	1.60	Ab	27.3
FeO	.21	An	1.1
MgO	.08	C	0.9
CaO	.23	En	0.2
Na_2O	3.25	Rutile	0.1
K_2O	5.10	Mt	0.7
H_2O^+	.23	Mn	0.6
H_2O^-	.08	Plagioclase	
TiO_2	.10	Ab_6 An_4	

#3 - Red porphyritic rhyolite dike, east shore of Rencontre Lake approximately 2,200 feet south of batholith contact.

R. Folinsbee, analyst.

The rhyolite shows close similarities both chemically and mineralogically, to the aplite and alaskite phases of the Ackley batholith. Also, the dikes are concentrated along the Ackley batholith - Old Womans Cove stock axis (Plate XVII), but are not as closely restricted to this axis as are the earlier dikes.

In spite of the evidence which seems to favour a genetic relationship of the dikes to the batholiths, the association may be purely one of structural control. The evidence which favours this possibility is the following; the Ackley batholith may have been intruded during the orogeny which formed the Fortune Bay synclinorium; the Great Bay de l'Eau conglomerate, because of its relatively undisturbed condition, is believed to be younger than the orogeny; all the dikes are younger than the Great Bay de l'Eau conglomerate. Confirming evidence that the rhyolite dikes belong to a later magmatic period is that they belong to a andesite (?)-dacite-

quartz-trachyte-rhyolite differentiation series, apparently distinct from the quartz-diorite-granodiorite-granite-alaskite-aplite series of the batholiths.

Also, at Crow Cliff, on the abrupt slope of Rencontre Lake, a small rhyolite dike cuts mineralized aplite. Thus, if the rhyolite is genetically related to the aplite, it was intruded at least appreciably later than the aplite.

STRUCTURAL GEOLOGY

By B.L. Smith

Faults

Figure 3 shows the strike pattern of 36 faults, which can be identified on aerial photographs because of obvious offsetting of rock units. The maximum trend is approximately parralel to the trend of most of the fold axes in the area. In most cases the actual fault zones are concealed beneath surficial material but topographic and some other evidence indicate that nearly all are high angle faults. Two exceptions are those for which dip symbols have been shown on the accompanying map; one is just north of the village of Andersons Cove and the other is exposed on the north shore of Cinq Isles Bay.

A good general rule in the area is that fault displacement tends to be such as to result in an omission, rather than duplication, of strata. Relatively large strike-slip components are indicated for the Long Harbour fault and the one which disrupts the Femme syncline.

Folds

The two major fold structures in the Rencontre East area are the anticlinal uplift associated with the Ackley batholith in the northern part of the area and a structural trough in the southernmost part of the map area. The latter shows clearly on the Terrenceville-Gisburn Lake map (Bradley, 1954) as a southwesterly plunging synclinal nose; the axis passes through the Femme syncline and about through the mouth of Long Harbour, thence under the waters of Fortune Bay. From limited information near Corbin it appears that the trough is plunging northeasterly in that part of the map area.

Interpretation of Tectonic History. Cambrian rocks and the Grand le Pierre formation (pyroclastics and felsite) in the adjacent Terrenceville-Gisburn Lake map-area were folded be-

fore extrusion of the Belle Bay volcanics (Bradley, 1954 p.). White reported an angular unconformity between Cambrian rocks and Belle Bay volcanics west of Belle Bay and the present writer concurs in this interpretation.

The Belle Bay and Rencontre rocks tend to be structurally concordant except that an angular unconformity separates the two groups in the vicinity of Conne Cove and on the west shore of Long Harbour. (South of Fortune Bay Bradley found structural concordance between older felsites and younger rocks which are almost certainly equivalent to those of the lower part of the Rencontre group). It is suggested here that relatively local disturbances (folding and/or faulting) were taking place intermittently near Long Harbour during the time represented by the upper part of the Belle Bay group and the lower part of the Rencontre; the evidence does not require that regional folding took place at that time. If the four occurrences of Rencontre rocks east of the Long Harbour fault have been assigned correctly to that group, some rather sharp lateral variations in lithology are indicated in this particular area. There are variations in lithology west of the Long Harbour fault, but the changes are not as abrupt as are required at Long Harbour. Lithologies on either side of the Long Harbour fault cannot be matched as nicely as one might expect and it is possible that the fault was active during Belle Bay volcanism.

Except near the Ackley batholith, fold structures tend to be broad and open. Cleavage is developed only in some of the slaty rocks and even in these it may be related more to faulting than to regional folding.

As a working hypothesis, it is sugessted that most of the major faults in the Fortune Bay area are wrench faults.

ECONOMIC GEOLOGY

By B.L. Smith

Fluorite

Some prospecting has been carried out on fluorite showings east of Long Harbour opposite Andersons Cove and Stones Cove on the west side of Long Harbour. There are many occurrences of fluorite in the area but most of these are trivial and nowhere has material been found that remotely approaches economic grade, taking into account the probable size of any of the deposits. Practically all of the showings are in felsite. They are particularly abundant between Long Harbour and Conne where they occur mostly either as joint fillings trending between N 20°W and N 75°W or in local and narrow breccia zones trending between N 40°E and N 80°E. The fluorite is mostly white to greenish in colour, less commonly purple. Fine-textured quartz is the only mineral that has been identified in association with the fluorite.

The best showing is on Strouds Hill, opposite Andersons Cove on the east side of Long Harbour, where some test pits were blasted by Reynolds Metals Inc. in 1952. There is here a breccia zone in felsite cemented by fluorite and fine-textured quartz or chalcedony. The best material is estimated visually at about 20% fluorite over a width of three feet but most of the breccia zone is narrower and of much lower grade. Thin sections indicate a sequence of deposition as follows; chalcedony followed by fluorite and possibly some contemporaneous quartz, followed in turn by brecciation of the fluorite and deposition of quartz which is partly in euhedral grains showing comb structure. No evidence of replacement of quartz of felsite by fluorite was found. Rather fine grinding would be necessary to separate quartz and fluorite.

The occurrence of so many small showings and the fact that they are confined almost entirely to the felsite may indicate that the fluorite was deposited from fluids associated

with the volcanic rocks. It is also possible that the fluorite has been deposited from fluids related to the Ackley Batholith or some other plutonic source. Structural control is implied by the fact that the occurrences are far more numerous near the axis of the Femme syncline than elsewhere in the area and by the fact that the fluorite-bearing breccia zones and joint fillings seem to have a simple reationship to major regional structures. The breccia zones are roughly parallel to the major fold axes of the area and the joint fillings are at right angles to that direction.

Aerial photographs show many narrow topographic trenches in the felsite throughout the area. Because it seemed possible that these represented fault zones that might have been mineralized with fluorite, many of these were examined carefully in the area between Long Harbour and Conne Cove but without finding more than a very few local traces of fluorite in rubble and on walls of the trenches.

Traces of fluorite were observed also on Bell Island opposite Southeast Bight in a narrow fault breccia zone. Fluorite is also a common mineral in minor amounts in association with molybdenite, described elsewhere in this report.

BARITE

Barite occurs in a breccia zone one to three feet wide exposed on the shore of a small cove about mid-way between Conne Cove and Femme. The barite is colourless to slightly bluish white and fills fractures in the breccia zone up to two or three inches in width. The occurrence is not of economic interest except as evidence of barite mineralization in the area. The breccia zone strikes a little west of north and dips at about 75 degrees easterly.

MOLYBDENITE

The most intensive prospecting in the area has been carried out on molybdenite showings. These have been described in much detail by White (1940) with considerable emphasis on mineralogy, paragenesis and origin.

Nearly all of the known occurrences of molybdenite are at or very near the southern margin of the Ackley granite. According to White (1940, p.976),

> "The distribution of the molybdenite shows a close correlation with the distribution of the aplitic phase of the Ackley batholith; the richest mineralization is always in aplite, but alaskite also contains molybdenite where it is intimately associated with mineralized aplite.
>
> Most of the aplite is concentrated in three broad emboyments of the batholith into volcanics, namely, Wylie Hill, Rencontre Lake, and Motu areas, each of which contains within itself a smaller zone of mineralization adjacent to the contact with the Belle Bay volcanics, which form the hanging walls of each of the Principal deposits. However, many aplite areas of various sized contain no molybdenite, particularly where they are unrelated to the volcancis contact.
>
> The Ackley City deposit is the most promising and most of the development work has been done on it. The Wylie Hill deposit is much larger than the Ackley City deposit, but is of a considerably lower grade. The Crow Cliff and Motu deposits show erratic distribution of molybdenite, but small tonnages of commercial ore may be present. Crow Cliff is a pegmatitic type of mineralization; Motu is like the Ackley City type.
>
> The only mineralization area in the Ackley batholith that bears no relation to the contact lies southeast of Franks Pond, over 3 miles north of the contact. However, this deposit differs from that of

the other areas because molybdenite is associated with quartz veins in granite. Two mining claims carry rather widely spaced veins. Each vein is several inches wide, and is sparcely mineralized with molybdenite; those of the northern claim are in general oriented N 72°E, and those of the southern claim almost at right angles, N 17°W."

With regard to the paragenesis, White (p.989) writes,

"During the early high temperature stages of formation of the Ackley City deposit, solutions that deposited quartz, muscovite, and molybdenite with minor chlorite, fluorite, and magnetite intimately permeated the aplite, without marked structural control. The primary fracture system is believed to have formed sanidine veinlets, with minor molybdenite, in general did not control the main mineralization, and therefore are believed to represent the last part of the silicification-muscovitization stage.

At least one period of fracturing, with minor brecciation, followed the earlier joints; the intensity distribution of the later joints seems to be correlated with the degree of the earlier mineralization, but this is probably a localization due to the relative incompetence of the muscovitized rock; faulting and displacements along the joints are negligible.

Late mineralization is negligible; a specimen of molybdenite replacing carbonate may be relatively late. The common sulphides, except pyrite, are rare, and are present only as late-stage, joint-filling veinlets."

White draws attention to the occurrences as a good example of an apparent genetic relationship of mineralization to the associated igneous rock. He suggested that the aplite had formed by rapid crystallization of a late stage magma in

broad emboyments of the batholith and that alteration and mineralization were produced by gases escaping from deeper parts of the still-crystallizing batholith. The problem of the mineralization being related to the aplite rather than the alaskite is discussed and evidence presented as to the chemical nature of the gases.

At the Ackley prospect, stripping and blasting have been carried out for some 800 feet along the strike of the granite contact on the steep western shore of Rencontre Pond. An adit leads to about 250 feet of drifts and cross-cuts and there is a shaft near the shore of the lake. According to White (p.977), the shaft, in 1938, was 60 feet deep and 650 feet of underground work had been carried out. Molybdenite is disseminated in aplite and in quartz stringers. The best mineralization is within 50 feet of the contact with Belle Bay felsite and there is hardly any beyond 100 feet. According to White the "orebody" was known to be 140 feet long and plunged easterly.

The Wylie showings are about ? miles northeasterly from Rencontre Pond. About 1000 feet of trenches through shallow overburden have been dug. They are now partly filled by rubble. White refers to "two large mineralized area, each approximately 1200 feet long by 400 feet wide". Molybdenite and pyrite occur as narrow joint fillings associated with quartz stringers. There is very little disseminated molybdenite. The host rock is aplite, which tends to be porphyritic.

The Montu prospect is about ? miles west of Rencontre Pond. A strike length of about 500 feet along the granite-felsite contact has been prospected by five transverse trenches each about 100 feet long. Molybdenite occurs sparsely disseminated in fine grained granite or aplite.

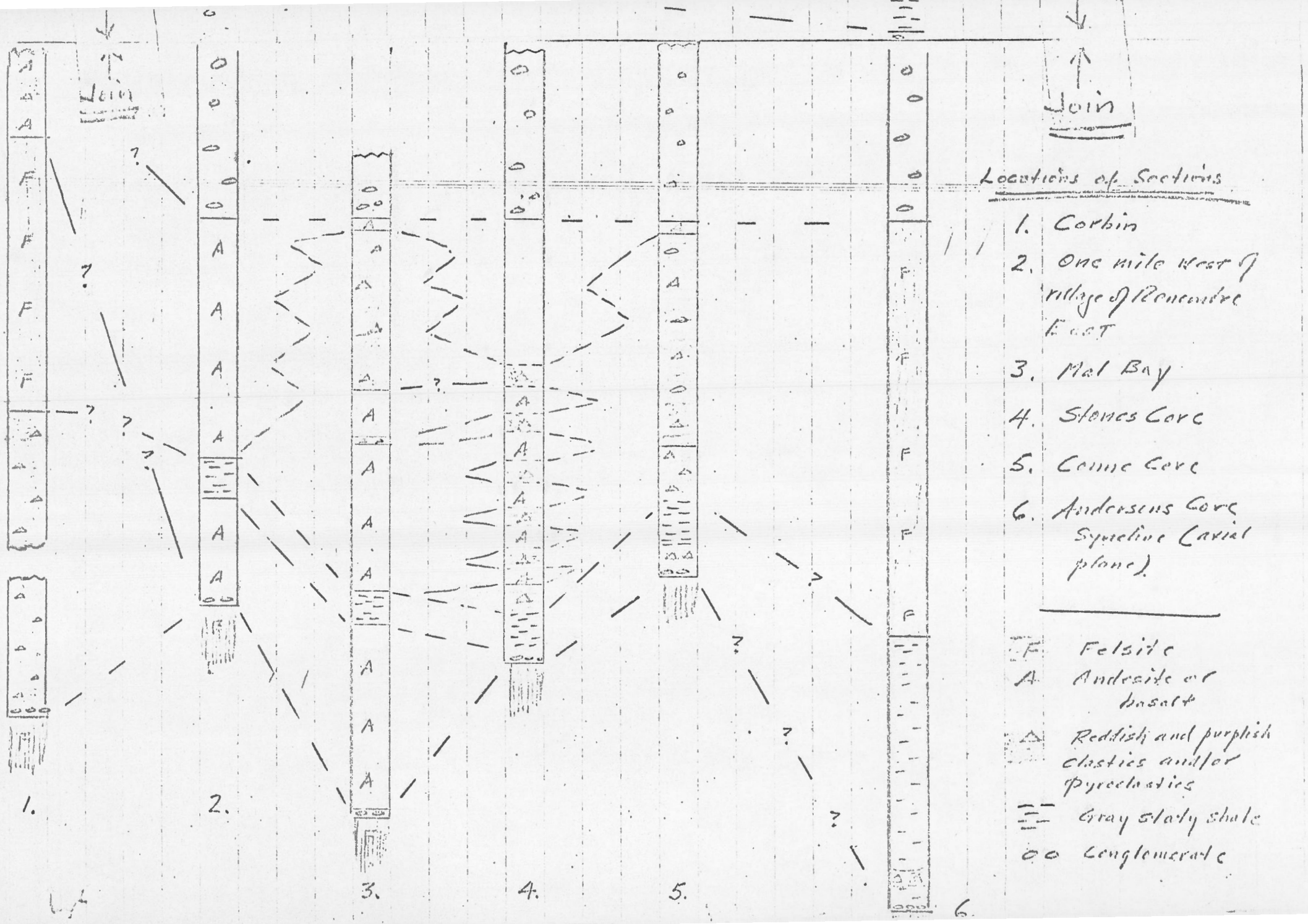
The Crow Cliff showing, at the top of the steep eastern shore of Rencontre Pond, is in pegmatite which contains coarse molybdenite and spectacular euhedral quartz cyrstals up to one foot in diameter. The latter also occur as metacrysts in the adjacent granite. The average width of the pegmatite

is three to five feet. It trends about due north.

The Franks Pond showing, about three miles northwest of Rencontre Pond has been referred to above in a quotation from White. It was not seen by this writer.

About ? miles west (east?) of Long Harbour, at the granite felsite contact, four shallow pits have been dug. Two of these show traces of fluorite and molybdenite.

PART I
FIG. 1


Join
Join
Locations of Sections
1. Corbin
2. One mile west of village of Rencontre East
3. Mal Bay
4. Stones Cove
5. Comme Cove
6. Andersens Cove Syncline (axial plane).
F Felsite
A Andesite or basalt
Reddish and purplish clastics and/or pyroclastics
Gray slaty shale
Conglomerate
1.
2.
3.
4.
5.
6.

PART I
FIG. 1

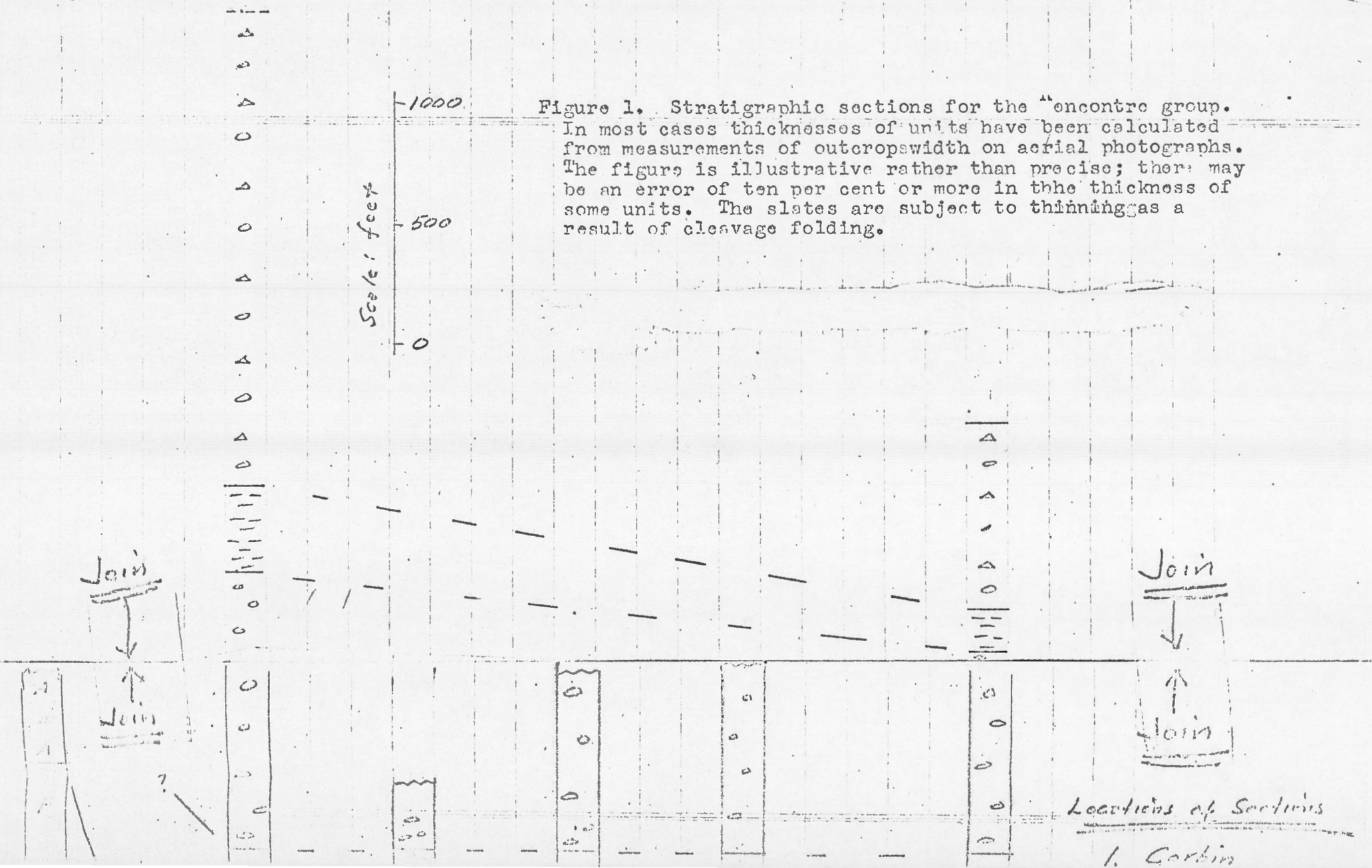


Figure 1. Stratigraphic sections for the encontre group. In most cases thicknesses of units have been calculated from measurements of outcropswidth on aerial photographs. The figure is illustrative rather than precise; there may be an error of ten per cent or more in the thickness of some units. The slates are subject to thinning as a result of cleavage folding.

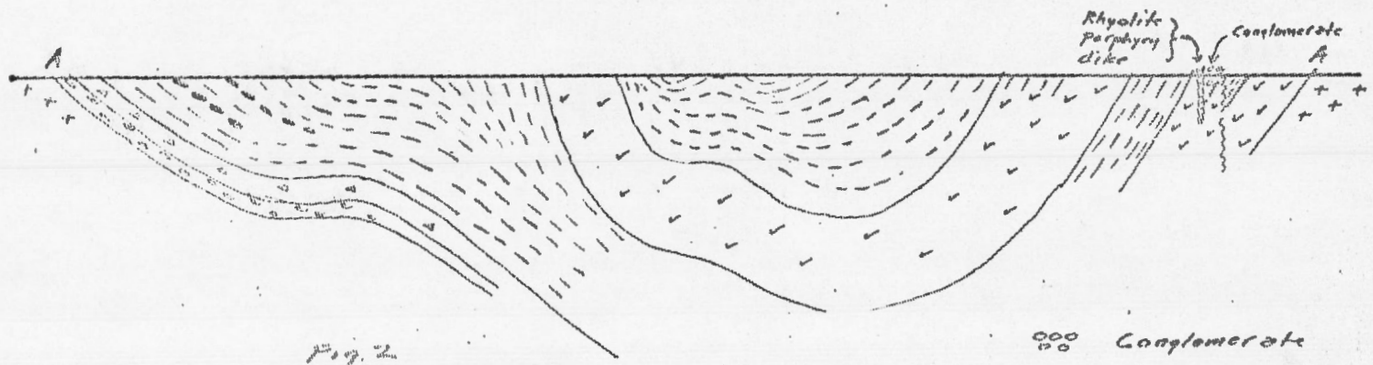


Fig. 2

SECTION ACROSS LONG HARBOUR SYNCLINE
FACING NORTHEASTERLY

Scale 1" = 1000'

Conglomerate

Red and purple clastic or pyroclastic rocks

Grey shale and slaty shale

Andesite and (or) basalt

Fault

Felsite

In this report, the base of the Rencontre group is considered to be at the points marked "A". It is possible that some, or all, of the rocks in this syncline belong in the Belle Bay group.

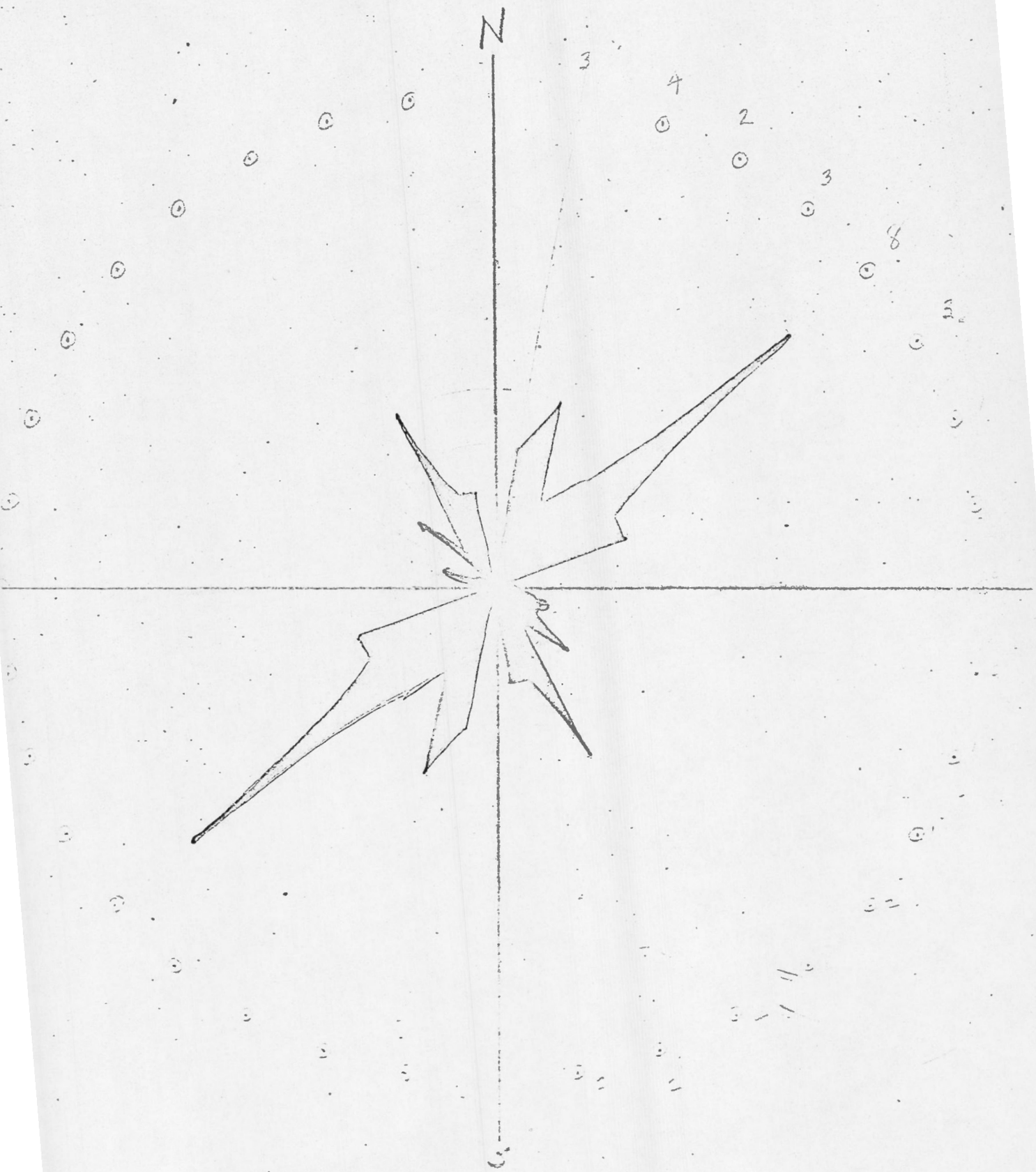


Fig. 3 Strike pattern of 36 faults.