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PETROGRAPHIC REPORT

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Énergie et Ressources naturelles
Québec

C O P Y

LOUIS DOREMUS HUNTOON

Consulting Mining Engineer

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156 Yonge Street,
Toronto, Canada.

CABLE ADDRESS
"HUNTY"
New York

NEW YORK OFFICE
15 Park Row,
New York City

New York, N.Y.,
June 12, 1942.

A.O. Dufresne, Esq.,
Deputy Minister of Mines,
Quebec, Province of Quebec,
Canada.

Dear Mr. Dufresne:

Enclosed herewith are:

REPORT: Abana Copper Zinc Co. - property located about four miles northwest of Normetal (formerly Abana).

ELECTRO-CONDUCTOR MAP: During the boom days in this area dip needle surveys were being made. The cost was slight as compared with geophysical surveys. I had no confidence in this map.

LETTER TO CHARLES MCCREA K.C., December 27, 1935. In this letter I refer to the Noranda Mine. I called his attention to this property and recommended extending the Nippissing Central to the Noranda in Quebec. The zinc deposit referred to is mentioned in one of the early reports of Noranda.

LETTER to PROFESSOR COLONY: In this letter I designate where the samples are from.

PROSPECTUS ABANA MINES: My notes covered the 300 foot level. The veins were narrow and scattered; at times there would be a pocket or widening of the ore, I found no widths such as those mentioned other than parallel veins - no solid ore.

YOU MAY KEEP ALL OF THE ABOVE.

PETROGRAPHIC REPORT: I also enclose petrographic report of Professor Colony of Columbia University. As this is the only copy I have I will appreciate if you will return it when you are through with it. I am confident that you can secure the copy I mailed to Mr. McCrea.

With kindest regards,

Sincerely,

(Signed) LOUIS D. HUNTOON.

C O P Y

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Consulting Mining Engineer

Kent Building,
156 Yonge St.,
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June 12, 1942.

A.O. Dufresne, Esq.,
Deputy Minister of Mines,
Quebec, Province of Quebec,
Canada.

RE: NORMETAL

Dear Mr. Dufresne:

My contact with Normetal (then known as Abana) was in the fall of 1927 when Mr. E.A. Robeart of Montreal had me examine the Abana Copper and Zinc Company's property about four miles northwest of Normetal. There was very little information published on the area at that time.

I obtained written permission from Mr. Sperman, Manager of Abana, to visit the underground workings, but not allowed to take any samples from underground. Mr. Bambrick was superintendent at that time.

There was very little work done on the 100 and 200 foot levels. I studied closely the ore exposures on the 300 foot level and took detailed notes so as to secure a set of samples on the surface which checked my underground notes. A petrographic report was made by Professor Colony, of Columbia University, on these specimens and rock, and mineralized rock specimens from the immediate area and extending about four to five miles to the northwest.

The report I submitted to Mr. E.A. Robeart was on the property to the northwest; I enclose copy of same.

I was interviewed many times in New York on Abana (now Normetal) but wrote no report.

On December 27, 1935, I wrote our good friend Charles McCrea enclosing copy of my letter fo Professor Colony and copy of his petrographic report. In my letter to Mr. McCrea you will note that I considered Noranda had possibilities of becoming a valuable mine with depth. I am mailing you the only copy I now have of the petrographic report and will ask you to return it to me after your study of same. If you write Mr. McCrea for the copy I mailed him, I am quite confident he will be glad to give it to your department.

With kindest regards,

Sincerely,

(Signed) LOUIS D. HUNTOON.

LOUIS DOREMUS HUNTOON
CONSULTING MINING ENGINEER

KENT BUILDING
156 YONGE STREET
TORONTO, CANADA

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"HUNTY"
NEW YORK

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COPY

File 93

Notes on samples for petrographic report

Toronto, Canada

October 28th, 1927.

Professor R. J. Colony,
Columbia University,
New York, N. Y.

My dear Colony:

I have just completed an examination of one and inspection of several properties in Des me loize Township, Quebec. This township adjoins the Quebec-Ontario boundary and is just North of Lake Abitibi; it is just North of the Trans-continental railroad. This may locate it on the map for you. You will find the area discussed in the Dominion Geological Report:- "Summary Report, 1925, Part C;" I have requested copy of report mailed you.

I may be called in this winter to examine the Abana Mine, and am therefore sending you some specimens for slides so as to be prepared. I will pay for the slides but do not wish to go to any considerable expense on the petrographic report as yet.

GRANITE:- To the north-east is a large granite area. The float from here was a gray hornblendic granite; did not get a specimen as I should have done. The contact of the granite strikes north-west.

KEEWATIN FORMATION:- To the south-west of the granite I observed a wide belt, possibly 1000 to 2000 feet in thickness, of a very highly sheared porphyritic rock. This sheared

porphyritic I traced for four miles along the strike. The shearing took place under great pressure; there is practically no schisting or brecciation. In the porphyritic rock there appear to be quartz veins or seggregations, but here again we can detect phenocrysts.

Due to the extent, both width and length, I am of the opinion that this porphyritic rock is a flow and not an intrusion. As a flow rock I cannot account for the phenocrysts. I desire information on this point.

The ore deposit at the Abana Mine occurs in this porphyritic rock and in general is a banded deposit (2" to 6" to say 12" wide) with now and then, for short distances, pockets from 5 feet to possibly 10 feet in width. The face of the drift when I noticed it comprised separate bands of practically solid chalcopyrite from 2" to 4" in width, separated by rock or rock mineralized more or less with pyrite.

I was not allowed to take any samples from underground; all of my specimens are from the surface.

SPECIMENS:- ABANA MINES.

1426 A :- The greenstone in contact with and south-west of the highly sheared zone. Phenocrysts can be observed in this rock. Also cubes of pyrite. Classify the rock.

1426 B :- The highly sheared porphyritic rock in which the ore occurs. The contact with and north-east of 1426 A; a well defined contact but no selvage or slickensides along contact. In many and possibly most places this highly sheared porphyritic rock is highly silicious which at times looks like quartz veins or quartz seggregations. Compare this with

1429 (Specimens from 3 miles north-west.) Classify and give such general information as may have a bearing on ore depositions in this formation. Is this merely a sheared and silicified greenstone represented by 1426 A ?

1427:- Disseminated mineralization between bands of solid sulphides in the sheared porphyritic rock. Sulphides comprise chalcopyrite, galena, pyrite and sphalerite. One zone in the mine is rich in chalcopyrite whereas 10 feet more or less south-west of this zone is another rich in zinc and a little lead and pyrite. The general distribution of the ore:- One zone containing high zinc, a little lead, and a fair percentage of pyrite; north-east and separated by rock, a second zone carrying high copper values indicates different periods of mineralization. Do these specimens throw any light on the genesis of deposition?

1428:A :- Ore specimens of the richer Chalcopyrite. Zinc and lead will be noted in these specimens which may give a clue on the sequence of deposition. These specimens probably represent the north-east or copper zone of mineralization.

1428 B :- These specimens of ore apparently represent the south-west zone of mineralization as they are rich in zinc. One specimen almost shows a contact of chalcopyrite and sphalerite. Sequence of deposition and such other information relating to possible commercial values will be appreciated.

ABANA COPPER & ZINC CO. - ROCHE PROPERTY - ABANA AREA.

The following specimens are from the Roche property, three miles north-west of Abana and on the same strike of the sheared Abana porphyry.

1429 :- Porphyritic rock - sheared but not to the extent of the Abana porphyritic rock No. 1426 B, with which compare.

No. 1429 appears to carry much more pyrite than 1426 B. Is the rock the same as 1426 B ?

1430 A :- Not necessary to have slide made. These represent the mineralization (ore body) of the Roche property. Samples are being assayed for gold (not sufficient mineralization to be of value.) A slide may throw some light on the excuse for mineralization but the advisability of this I leave with you.

1430 B :- What appeared on the surface to be a quartz vein but for a short distance only. It is my opinion that this quartz is merely a highly silicification of the porphyritic rock. This I would like determined if possible as it may have some gearing on the Abana property.

Sincerely,

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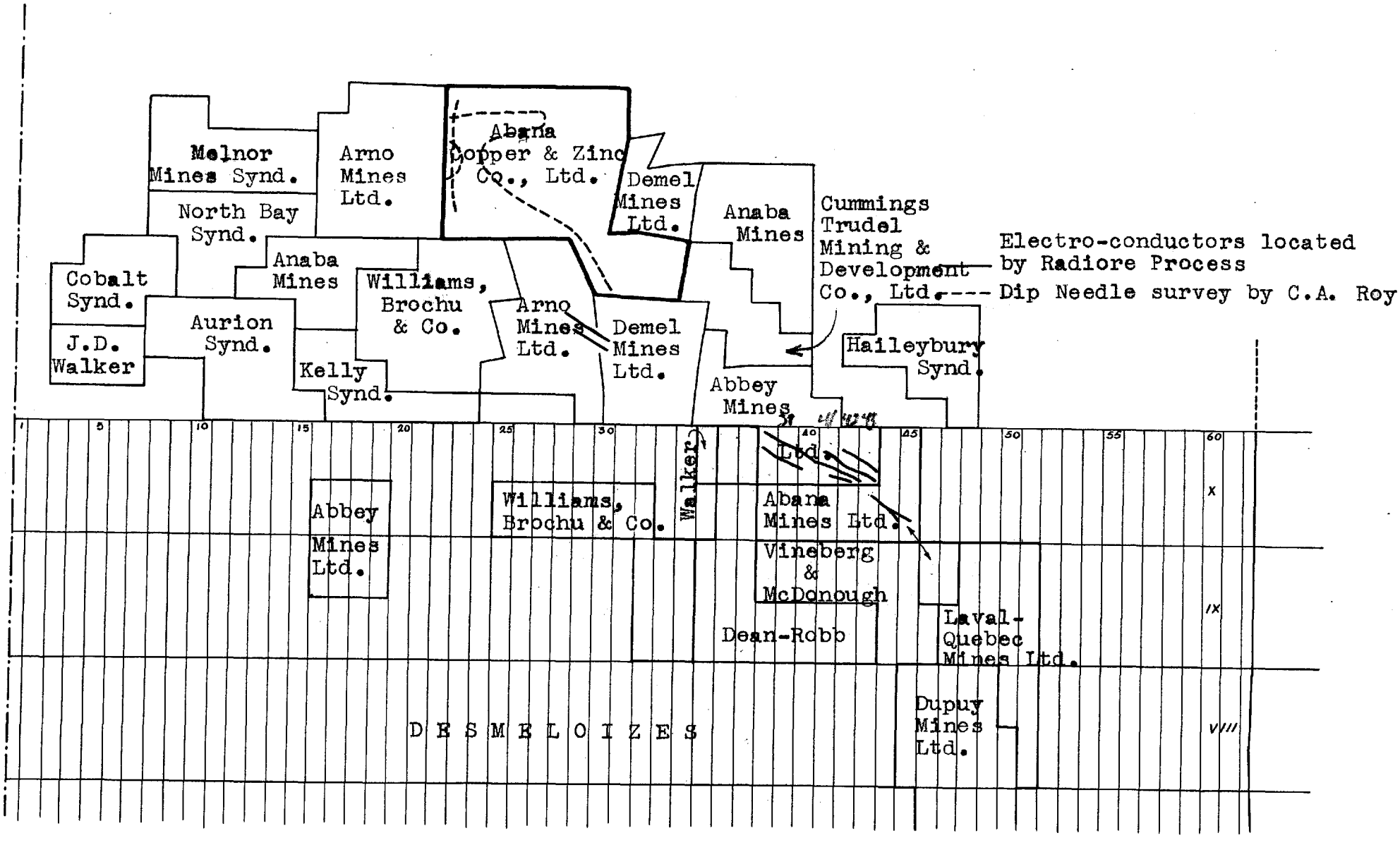
Melnor Mines Synd.
North Bay Synd.
Arno Mines Ltd.
Abana Copper & Zinc Co., Ltd.
Demel Mines Ltd.
Anaba Mines
Cummings Trudel Mining & Development Co., Ltd.
Electro-conductors located by Radiore Process
Dip Needle survey by C.A. Roy
Cobalt Synd.
Anaba Mines
Williams, Brochu & Co.
Arno Mines Ltd.
Demel Mines Ltd.
J.D. Walker
Aurion Synd.
Kelly Synd.
Abbey Mines
Haileybury Synd.
Abbey Mines Ltd.
Williams, Brochu & Co.
Walker
Abana Mines Ltd.
Vineberg & McDonough
Dean-Robb
Laval-Quebec Mines Ltd.
Dupuy Mines Ltd.
D E S M E L O I Z E S
1
5
10
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X
IX
VIII

No. 540

Petrographic report on a series of samples from the Abana area, Desmeloizes Township, Quebec, for Mr. Louis D. Huntoon.

BY: R. J. COLONY

New York, November, 1927.

I N D E X

STATEMENT

A series of samples from the vicinity of the Abana mine, and from a property three miles northwest of the Abana mine, but along the strike of the formation in which the Abana mine was opened, were submitted for petrographic study. The problem is one of comparison, paragenesis and general interpretation. The specific questions attached to the problem are as follows:

SPECIMENS:- ABANA MINES.

1426-A: The greenstone in contact with and southwest of the highly sheared zone. Phenocrysts can be observed in this rock. Also cubes of pyrite. Classify the rock.

1426-B: The highly sheared porphyritic rock in which the ore occurs. In contact with and northeast of 1426-A; a well defined contact but no selvage or slickensides along contact. In many and possibly most places this highly sheared porphyritic rock is so highly silicious that at times it looks like quartz veins or quartz segregations. Compare this with 1429 (specimens from three miles northwest). Classify and give such general information as may have a bearing on ore depositions in this formation. Is this merely a sheared and silicified greenstone represented by 1426-A?

1427: Disseminated mineralization between bands of solid sulphides in the sheared porphyritic rock. Sulphides comprise chalcopyrite, galena, pyrite and sphalerite.

One zone in the mine is rich in chalcopyrite whereas 10 feet more or less southwest of this zone is another rich in zinc and a little lead and pyrite. The general distribution of the ore: One zone containing high zinc, a little lead and a fair percentage of pyrite; northeast and separated by rock, a second zone carrying high copper values indicates different periods of mineralization. Do these specimens throw any light on the genesis of deposition?

1428-A: Ore specimens of the richer chalcopyrite. Zinc and lead will be noted in these specimens which may give a clue as to the sequence of deposition. These specimens probably represent the northeast or copper zone of mineralization.

1428-B: These specimens of ore apparently represent the southwest zone of mineralization as they are rich in zinc. One specimen almost shows a contact of chalcopyrite and sphalerite. Sequence of deposition and such other information relating to possible commercial values will be appreciated.

ROCHE PROPERTY - ABANA AREA

The following specimens are from the Roche property, three miles northwest of Abana and on the same strike of the sheared Abana porphyry:

1429: Porphyritic rock - sheared but not to the extent of the Abana porphyritic rock No.1426-B with which compare. No.1429 appears to carry much more pyrite than 1426-B. Is the rock the same as 1426-B?

1430-A: These represent the mineralization (ore body) of the Roche property. Samples are being assayed for gold (not sufficient mineralization to be of value). A slide may throw some light on the excuse for mineralization but the advisability of this I leave with you.

1430-B: What appeared on the surface to be a quartz vein but for a short distance only. It is my opinion that this quartz is merely a highly silicification of the porphyritic rock. This I would like determined if possible as it may have some bearing on the Abana property.

Sixteen thin sections and six polished plates were prepared from these samples, and all observations and conclusions in this report are based on the petrographic study of these sections and polished surfaces.

I found the material very puzzling and difficult to work with; it is impossible to answer some of the questions very satisfactorily because of the difficult nature of the material. Metamorphism and mineralization have obscured the original condition of the rocks and some of the conclusions are open to question. If this is kept in mind the observations herein recorded may, however, be of some service in a further field study of the area.

SUMMARY AND CONCLUSIONS

These rocks are puzzling in certain respects and I find some features difficult to explain. Two members of the lot are obviously very intensely metamorphosed rocks of igneous origin: No.1426-A, a chloritized, carbonated and silicified andesite, and No.1429, a sheared and much silicified rhyolitic porphyry. The others are IN THEIR PRESENT CONDITION and regardless of their origin, now essentially quartzites and schistose quartz rocks or quartz-sericite phyllites that contain hardly any traces of a former igneous and porphyritic habit. I could not have told they ever were igneous without the statement of field relations. It is difficult to explain just how such a complete change in composition and such complete destruction of original structure could have been brought about, unless it was accomplished by very thorough replacement and recrystallization, followed or accompanied by intense shearing. It is also difficult to explain the presence, in the mineralized zones, of ottrelite-zoisite, penninite and carbonate, unless they were introduced themselves, since nothing in the rocks, provided they were originally rhyolites, or acid volcanic ash, or even original quartzose sediments, would furnish the necessary constituents for the making of such silicate minerals.

The ORE-MINERALS in the Abana samples are closely associated with these silicates (ottrelite, zoisite, penninite, quartz and also carbonate), and the evidence shows that they have replaced the silicates. The silicates, therefore, seem to have influenced deposition.

This may be because they were themselves the forerunners of mineralization and were themselves introduced along zones of weakness in the sheared and silicified porphyry and were closely followed by or actually accompanied by the ore minerals, which outlasted them in deposition time; or else the silicate-mineralized zones were originally of different composition from the sheared porphyry, and the ottrelite-zoisite-penninite combination is a product of the metamorphism of a complex series of original volcanics and possibly sediments, the ottrelite-zoisite-penninite bands or zones forming, later, favorable loci for mineral deposition because of the controlling factor of greater ease in replacement.

I do not believe that I can tell which is the more probable explanation. I suppose that the intensely sheared and wholly silicified samples, Nos.1426-B, 1427, 1428-A, 1430-A and B, could have developed from a rock such as No.1429, but if such is the case then the silicates mentioned must have been introduced.

So far as the ore mineral paragenesis is concerned, I judge the pyrite is the earliest of the ore-minerals. It has been attacked by both sphalerite and chalcopyrite, and it, itself, has replaced the silicate minerals.

The sphalerite seems next in order of deposition, followed by the chalcopyrite, but the evidence is not so satisfactory here. The sphalerite contains many minute blebs of chalcopyrite that was originally dissolved in the sphalerite; so many, in fact, that it suggests the precipitation of sphalerite from mineralizing solutions that were progressively increasing in chalcopyrite content as the sphalerite was precipitating,

and that ultimately became so concentrated in chalcopyrite that it began to be deposited and actually replaced in part some of the earlier formed pyrite and sphalerite.

I am unable to say why one zone should be richer in zinc, whereas the other is richer in chalcopyrite. Nothing in the sections or polished plates tives any clue to this phase of the problem.

(Signed) R. J. COLONY
Geologist.

NEW YORK, NOVEMBER, 1927.

DESCRIPTION OF THE ABANA SAMPLES

These comprise Nos. 1426-A, 1426-B, 1427, 1428-A and 1428-B.

They have been described in considerable detail because of the complexity of the problem.

PETROGRAPHIC DESCRIPTION

Date: November, 1927
Collector: Louis D. Huntoon Field Number: 1426-A Description Number:540

I. FIELD NOTES

Locality: Desmeloizes Township, Quebec
Occurrence: Abana Mines "Greenstone"
Question: Classification

II. HAND SPECIMEN DESCRIPTION

General Appearance:

III. MICROSCOPIC STUDY FOR CLASSIFICATION

Texture: Moderately fine
Size of Grain: Original grains destroyed
Original Structure: Probably slightly porphyritic - obscure flowage
Primary Process Represented: Probably extrusion of lava
Secondary Structure: Complex alteration aggregate - Sheared (?)
Secondary Processes Represented: Intense modification and metamorphism - Shearing (?)

MINERALOGY (Minerals are grouped for interpretation purposes and are arranged in group in approximate order of abundance) (In some cases approximate percentages are given)

PRIMARY % (X)Essential Minerals	(Z)SECONDARY % Alteration Products (Especially Intermediate Products)	(M)METAMORPHIC % Recrystallization Minerals	(T)TERTIARY CHANGES OR WEATHERING AND ENRICHMENT EFFECTS (Especially End Products)
Feldspars, now descroyed Ferromagnesian now destroyed	Listed as metamorphic and introduced	Chlorite Saussurite Quartz Carbonate Magnetite Ilmenite Leucoxene	
(Y) ACCESSORY MINERALS Apatite Magnetite (?)		(O)INTRODUCED SUBSTANCES OR MINERALIZATION Quartz - Carbonate Pyrite	

SPECIAL FEATURES:

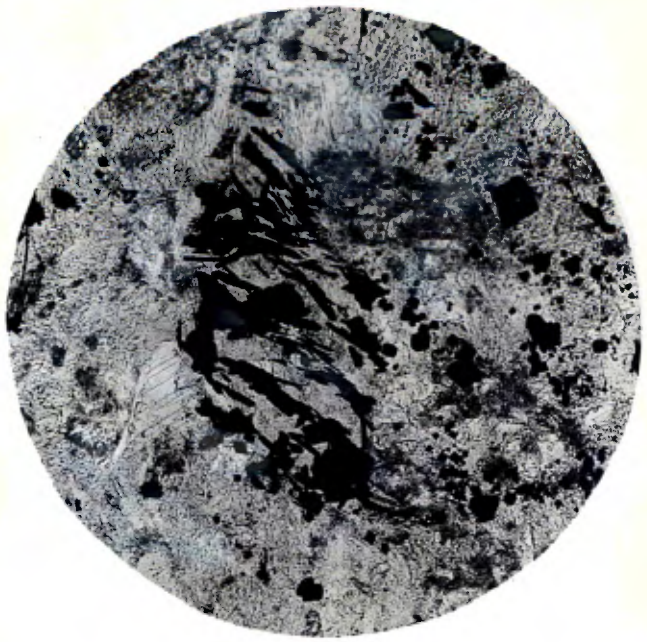
For description and special features, see next page.

ORIGIN OF THE ROCK: Igneous, Extrusive, now metamorphosed
CLASSIFICATION: Meta-Andesite (Greenstone is a godd name for this rock).

DESCRIPTION AND SPECIAL FEATURES - SAMPLE No.1426-A.

1. Phenocrysts of feldspar, now almost wholly destroyed, so that they are aggregate pseudomorphs of saussurite after a medium basic plagioclase. An occasional one still retains traces of the twinning common to plagioclase.
2. Irregular patches of Chlorite, mixed with a red-black metallic that has a platy structure, judged to be ilmenite. These areas are probably former hornblendic crystals, all now thoroughly destroyed.
3. Much carbonate, most of which represents introduced matter.
4. Much quartz, some probably derived from former original minerals by metamorphism, and some representing introduced matter.

The rock is a carbonated, chloritized, silicified and extensively modified volcanic that was probably an andesite in the first place. Traces of a porphyritic structure still exist and a suggestion of flowage also, although this is obscured by what seems to be a structure produced by shearing. The present condition of the rock could have been brought about only by intense dynamo-hydrothermal metamorphic processes that must have been connected with the intrusion of some other and deeper seated igneous body, although this may not appear at the present surface.



No. 1. PHOTOMICROGRAPH OF No.1426-A. Taken from thin section in ordinary light, magnification 40 diameters.

Showing aggregate pseudomorphs after former feldspar phenocrysts, and the platy black metallic in a complex alteration aggregate consisting of carbonate, chlorite and quartz. Since leucoxene is connected with the platy metallic, I judge it may be ilmenite. The rock has been very extensively modified, by silicification, chloritization and carbonatization.

PETROGRAPHIC DESCRIPTION

Date: November, 1927
Collector: Louis D. Huntoon

Field Number: 1426-B Description Number: 540

I. FIELD NOTES

Locality: Desmeloizes Township, Quebec
Occurrence: Abana Mines - Contact with and northeast of No.1426-A
Question: Compare with 1429 - Is this a sheared facies of 1426-A?

II. HAND SPECIMEN DESCRIPTION

General Appearance:

III. MICROSCOPIC STUDY FOR CLASSIFICATION

Texture: Fine Size of Grain:
Original Structure: Obscure
Primary Process Represented: Very obscure
Secondary Structure: Schistose and recrystallization aggregate - Augen structure
Secondary Processes Represented: Dynamic metamorphism

MINERALOGY (Minerals are grouped for interpretation purposes and are arranged in each group in approximate order of abundance) (In some cases approximate percentages are given)

PRIMARY % (X)Essential Minerals	(Z)SECONDARY % Alteration Products (Especially Intermediate Products)	(M)METAMORPHIC % Recrystallization Minerals	(T)TERTIARY CHANGES OR WEATHERING AND ENRICHMENT EFFECTS (Especially End Products)
All descroyed Some of the quartz? Remnants of feldspar?		Quartz Sericite Ottrelite Rutile Carbonate Chlorite Leucoxene	
(Y)ACCESSORY MINERALS		(O)INTRODUCED SUBSTANCES OR MINERALIZATION Quartz Pyrite Sphalerite Chalcopyrite Carbonate	

SPECIAL FEATURES: For special features and description see next page.

ORIGIN OF THE ROCK: Dynamic metamorphic

CLASSIFICATION: Sericitic quartz schist - (possibly a sheared meta-rhyolite?)

SPECIAL FEATURES AND DESCRIPTION OF NO.1426-B

The groundmass of this rock consists of a mosaic-like aggregate of very small quartz grains, through which run streaks of sericite and ottrelite, that give a slight schistosity to the rock. Ottrelite is distributed likewise in irregular metacrysts, around some of which slight flowage of dynamic origin has produced a little augen structure; patches of carbonate, oriented in the direction of schistosity aid in emphasizing the schistose structure of the rock.

There are no original phenocrysts remaining, judging from the evidence presented in the sections. The porphyritic aspect of the hand specimens must be due to the pseudophenocrysts (metacrysts) of ottrelite or zoisite and carbonate. ALL the original minerals have been wholly destroyed, and the rock has been either intensely silicified, or else it was highly siliceous in the first place, and has been recrystallized.

Judging from some of the other samples in the suite of specimens submitted, this rock may have been originally a fine and very acid porphyritic rock of the nature of a rhyolite. It has been so completely metamorphosed and so modified that its original character is very obscure. It is now essentially a very quartose schist that is slightly sericitic (a quartz phyllite essentially).

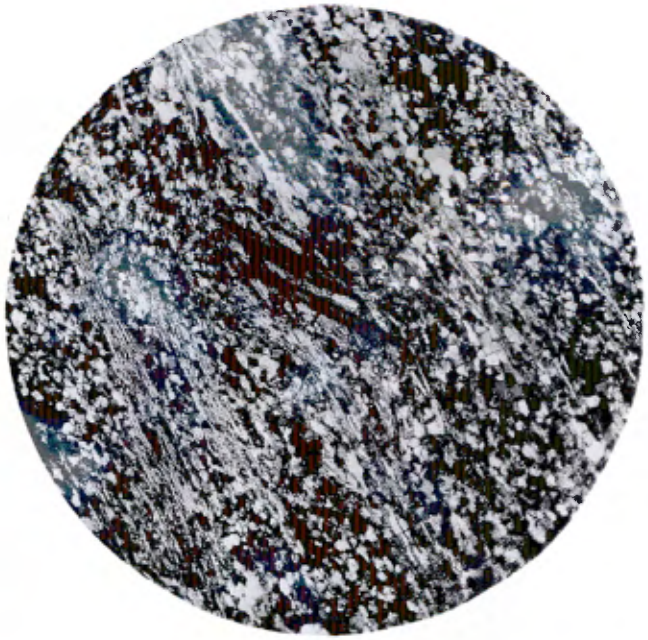
No.1429, taken 3 miles northwest of the place from which this sample, (No.1426-B) was secured, is somewhat similar to this sample, but No.1429 is much less sheared, and it retains some of its original structure. The quartz phenocrysts in

1429 are not crushed or deformed at all, although the groundmass of the rock (1429) is about as quartzose as that of No.1426-B and there is just as great a development of streaks of sericite in one as in the other. No.1426-B could, therefore, be interpreted as a much more intensely sheared and more severely deformed portion of the same formational unit that is represented by No.1429.

No.1426-A. however, is so distinctly different in composition that I cannot connect the two (1426-A and 1426-B) at all. The only resemblance lies in the presence in both 1426-A and 1426-B, of carbonate and quartz that have been introduced.

In this sample (1426-B) the ottrelite and the carbonate have been slightly affected by later movement, as they both are fractured and more or less deformed, although the carbonate has been less disturbed than the ottrelite.

This rock is so different in composition and structure from 1426-A that I judge it is a different formational unit. It is probably related to or possibly the same as the very acid porphyry (1429).



No. 2. PHOTOMICROGRAPH OF 1426-B, taken from thin section in polarized light, nicols crossed, magnification 40 diameters.

Showing the schistose structure given to the rock by the development of streaks of sericite, and the finely granular recrystallized groundmass of aggregate quartz. A metacryst of ottrelite with polysynthetic twinning, oriented at 45° to the schistosity of the rock, appears in the centre of the field. The ottrelite in this rock is colorless, with only faint pleochroism, but it is quite characteristic in its structure and mode of occurrence. In some of the other samples it grades into zoisite.

PETROGRAPHIC DESCRIPTION

Date: November, 1927
(lector: Louis D. Huntoon

Field Number: 1427 Description Number: 540

I. FIELD NOTES
Locality: Desmeloizes Township, Quebec
Occurrence: Abana Mines - mineralization between bands of solid sulphides
Question: Genesis?

II. HAND SPECIMEN DESCRIPTION
General Appearance:

III. MICROSCOPIC STUDY FOR CLASSIFICATION
Texture: Fine to medium Size of Grain:
Original Structure: Very obscure
Primary Process Represented: Obscure
Secondary Structure: Sheared - schistose - cataclastic
Secondary Processes Represented: Dynamic metamorphism and mineralization

MINERALOGY (Minerals are grouped for interpretation purposes and are arranged in each group in approximate order of abundance) (In some cases approximate percentages are given)

PRIMARY % (X)Essential Minerals	(Z)SECONDARY % Alteration Products (Especially Intermed-iate Products)	(M)METAMORPHIC % Recrystallization Minerals	(T)TERTIARY CHANGES OR WEATHERING AND ENRICHMENT EFFECTS (Especially End Products)
All destroyed Quartz(?)possibly	Listed as metamorphic and introduced	Quartz Sericite Ottrelite Carbonate Chlorite Leucoxene Zoisite	
(Y) ACCESSORY MINERALS		(0)INTRODUCED SUBSTANCES OR MINERALIZATION Pyrite Galena Chalcopyrite Sphalerite Quartz Some of the silicates?	

SPECIAL FEATURES: For Special Features and description see next page.

ORIGIN OF THE ROCK: Dynamic metamorphic

CLASSIFICATION: Mineralized quartz sericite schist or phyllite

SPECIAL FEATURES AND DESCRIPTION OF 1427

The ROCK-PART of the sample resembles specimen 1426-B. It is a schistose, very quartzose, rock, with a little sericite distributed through it in streaks and scattered through the quartz in microscopic needles; pyrite and chalcopyrite occur in streaks also, intimately associated, and mixed with a little ottrelite. Patches of a little more coarsely granular quartz, around which streaks of sericite bend, making an augen structure of a sort, may possibly represent crushed and sheared quartz phenocrysts, although the evidence is not satisfactory. The ROCK-PART, therefore, of this specimen is essentially the same as No.1426-B and like it may have been originally fine, slightly porphyritic and rhyolitic(?). It has been sheared and metamorphosed, so that in its present condition the rock is a quartz-sericite phyllite, quite similar to 1426-B.

The ORE-PART of the sample, however, is quite different. It is composed of radiating and fascicular bladed crystals of a faintly pleochroic to moderately strongly pleochroic mineral, that has moderately high relied, low birefringence, exhibits polysynthetic twinning and responds to the optical tests for a member of the chloritoid group (ottrelite). There is also a member of the chlorite group present that has a similar bladed or lamellar habit and that exhibits anomalous ultra tints in polarization, that is judged to be penninite. Mixed with these two minerals there is more or less coarse sericite and streaks of leucoxene. The ore minerals are pyrite, chalcopyrite and a very small amount of very dark colored sphalerite, distributed interstially with respect to

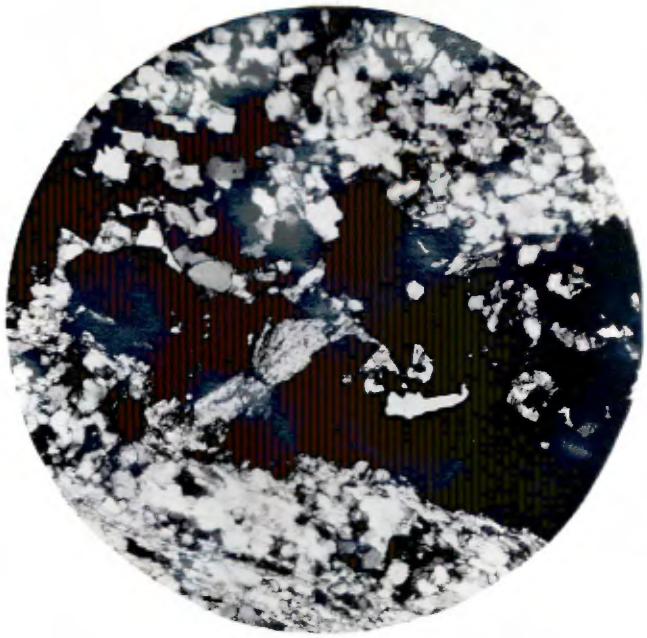
the chlorite (penninite) and chloritoid (ottrelite), and slightly encroaching upon these silicates. There is some evidence of attack by the sulphides upon the silicates since they encroach upon and partially replace the silicate minerals.

There is nothing in the sheared, silicified and very acid rhyolitic porphyry that could furnish the necessary constituents for the making of the chloritoid and the chlorite.

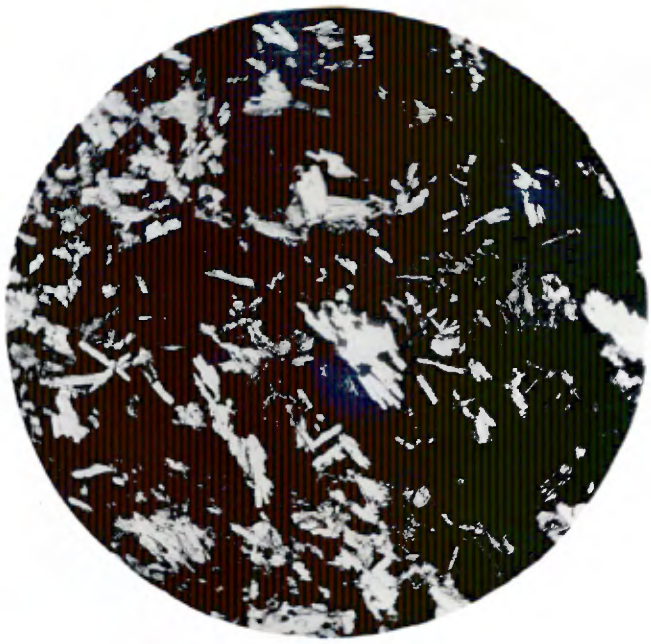
There is moreover, a little chloritoid (ottrelite) associated with the pyrite in streaks in the ROCK-PART of this sample. The evidence seems to favor, therefore, introduction of at least a portion of the silicates as a part of the general mineralizing process that gave rise, ultimately, to the ore minerals, although the chloritoid (ottrelite) in No.1426-B was apparently developed during the dynamic metamorphism of the rock; but even in that sample the ottrelite seems to have formed at the CLOSE of the metamorphic period, and it may have had an initial extraneous source.

Some of the bladed mineral is quite colorless and is not pleochroic at all; it more nearly resembles zoisite. I suspect that both zoisite and ottrelite are present; colorless ottrelite and zoisite resemble each other and have the same general significance.

The evidence presented in the polished plates seems to show that the sphalerite is later than the pyrite, since the sphalerite cuts the pyrite; it does not appear to have replaced much of it, but the evidence for transgression and slight replacement is pretty definite.



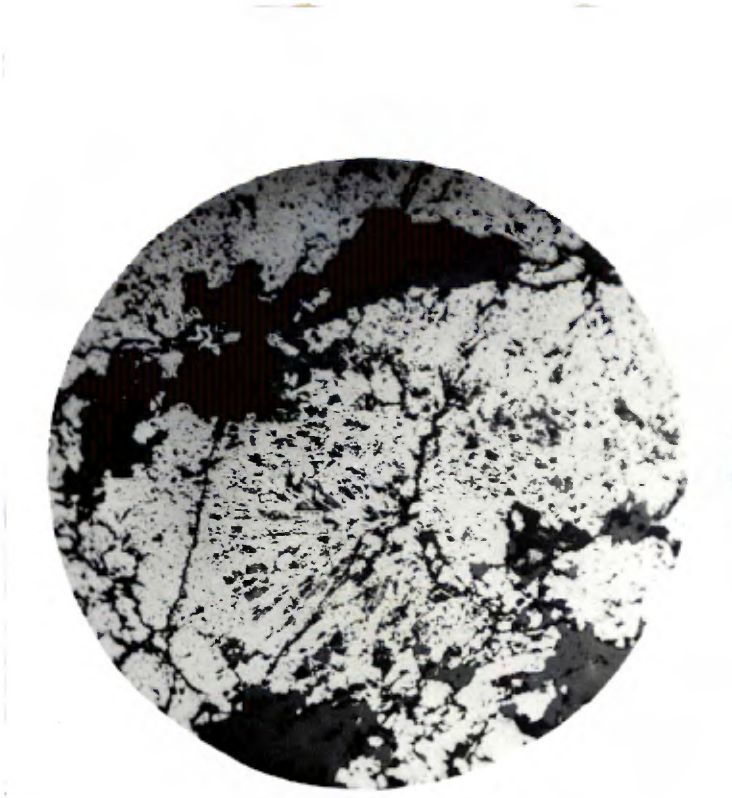
No. 3. PHOTOMICROGRAPH OF 1427, taken from thin section OF THE ROCK-PART, in polarized light, magnification 60 diameters. The BLACK PART of the picture is the ore minerals, pyrite and chalcopyrite. Note the metacryst of ottrelite surrounded by the sulphides. The granular groundmass consists of quartz mixed with streaks of sericite. The rock-part of the sample represents an intensely sheared porphyry, so extensively metamorphosed that it has been converted into a quartz sericite phyllite.



No. 4. PHOTOMICROGRAPH OF 1427, taken from a thin section of the "ore-part", in polarized light, nicols crossed, magnification 40 diameters.

The BLACK part is the ore- pyrite and chalcopyrite; the needles and bundles of needles are ottrelite. This part carries much chlorite, ottrelite, sericite and quartz. The sulphides (black) are in part interstitial, but also in part replacing the silicate minerals.

No. 5. PHOTOMICROGRAPH OF 1427, ore part, taken from polished slab, direct reflected light, magnification 30 diameters. Showing pyrite (Py) with included patches of silicate minerals, encroached upon and cut by sphalerite (Sp). The sphalerite carries microscopic blebs of chalcopyrite that is coeval with the sphalerite. That is, some chalcopyrite existed in solution in the sphalerite and it has precipitated in minute blebs within the sphalerite. Pyrite here is the earlier, sphalerite the later.



No. 6. PHOTOMICROGRAPH OF 1427, ore part, taken from polished slab, direct reflected light, magnification 30 diameters. Another sample showing pyrite with ghosts of radiate structure derived by replacement of radiate ottrelite crystals. Note that the pyrite is slightly fractured.

PETROGRAPHIC DESCRIPTION

Date: November, 1927
Collector: Louis D. Huntoon Field Number: 1428-A Description Number: 540

I. FIELD NOTES
Locality: Desmeloizes Township, Quebec
Occurrence: North-east zone of mineralization (?)
Question: Paragenesis and history

II. HAND SPECIMEN DESCRIPTION
General Appearance:

III. MICROSCOPIC STUDY FOR CLASSIFICATION
Texture: Variable Size of Grain:
Original Structure: Obscure
Primary Process Represented: Obscure
Secondary Structure: Schistose - Cataclastic
Secondary Processes Represented: Dynamic metamorphism and mineralization

MINERALOGY (Minerals are grouped for interpretation purposes and are arranged in each group in approximate order of abundance) (In some cases approximate percentages are given)

PRIMARY %)Essential Minerals	(Z)SECONDARY % Alteration Products (Especially Intermediate Products)	(M)METAMORPHIC % Recrystallization Minerals	(T)TERTIARY CHANGES OR WEATHERING AND ENRICHMENT EFFECTS (Especially End Products)
All destroyed	Listed as metamorphic and introduced	Quartz Zoisite Sericite Chlorite Garnet(?)altered A little feldspar	
(Y)ACCESSORY MINERALS		(O)INTRODUCED SUBSTANCES OR MINERALIZATION Pyrite Chalcopyrite Sphalerite Quartz A very little galena and bornite	

SPECIAL FEATURES: For Special Features and description see next page.

ORIGIN OF THE ROCK: Dynamic metamorphic

CLASSIFICATION: Mineralized quartz - sericite phyllite

SPECIAL FEATURES AND DESCRIPTION OF NO.1428-A

The ROCK-PART is quartzose, sheared, sericitic and mineralized. More or less zoisite is scattered through the rock and a very small amount of alkali feldspar occurs, but in such relations that I judge it is either a recrystallization product or else it has been introduced with some of the quartz.

In this section the principal sulphide mineral is pyrite, mixed with a much smaller quantity of a reddish mineral that seems to be an iron oxide of some sort, like hematite, but it is not an oxidation product of the pyrite. It has been, like the pyrite, introduced.

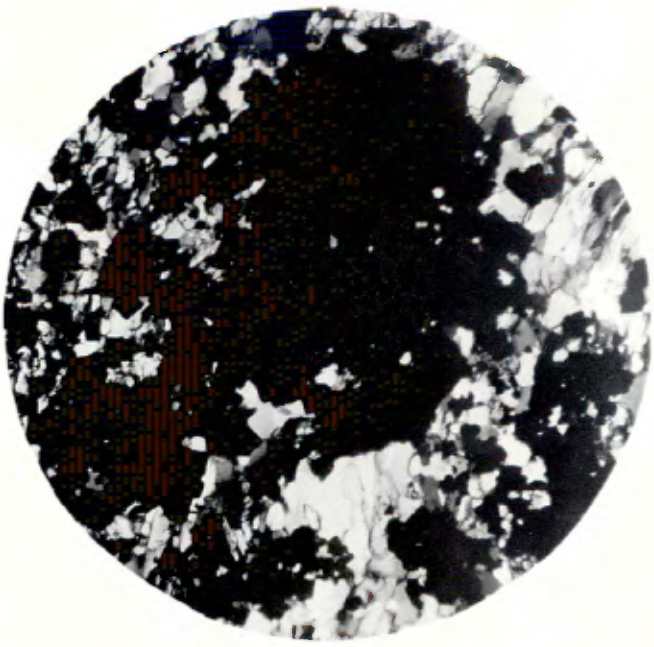
The ORE-PART of the specimen is a complex aggregate of colorless, bladed zoisite, exhibiting no pleochroism, with polysynthetic twinning and occurring in radiate and fasicular bundles much like the ottrelite described in other sections. The zoisite and ottrelite seem to grade into each other; they resemble each other very closely and are probably pretty closely alike in composition. Here also occurs lamellar chlorite (penninite) and much fine sericite. Eyes or "augen" of crushed quartz occur now and then, and isotropic residues of some mineral that had a high relief (garnet??), but that has been much modified.

The ORE MINERALS in the "ore-part" of the specimen, are chiefly pyrite and chalcopyrite, with a little sphalerite. They show cross-cutting and encroachment relations to the silicates much more clearly than in No.1427. The evidence for sequence is not clear. The pyrite appears to have inherited structures possessed by the silicate minerals (zoisite-

chlorite) and chalcopyrite has surrounded and engulfed both pyrite and sphalerite; there is very little veining of one by the other and aside from the swamping of both pyrite and sphalerite in the chalcopyrite, the polished surfaces offer no very definite proof of order of deposition.

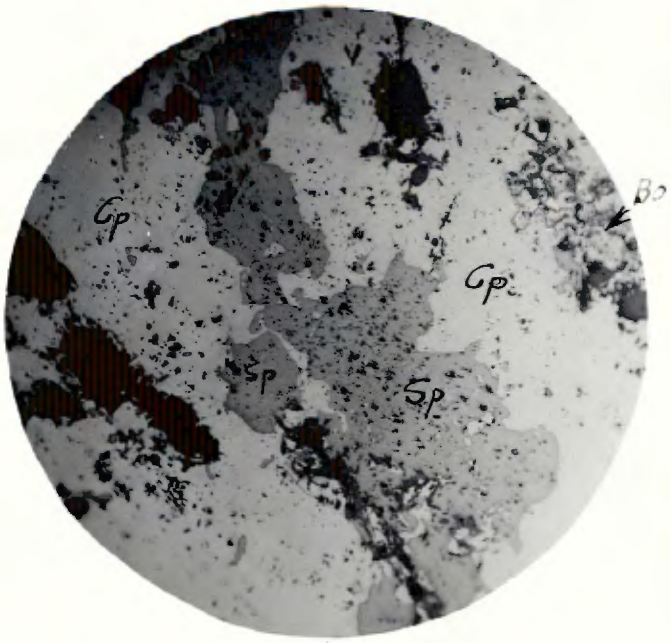
I judge the pyrite is earlier than all the other ore-minerals but the chalcopyrite-sphalerite sequence is difficult to determine. There are ragged, microscopic patches of bornite engulfed in the chalcopyrite, very much corroded ("moth-eaten"), and in these are minute splotches of blue chalcocite. Microscopic patches of galena occur in the sphalerite, very sparingly distributed, but the sum total of bornite and galena is exceedingly small.

No. 7. PHOTOMICROGRAPH OF 1428-A, taken from thin section in polarized light, nicols crossed, magnification 60 diameters.
Showing the radiate and fascicular bladed crystals of zoisite (behaves more like zoisite in this specimen) with polysynthetic twinning. The BLACK patches are the sulphide minerals replacing in part the silicates.

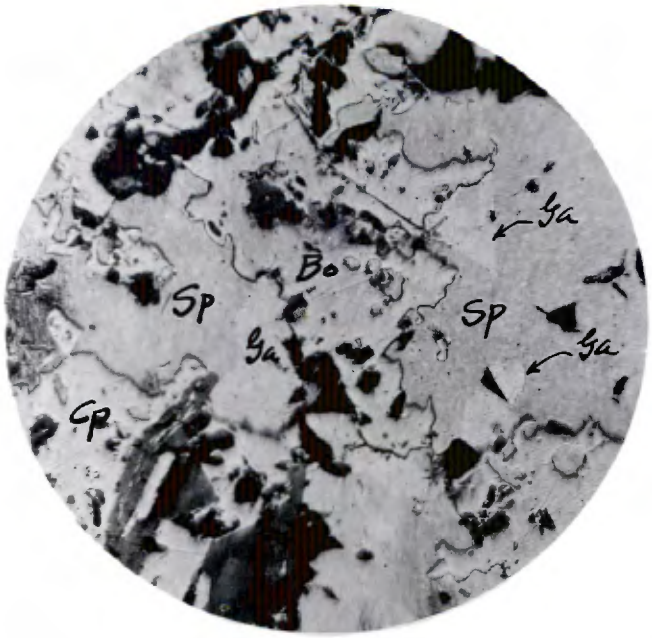


No. 8. PHOTOMICROGRAPH OF 1428-A. Taken from another thin section in polarized light, nicols' crossed, magnification 60 diameters.
The BLACK crystals are pyrite and chalcopyrite, replacing a fine aggregate groundmass composed of quartz, mixed with chlorite needles and fine sericite. The quartz-sericite-phyllite part of the sample.

No. 9. PHOTOMICROGRAPH OF 1428-A. Taken from a polished plate in direct reflected light, magnification 30 diameters. Pyrite (Py) in chalcopyrite (Cp). The dark and light gray crystals and patches are the silicate minerals and quartz. It is possible the pyrite here is a replacement remnant, but the evidence is not conclusive.



No. 10. PHOTOMICROGRAPH OF 1428-A. Taken from polished plate, in direct reflected light, magnification 30 diameters. Sphalerite (Sp) with coeval blebs of chalcopyrite in it, surrounded by later chalcopyrite (Cp). Numerous microscopic, very ragged and "moth-eaten" patches of bornite (Bo) are scattered through the chalcopyrite. The sequence in mineralization is judged to be: pyrite, sphalerite - bornite - chalcopyrite, since in some places chalcopyrite seems to encroach upon the sphalerite.



No. 11. PHOTOMICROGRAPH OF 1428-A, taken from polished plate in direct reflected light, magnification 300 diameters. Showing bornite (Bo), sphalerite (Sp) with microscopic patches of galena (Ga) in it, all surrounded by chalcopyrite (Cp).

No. 12. PHOTOMICROGRAPH OF 1428-A, taken from polished plate in direct reflected light, magnification 300 diameters. Chalcopyrite (Cp) replacing zoisite and chlorite. The chalcopyrite is clearly later than, and in part replaces, the pyrite, but the exact relations between chalcopyrite and sphalerite are not so clear.

PETROGRAPHIC DESCRIPTION

Date: November, 1927
Collector: Louis D. Huntoon Field Number: 1428-B Description Number:540

I. FIELD NOTES
Locality: Desmeloizes Township, Quebec
Occurrence: Southwest zone of Mineralization (?)
Question: Paragenesis and history

II. HAND SPECIMEN DESCRIPTION
General Appearance:

III. MICROSCOPIC STUDY FOR CLASSIFICATION
Texture: Variable Size of Grain:
Original Structure: Destroyed
Primary Process Represented: Uncertain
Secondary Structure: Crystalline aggregate
Secondary Processes Represented: Intense metamorphism and mineralization

MINERALOGY (Minerals are grouped for interpretation purposes and are arranged in each group in approximate order of abundance) (In some cases approximate percentages are given)

PRIMARY % (X)Essential Minerals	(Z)SECONDARY % Alteration Products (Especially Intermediate Products)	(M)METAMORPHIC % Recrystallization Minerals	(T)TERTIARY CHANGES OR WEATHERING AND ENRICHMENT EFFECTS (Especially End Products)
all originals wholly destroyed	Listed as metamorphic and introduced	Ottrelite or Zoisite Chlorite Much carbonate Quartz	
(Y) ACCESSORY MINERALS		(O)INTRODUCED SUBSTANCES OR MINERALIZATION Quartz, Carbonate, Pyrite, sphalerite Chalcopyrite, Galena	

SPECIAL FEATURES: FOR SPECIAL FEATURES AND DESCRIPTION SEE NEXT PAGE.

ORIGIN OF THE ROCK: Mineralization and replacement product

CLASSIFICATION: Sulphide ore of zinc and copper

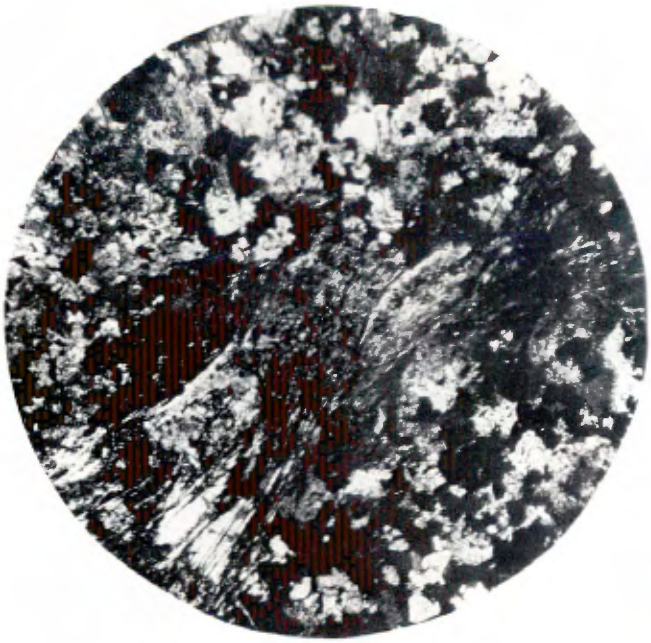
SPECIAL FEATURES AND DESCRIPTION OF NO.1428-B.

There are traces of the mosaic-like finely granular quartz aggregate characteristic of the very acid sheared samples, but most of this has been replaced by mineralization products, including carbonate in quantity, which has not been noted except in very small amounts in the other samples. Quartz - Carbonate-pyrite appears to represent the first mineralization. The carbonate especially was later attacked by a very dark sphalerite that possesses a structure probably inherited from some former mineral that has been replaced; perhaps carbonate. This dark sphalerite cuts both quartz and carbonate and I judge it has attacked the pyrite to some extent also. The pyrite itself has attacked the carbonate, so that carbonization was the precursor of mineralization.

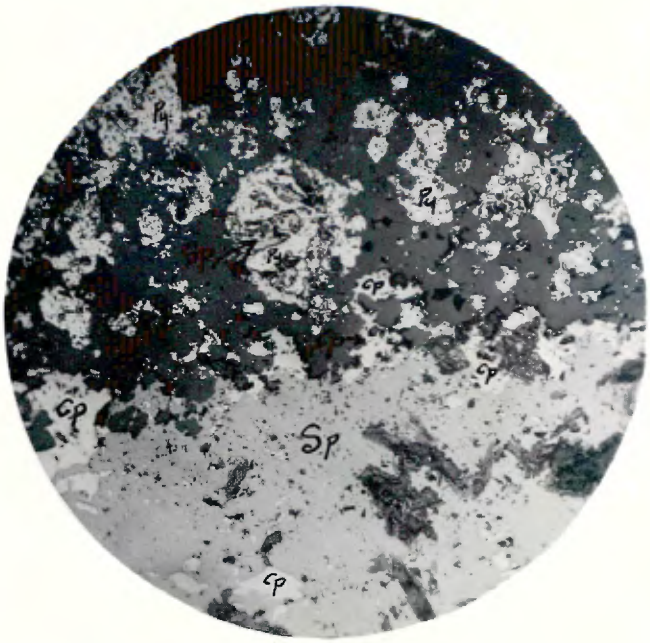
While the evidence in the different specimens for the earlier deposition of the pyrite is fairly clear, the sphalerite - chalcopyrite succession is not so certain. I think however, that the sphalerite with its associated galena is antecedent to the chalcopyrite, although the two are pretty closely associated.

The difference between the "copper-Rich" zone and the "zinc-rich" zone, that is, between 1428-A and 1428-B, is due to the more complete replacement of pyrite-sphalerite by chalcopyrite in the northeast zone of mineralization. Why this is so I do not know.

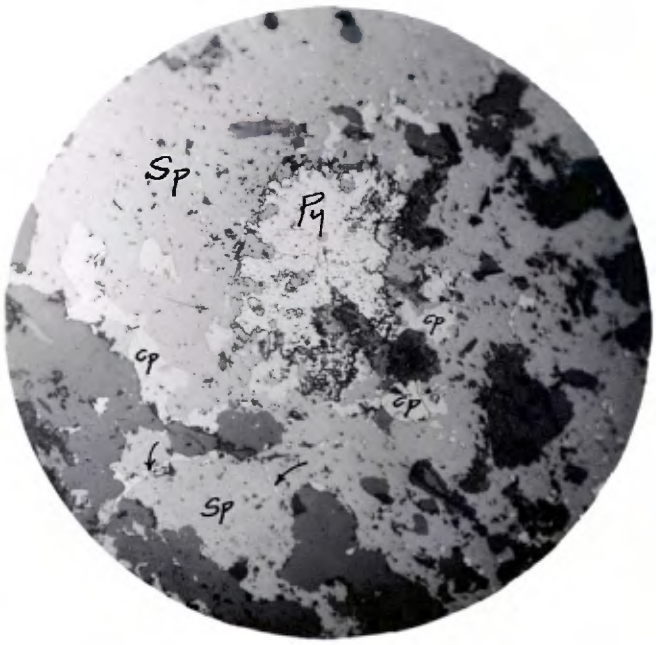
No. 13. PHOTOMICROGRAPH OF 1428-B. Taken from thin section in ordinary light, magnification 70 diameters. The dead black part of the picture represents the sulphides pyrite-chalcopyrite. The very dark part speckled with minute gray spots is the sphalerite. This is so very dark in color that even in thin section it is reddish brown and hence does not "take" very well. The white grains are quartz and carbonate, earlier than, cut by and replaced by the sulphides.



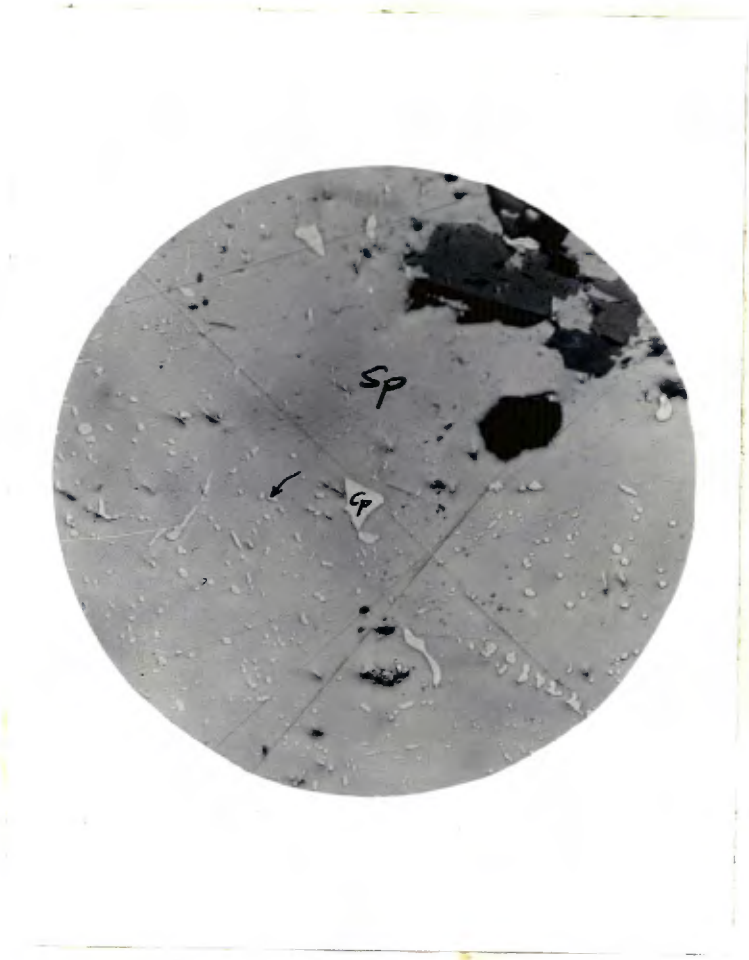
No.14. PHOTOMICROGRAPH OF 1428-B. Taken from another section, in polarized light, nicols crossed, magnification 60 diameters. Showing a modified zoisite (or ottrelite) crystal in a replacement aggregate of carbonate (light and dark gray grains) mixed with pyrite (black grains). This suggests replacement of the original sheared and schistose porphyry (quartz-sericite phyllite) by carbonate, which has later been attacked by pyrite. That is, there is here a suggestion that the zoisite-ottrelite-chlorite parts of these samples may be replacement-mineralization zones in the quartz-sericite phyllite.



No.15. PHOTOMICROGRAPH OF 1428-B. The "zinc-rich"zone. Taken from polished plate, magnification 30 diameters. Pyrite(Py) replacing the silicate minerals and carrying microscopic patches of the silicates as unreplaced remnants, and sphalerite (Sp) replacing likewise the silicate minerals and encroaching on the pyrite (see arrow in picture). Chalcopyrite (Cp) just beginning to appear, and existing in two origins. Minute blebs that were in solid solution in the sphalerite originally, but that have now precipitated, and later chalcopyrite that here looks as though they were replacement remnants in the sphalerite, but that are actually later than it. See Picture No.16.



No.16. PHOTOMICROGRAPH OF 1428-B. The "zinc-rich" zone. Taken from polished plate, magnification 30 diameters. Showing pyrite (Py) surrounded by and corroded by Sphalerite (Sp), which in turn is cut by chalcopyrite (Cp). Arrows point to veinlets of chalcopyrite traversing the sphalerite. While chalcopyrite and sphalerite are intimately associated what evidence there is favors a slightly earlier deposition of the sphalerite.



No.17. PHOTOMICROGRAPH OF 1428-B. The "zinc-rich" zone. Taken from a polished plate, magnification 300 diameters. The light gray field is sphalerite (Sp). All of the minute blebs and stringers of very light color are blebs of chalcopyrite (Cp) that is contemporaneous with the sphalerite. A small arrow points to one of these many blebs. The later chalcopyrite probably represents a progressive concentration of that component and a progressive decrease in sphalerite so that the deposition period of the chalcopyrite extended beyond that of the sphalerite.

ADDITIONAL COMMENT ON THE ABANA SAMPLES

No.1426-A is clearly of igneous origin, notwithstanding the very intensive and extensive metamorphism that has affected it. Originally a volcanic of andesite make-up, but now changed in composition, though retaining remnants of its former structure.

The other members of the Abana series are very much more obscure. I should be unable to determine an igneous origin for them, judging from themselves alone.

In connection with No.1429, Roche property, however, and in view of the field observations, it is possible that samples Nos.1426-B, 1427, 1428-A and B, may be intensely modified, strongly sheared, much silicified portions of the same formation represented by No.1429.

In their present form and with their present composition there is nothing about them suggestive of an igneous origin; moreover, it is difficult to account for the composition of the ORE part of these rocks, consisting as it does of zoisite-ottrelite, chlorite, carbonate, quartz and the sulphides, unless most if not all of these minerals were introduced with the ore-minerals.

Additional field information is needed to clear up some of these questions.

Description of the samples from the Roche property, three miles northwest of Abana mine along the same strike. These comprise samples Nos. 1429, 1430-A and 1430-B, each described in more or less detail.

PETROGRAPHIC DESCRIPTION

Date: November, 1927
Collector: Louis D. Huntoon Field Number: 1429 Description Number: 540

I. FIELD NOTES
Locality: Desmeloizes Township, Quebec
Occurrence: Roche Property, Abana area
Question: Compare with 1426-B

II. HAND SPECIMEN DESCRIPTION
General Appearance:

III. MICROSCOPIC STUDY FOR CLASSIFICATION
Texture: fine Size of Grain:
Original Structure: Porphyritic- slightly
Primary Process Represented: Extrusion of lava, probably
Secondary Structure: recrystallization aggregate - schistose
Secondary Processes Represented: Recrystallization - metamorphism

MINERALOGY (Minerals are grouped for interpretation purposes and are arranged in each group in approximate order of abundance) (In some cases approximate percentages are given)

PRIMARY % (Essential Minerals	(Z)SECONDARY % Alteration Products (Especially Intermed- Products)	(M)METAMORPHIC % Recrystallization Minerals	(T)TERTIARY CHANGES OR WEATHERING AND ENRICHMENT EFFECTS (Especially End Products)
Quartz all others destroyed	Listed as metamorphic and introduced	Quartz Chlorite Sericite Leucoxene	Limonite
(¥)ACCESSORY MINERALS		(O)INTRODUCED SUBSTANCES OR MINERALIZATION Quartz Carbonate(?)now destroyed	

SPECIAL FEATURES: For special features and description see next page.

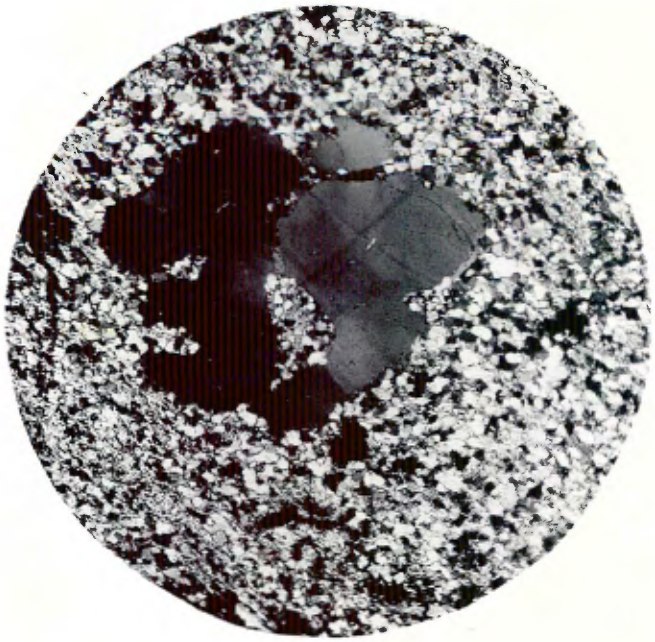
ORIGIN OF THE ROCK: Igneous - now metamorphosed

CLASSIFICATION: Sheared metarhyolite (now essentially a quartzite)

SPECIAL FEATURES AND DESCRIPTION NO.1429.

A finely granular and quartzose groundmass that is a product of recrystallization, and that has a slightly schistose aspect due to the stringers and streaks of chlorite and sericite, characterize this rock. Original small phenocrysts of quartz, some corroded, still persist; these serve as criteria for origin. The rock is slightly sheared, much silicified, recrystallized and metamorphosed, slightly porphyritic and rhyolitic. Iron stained patches and cavities with iron stained walls show that a former mineral of some sort, probably a ferruginous carbonate, has been oxidized and leached. Rock No.1426-B could have been derived from a formation like this, but 1426-B is much more intensely sheared and much more extensively modified.

This rock, No.1429, is the only one of the series that enables one to feel reasonably sure of origin. This undoubtedly represents a much modified rhyolitic rock; if the others, excepting 1426-A belong to the same formation, they have been subjected to much more intense metamorphism.



No.18. PHOTOMICROGRAPH OF 1429. ROCHE PROPERTY, ABANA AREA. Taken from thin section, polarized light, nicols crossed, magnification 40 diameters. Showing:

(a) Quartz phenocryst, considerably corroded.
(b) Granular quartz groundmass; a recrystallization and metamorphic product.
(c) Fine sericite, distributed in streaks that give more or less schistosity to the rock.

Similar in composition to 1426-B but not so intensely sheared.

PETROGRAPHIC DESCRIPTION

Date: November, 1927
Collector: Louis D. Huntoon Field Number: 1430-A Description Number: 540

I. FIELD NOTES
Locality: Desmeloizes Township, Quebec
Occurrence: Roche property, Abana area - ORE BODY
Question: Interpretation

II. HAND SPECIMEN DESCRIPTION
General Appearance:

III. MICROSCOPIC STUDY FOR CLASSIFICATION
Texture: Fine, variable Size of Grain:
Original Structure: Obscure
Primary Process Represented: Obscure
Secondary Structure: Recrystallization aggregate - Cataclastic
Secondary Processes Represented: Metamorphism

MINERALOGY (Minerals are grouped for interpretation purposes and are arranged in each group in approximate order of abundance) (In some cases approximate percentages are given)

PRIMARY % (X)Essential Minerals	(Z)SECONDARY % Alteration Products (Especially Intermediate Products	(M)METAMORPHIC % Recrystallization Minerals	(T)TERTIARY CHANGES OR WEATHERING AND ENRICHMENT EFFECTS
Quartz All others destroyed Biotite, destroyed	Listed as metamorphic and introduced	Quartz Chlorite Sericite	Limonite Hematite
(Y)ACCESSORY MINERALS		(O)INTRODUCED SUBSTANCES OR MINERALIZATION Quartz Pyrite Carbonate altered)	

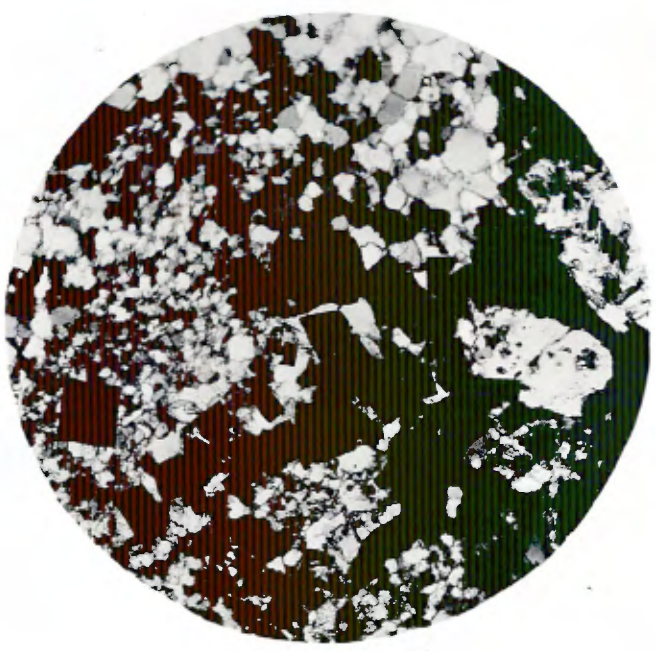
SPECIAL FEATURES: For special features and description see next page.

ORIGIN OF THE ROCK: Dynamic metamorphic

CLASSIFICATION: Quartzite (possibly a sheared and silicified rhyolitic rock?)

SPECIAL FEATURES AND DESCRIPTION OF No.1430-A.

Much more obscure than 1429. Very quartzose, but with suggestions of former phenocrysts of quartz that have been granulated, but that are not so fine as the groundmass quartz. A very slightly schistose structure is given to the rock by streaks of chlorite. The rock could have developed from a formation like 1429 through more intense shearing. Pyrite and hematite both are present, but the hematite seems not to have developed from the pyrite. Ir probably was derived through the oxidation of a ferruginous carbonate, traces of which still exist, only partly altered. This sample, as well as the other similar ones, Nos.1426-B and 1427 and 1430-B, for example, show in themselves absolutely no evidence of their igneous origin. Were it not for the accompanying associated rock No.1429 and for the statement of field observations, especially in Summary Report, 1925, part C, Canada Department of Mines, I should not have ascribed an igneous origin to them, but would have judged them as having been original quartzose sediments in the first place. Such complete destruction of original structures and compositions and such complete conversion to essentially nothing but quartz is of considerable interest.



No.19. PHOTOMICROGRAPH OF 1430-A. ROCHE PROPERTY, ABANA AREA. Taken from thin section, polarized light, nicols crossed, magnification 40 diameters. Pyrite (black crystals and patches) replacing quartz aggregate. This sample is not unlike 1429, but shearing has been a little more intense, or perhaps the effect of shearing has been a little more pronounced. It is the "mineralized" part of the rock.

PETROGRAPHIC DESCRIPTION

Date: November, 1927
Collector: Louis D. Huntoon Field Number: 1430-B Description Number: 540

I. FIELD NOTES
Locality: Desmeloizes Township, Quebec
Occurrence: Roche Property, Abana area.
Question: Interpretation

II. HAND SPECIMEN DESCRIPTION
General Appearance:

III. MICROSCOPIC STUDY FOR CLASSIFICATION
Texture: Fine variable Size of Grain:
Original Structure: Obscure-probably slightly porphyritic
Primary Process Represented: Obscure-probably igneous
Secondary Structure: Slightly sheared - crystalline aggregate - cataclastic
Secondary Processes Represented: Dynamic metamorphism.

MINERALOGY (Minerals are grouped for interpretation purposes and are arranged in each group in approximate order of abundance) (In some cases approximate percentages are given)

PRIMARY % (X)Essential Minerals	(Z)SECONDARY % Alteration Products (Especially Intermediate Products	(M)METAMORPHIC % Recrystallization Minerals	(T)TERTIARY CHANGES OR WEATHERING AND ENRICHMENT EFFECTS
Quartz All others destroyed	Listed as metamorphic and introduced	Quartz Sericite Chlorite	Limonite
(Y)ACCESSORY MINERALS		(O)INTRODUCED SUBSTANCES OR MINERALIZATION	
Zircon		Quartz Carbonate Pyrite A dark bronzy metallic	

SPECIAL FEATURES: For special features and description see next page.

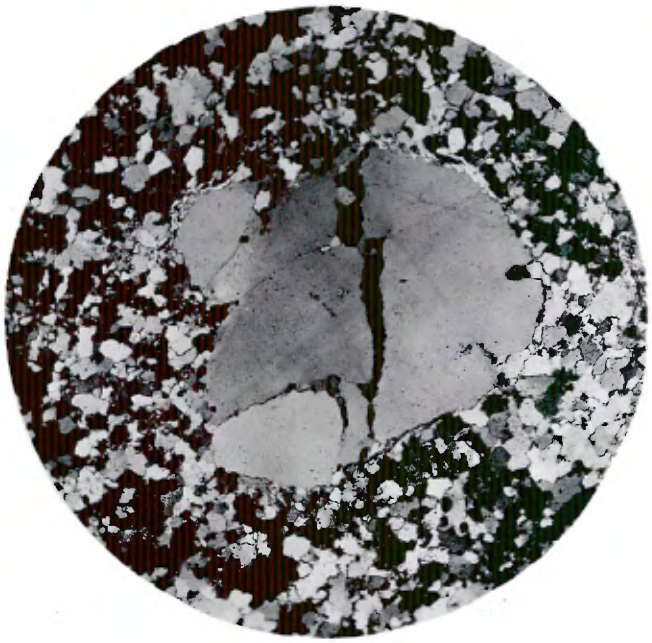
ORIGIN OF THE ROCK: Dynamic metamorphic

CLASSIFICATION: Quartzite (possibly a meta-rhyolite?)

SPECIAL FEATURES AND DESCRIPTION No.1430-B

The only evidence for an igneous origin is the presence of a few small more or less corroded phenocrysts of quartz. The groundmass of this rock, like all the others of this series consists of granular, interlocking, aggregate quartz. All trades of original feldspar have been destroyed completely, so that intense silicification has entirely changed the original condition, provided the rock was an igneous one in the first place.

A little pyrite, a little carbonate, and a small amount of another dark-bronzy metallic (pyrrhotite?), now much oxidized, were introduced, and, provided the rock was igneous in the first place, much quartz was introduced as well. In its present condition the rock is essentially a quartzite, notwithstanding a possible former igneous condition.



No.20. PHOTOMICROGRAPH OF 1430-B. ROCHE PROPERTY, ABANA AREA. Taken in polarized light, nicols crossed, magnification 40 diameters. Showing corroded quartz phenocrysts and recrystallized mosaic groundmass of quartz.
All of these samples are so abnormally rich in quartz for rocks of igneous origin that they can be explained only as rocks so intensely silicified and metamorphosed that the feldspar normally present has been destroyed and converted into sericite, and possibly additional quartz.

ADDITIONAL COMMENT ON THE ROCHE SAMPLES

No.1429 is the only one of the entire series, both Abana and Roch, that retains enough of its original character to make certain its origin, with or course, the exception of the meta-andesite No.1426-A. No.1429 is clearly a highly modified, much silicified and sheared rhyolitic porphyry, but even it is made of nothing but quartz now. The other two samples, 1430-A and 1430-B are so intensely silicified that they are essentially quartzites. It is so difficult to account for the complete destruction of feldspar with so little evidence of its former presence left, that an alternative suggestion seems necessary. Is it possible that, instead of one formational unit such as a rhyolite porphyry, strongly sheared in places, intensely and completely changed and altered in certain zones, there may be really several units, among which are rhyolites, acid volcanic ASH, tuffs, and perhaps even an original quartzose sediment, and that the differences in composition are partly original, rather than entirely later and induced?

I cannot definitely answer this question from the material submitted; this alternative suggestion should be borne in mind in connection with further study of this area.

(Signed) R.H. COLONY
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