Survey of the Pre-Cambrian rocks of the North West: record of lithological work: 6557-6716, 144-6665. Book II 1882/1883

United States Geological Survey

Lithological Descriptions.

Book II.

1882 – '83

6557
St. Joseph
Island
Lake Huron

Gray Vitreous Quartzite.

C. R. Van Hise Oct. 1883

Microscopic Description.

No feldspar is present. The quartz grains often interlock, enlargements being sometimes evident. There is but little interstitial quartz, but very much of kaolin and muscovite.

6558
Campement d'Ours Island L. Huron.

Red Feldspathic Quartzite.

C. R. Vanhise Oct. 1883

Microscopic Description.

Fine grained. Contains as much orthoclase and plagioclase as 6553. The quartz and feldspar grains often interlock, but no enlargement division lines were seen. There is a very little interstitial matter, which is mainly chlorite.

6564

Near McLennan's Landing Lake Huron

Purple Vitreous Quartzite.

C. R. Vanhise Oct. 1883

Microscopic Description

There is no feldspar. The quartz grains rarely interlock, and no enlargement division lines were observed. Complex quartz grains occur. The interstitial matter includes quartz and perhaps some amorphous silica, with much clayey material. A few grains of magnetite and some little amount of brown iron oxide, are present.

6566

Near
McLennan's
Landing
Lake Huron
Canada.

White Vitreous Quartzite.

C. R. Van Hise Nov. 1883

Microscopic Description.

Very like 6557. The chief differences are that division lines of enlargement are commonly seen, the quartzes are larger and muscovite is more prominent.

6572

Mc Lennan's Landing North Shore Lake Huron.

Pink Quartzite.

C. R. Vanhise Oct. Nov. 1883

Microscopic Description.

There is no feldspar. The quartz grains are for the most part but little enlarged, but sometimes interlock. Enlargement division lines are usually perceptible. The interstitial matter is partly quartz, but for the most part clayey material. A few grains of magnetite are present. The pink color is due to iron oxide in the interstitial substance. (Compare 4400.)

1883 – '84

Field Expenses

6571

In the vicinity of McLennans Landing Lake Huron

Quartzite (R.J. C. of Logan.)

C. R. Vanhise Nov. 1883

Microscopic Description.

There is no feldspar. The quartz grains are enlarged and often interlock, the division lines of enlargement bring frequently visible. Complex quartz areas occur (one of them apparently including some amorphous matter) with enlargement of the same complex nature. There is much interstitial matter, mostly kaolin but including some quartz.

6574
West of
McLennan's
Landing
Lake Huron

Quartzite. – (R. J. C. of Logan).

C. R. Vanhise Nov. 1883

Microscopic Description.

The quartz grains are large, sometimes interlocking but the division lines of enlargement rarely (though at times plainly) visible. One large irregular area of imperfectly crystallized quartz, stained red with ferrite, is taken to be one of the "jasper" pebbles. Large interspaces occur occupied with kaolin and muscovite, with some quartz.

6585

S.E. 1/4 ~~sec~~
Sec. 24
Township of
MacDonald
near Sault
St Marie
Canada.

White Vitreous Quartzite.

C. R. Vanhise Nov. 1883

Microscopic Description.

The quartzes everywhere almost perfectly interlocking, but the division lines of enlargement very plainly visible. There is no interstitial material. Small ferrite inclusions are plentiful.

6593

Near the middle of the north line of Sec. 30 Township of Meredith near Sault Ste Marie Canada.

White Vitreous Quartzite.

C. R. Vanhise Nov. 1883

Microscopic Description.

Differs from 6585 only in having a few flakes of interstitial Kaolin.

6604

Near
Echo River
Canada.

White Vitreous Quartzite.

C. R. Van Hise Nov. 1883

Microscopic Description.

Grains of quartz do not interlock and show no enlargements. One large area shows complicated dovetailing, but this as a whole is a complex rounded pebble. The vague outlines of quartz grains spoken of several times heretofore, and explained by the deposition of silica which gradually changed into independent material, in this section looks as if it may be in part at least due to the growing grain including more and more Kaolin, which was about it and which it must penetrate or push aside as a condition of continued growth. Much Kaolin and quartz occur in the interspaces.

6607
North of
Echo River
on Bruce
Mine Road
Canada.

Conglomeratic Quartzite. (R. J. C. of Logan.)

C. R. Van Hise Nov. 1883

Microscopic Description.

The grains not interlocking, except when the pebbles, are themselves complex. No enlargements noted. One large "jasper" composed of very fine crystalline quartz occurs in the section. The interspaces contain clay, quartz, and brown iron oxide.

6608
North of
Echo River
on Bruce
Mine Road.
Canada.

Conglomeratic Quartzite (R. J. L. & Logan)
C. R. Yanhise Nov. 1883

Microscopic Description.

Same as 6607. Shows vague quartz outlines as spoken of in 6604.

6633

From test pits near the Lake Superior Mine, Mich.

Red Ferruginous Quartzite.

C. R. Vanhise Nov. 1883

Microscopic Description.

Very little interlocking of quartz grains and no visible enlargements noted. The filling material is clay, brown iron oxide and quartz.

6636

One mile south of the Lake Superior Mine, Mich.

Feldspathic Quartzite.

C. R. Vanhise Nov. 1883.

Microscopic Description.

A few large grains of orthoclase are contained. Occasionally the quartzes interlock but there are no visible division lines of enlargement. A fine quartz fills the larger part of the interspaces. The remaining minerals are calcite, chlorite, and limonite.

6640
North of
Spurr Mine
Mich.

Magnetitic Actinolite Schist.

C. R. Vanhise Oct. 1883

Microscopic Description.

Actinolite in blades, running in all directions, is the most important constituent; it composes fully half of the rock. Magnetite is the mineral second in abundance the individuals on the outside being more or less altered to hematite. Quartz is the remaining mineral of note. (See Geology of Wis. pp 572, 647.)

6641
S.W. 1/4
N.W. 1/4
Sec. 24
T. 48
R. 31
Mich.
Spurr
Mountain.

Ferruginous Actinolitic Quartzite.

C.R. Vanhise Dec. 1883

Microscopic Description.

Nothing indicating a clastic origin is seen. Small perfectly fitting quartzes make most of the rock. Bundles of fibres and blades of actinolite running in every direction many of the smaller ones cutting the quartzes. The remaining mineral of account is magnetite. Little hornblende, hematite, and limonite.

6643

Spurr

Mountain

Mich

Ferruginous Quartz or "Banded Jasper."

C. R. Van Hise Dec. 1883

Microscopic Description.

Composed of very small ~~perfectly~~ fitting quartz grains, mingled with much magnetite and hematite. There is no sign of a clastic origin.

6649
Foot wall
Spurr Mine
Mich.

Quartzite.

C. R. Vanhise Dec 1883

Microscopic Description.

Quartz as in 6643 composes nearly all the section. Scattered through this mineral are minute scales of hornblende, and black specks of magnetite.

6650

Hanging Wall Spur Mine Mich.

Biotitic Chlorite Schist.

C. R. Vanhise Oct. 1883

Microscopic Description.

Minute blades and fibres of a green or greenish yellow chlorite compose most of the rock. The other minerals are biotite, which occurs in brown blades, some of them minute, but many of considerable size, and magnetite. (See Am. Jour. Sci. iii x 1; also + Brooks Geol. Wis. Vol III pp 572, 647

6652
Hanging Wall
Spurr Mine
Mich.

Biotite Chlorite Schist.

C. R. Yanhise Oct. 1883.

Microscopic Description.

The same as 6650 except that biotite is much more abundant, it composing about one third of the section. (See. Geol. Wis vol III hp 572, 647.

6653
Foot Wall
Spurr Mine
Mich.

Biotite-Chlorite-Schist.

C. R. Van Hise Dec 1883

Microscopic Description.

Biotite and chlorite are about equally abundant, and are mingled together in the interspaces of the quartz grains. The chlorite is often the result of alteration in the biotite. This change has taken place along the edges and cleavage lines of the mineral giving borders or bands of a greenish color about or through the brown biotite. If the change has advanced far enough, the biotite, though still brown in unpolarized light when placed parallel to the vertical cross-hair in polarized light, becomes green instead of mottled black. In many cases the change is nearly or quite complete, but whether all of the chlorite is due to this alteration, it is impossible to say. The quartz grains often have a rounded look, as if they were clastic, but again they are irregular and interlocking. Lines of division were sought, but a single one only was found. However, it is probable that all the irregular grains are enlarged. (See Geol. Wis vol III p 572.)

6654
Hanging ~~Foot~~ Wall
Spurr Mine
Mich.

White Vitreous Quartzite.

C. R. Van Hise Dec. 1883

Microscopic Description.

Clearly a clastic rock. The quartz grains are clear and often interlock, but in several places traces of division lines of enlargement were seen. Contains a little chlorite and biotite similar to and similarly located, to those of 6653 into which this rock varies. 6654, however, contains orthoclase and microcline with flakes of muscovite, these minerals not having been noticed in 6653. Also in the interstices there is considerable kaolin. (Geol. Wis. Vol. III pp 594-614)

6657 Dump file, Spurr Mountain Mine, Mich

Ferruginous Chloritic Actinolite Rock.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Actinolite formerly composed the greater portion of the rock, but a half of the mineral, or more, is now altered to green or yellowish green chlorite, and a smaller portion to long, narrow, brown blades of biotite. All stages of the change to chlorite are seen. Magnetite, much of it in octahedrons, is abundant and hematite and garnet are present. It is possible that a portion of the chlorite is due to the garnet alteration, though much of it comes from actinolite, as explained above. The chlorite of actinolitic origin is of the same two varieties as seen in a University section cut from a garnet pseudomorph from above locality. viz:- 1st, a permanent green kind and 2nd a light yellow uniaxial chlorite, which, when placed parallel to a single plane, becomes a deep green by dichroism. (Geol. Wis. vol III pp 572-647.

6659
Dump file
Spurr Mine
Mich.

Magnetitic Chlorite Rock.

C. R. Van Hise. Dec. 1883.

Microscopic Description.

Matrix: Greenish and pale greenish-yellow fibres and blades of chlorite make up the most of the rock. Magnetite in numerous specks, and crystals of varying size is the only remaining mineral.

6665
Near
Michigamme
Mine
Mich.

Chloritic Quartzite.

C. R. Van Hise Dec. 1883.

Microscopic Description.

Quite complicatedly dovetailing quartz grains compose the most of the rock. They are quite free from impurity, but in two or three places division lines of enlargement were seen. Chlorite precisely as in 6653, 6654 is the only mineral of account. Some ferrite is present.

6666
A few feet south of 6665

Biotite Chlorite Schist.

C. R. Van Hise Dec. 1883.

Microscopic Description.

This rock is a counterpart of 6653. Minor differences are occurrences of flakes of muscovite, and a few small garnets and ~~more~~ satisfactory proofs of enlargement of the quartz.

6669
A few feet south of 6666.

Chloritic Biotite-Schist.

C. R. Van Hise Dec. 1883

Microscopic Description.

Finely schistose. Biotite in very numerous minute scales, mingled with chlorite and flakes of Kaolin and scattered through a fine ground mass of quartz with little plagioclase. Enlargements of the quartz were sought with a high power, and seen satisfactorily in quite a number of grains. Perfect garnet crystal and numerous grains of magnetite are present.

6670
a short distance south of 6669.

Biotitic Chlorite Schist.

C. R. Van Hise Dec. 1883.

Microscopic Description.

The same as 6669 except that 6670 is a little coarser grained, and that chlorite largely replaces biotite, although the latter mineral is yet plentiful. Enlargements of the quartz perhaps even more satisfactorily shown than in 6669.

6671
Few feet from 6670

Calcitic Hornblende Schist.

C. R. Van Hise Dec. 1883

Macroscopic Description.

Shows large calcites, which look at first glance like porphyritic orthoclases, buried in a coarse matrix of black hornblende.

Microscopic Description.

Very large and abundant calcites and hornblendes set in a fine quartz matrix. The calcite is evidently secondary to the hornblende for each large individual of the latter includes many grains of calcite. It seems probable that 6671 is but a phase of 6670, but it seems worthy of consideration, if this is true, why the change from one to the other is so abrupt. Magnetite is quite plentiful some grains being large.

6672
From the same place as 6670 and 6671.

Hornblendic Biotite Schist.

C. R. Van Hise Dec. 1883.

Microscopic Description.

The rock shows a coarse and a fine part, the chief difference between the two being that the former contains very much more biotite than the latter, that mineral alone composing more than half the rock. A good deal of hornblende and chlorite are present. The quartz is not different from that in 6670, 6671. The fine part of this rock does not vary materially from 6670, but the coarse part is not like 6671, although it may be a phase of it. The differences are that hornblende sinks into a subordinate place; biotite becoming the most important ~~mineral~~; that pyrite, altered upon the outside to magnetite, is abundant and no calcite is seen.

6678
North of
Foot Wall
Michigamme
Mines
Mich.

Hornblendic Magnetite Schist.

C. R. Vanhise. Dec. 1883.

Microscopic Description.

Intricately interlocking quartz is the most prominent constituent. No trace of enlargement is seen. Magnetite is abundant and also a good deal of hornblende, many of the smaller blades of which, with numerous granules of magnetite are included in the quartz grains — proving the latter mineral to be later in crystallization than either of the former.

6679
Foot Wall
Michigamme
Mine
Mich.

Actinolitic Magnetite Schist.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Actinolite, and magnetite, are the minerals of most importance after the quartz. These are often included in the latter, and hence the quartz must be subsequent to them in crystallization. Lesser quantities of garnet, chlorite, and biotite are seen, the latter two minerals the result, in part at least, of an alteration of the actinolite.

6680
West end of a pit. Michigamme Mines Mich.

Biotitic and Chloritic Quartzite.

C. R. Van Hise Dec. 1883

Microscopic Description.

Unlike 6678, 6679. The quartz although frequently interlocking has a fragmental appearance. Division lines of enlargement are also seen, and the accessory minerals — biotite, chlorite and magnetite — instead of cutting the quartz, are concentrated in the interspaces.

6681

Hanging Wall
Michigamme
Mine
Mich.

Garnetiferous and Magnetitic Chlorite Rock.

C. R. Yanhise Dec. 1883.

Microscopic Description.

Differs from 6659 in containing numerous small garnets. Quite a number of areas of interlocking quartz grains, and a few blades of biotite. The quartz is not generally scattered through the section, but is seen in quite large complex areas where it very largely excludes other minerals.

6682
Hanging
Wall
Michigamme
Mine
Mich.

Chloritic Quartzite.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Differs from 6680 only in containing no biotite.

6683
Hanging
Wall
Michigamme
Mine
Mich.

Chloritic Quartzite.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Differs from 6682 in that the chlorite is deeply stained with brown iron oxide.

6684
Dump
file
Michigamme
Mine
Mich.

Actinolite Chlorite Magnetite Rock.

C. R. Vanhise Dec. 1883

Microscopic Description.

Differs from 6657 only in the unimportant particulars that 6684 carries a much greater proportion of magnetite and more chlorite.

6685
Same
place as
6684

Magnetite Chlorite Rock.

C. R. Vanhise Dec. 1883

Microscopic Description.

Magnetite more abundant than in 6659; also contains a little actinolite and calcite. Otherwise not different.

6688
South of
Michigamme
Mine
Mich.

Chloritic Quartzite.

C. R. Van Hise Dec. 1883.

Microscopic Description.

Like 6682. A little kaolin is present.

6690

short distance from the Michigamme Mine Mich.

Biotitic Actinolite-Schist.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Actinolite and quartz in about equal quantities make up the rock. The grains of the latter mineral are small, and perfectly fitting. In several cases a single blade of actinolite was found penetrating two or more quartz individuals. Cleavage in two directions to be seen in the actinolite. An alteration of the actinolite to chlorite has taken place in a small degree but more largely to biotite, a considerable quantity of which is present, and plainly from this source. All phases of the change are to be seen in this section, from the time when a little portion of the end, or a narrow space along a cleavage line, of an actinolite blade has become biotite, up to cases where the biotite individuals show no trace of their origin. Hematite and limonite are present in small quantity.

6694
Foot Wall
of pit of
Champion
Mine
Mich.

Quartzite.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Mingled with the quartz grains is a good deal of feldspar both monoclinic and triclinic. The quartz sometimes shows enlargements, but the most of the induration is due to the abundant interstitial quartz. Some chlorite and clay are present.

6702

Near Republic Mine Mich.

Magnetitic Quartzite or "Banded Jasper."

C. R. Van Hise Dec. 1883

Microscopic Description.

Made up of small interlocking quartz grains, including much iron oxide, chiefly magnetite, the remainder hematite.

(See Geol. Wis. vol III pp 541, 543, 550; also Wadsworth's notes etc p 47.)

6703
Republic Mt
Mich.

Ferruginous Actinolite-Schist.

C. R. Van Hise Dec. 1883.

Microscopic Description.

Closely allied to 6690. The chief differences are:- (1) nearly all the actinolite is fresh; (2) the large amount of magnetite and hematite present — mostly the former. Little hornblende scales are quite plentiful.

6706
Republic
Mountain
Mich.

Actinolitic Ferruginous Schist.

C. R. Van Hise Dec. 1883

Microscopic Description.

The points of difference from 6703 are (1) the smaller amount of actinolite; (2) the iron oxide is mostly hematite; and (3) the quartz is in finer grains. A part of the section approaches a "jaspery iron ore".

6710
6712
Republic
Mountain
Mich.

Ferruginous Actinolite Schist.

C. R. Vanhise Dec. 1883

Microscopic Description.

Only differ from 6703 in that the magnetite is concentrated in layers, this giving the sections a banded appearance. Part of the magnetite in crystals.

6713
6714
Republic
Mountain
Mich.

Ferruginous Quartz Schist "Banded Jaspery Schist."

C. R. Van Hise Dec 1883

Microscopic Description.

Differs from 6706, 6710 in the absence of actinolite. The banding is due to a concentration of the iron oxide in certain layers. Everywhere included in the quartz grains are numerous specks of magnetite and hematite; hence this mineral must be subsequent to the iron oxides.

6716
Republic
Mine
Mich.

Ferruginous Micaceous Quartzite.

C. R. Vanhise Dec 1883

Microscopic Description.

Interlocking quartz grains, with no sign of enlargement, compose most of the rock. The other minerals are muscovite, magnetite and hematite. The larger grains of these minerals are mostly crowded between the quartzes, but many of the smaller ones are included by the quartz, showing the later formation of this mineral.

(See Geol. of Wis. vol III pp. 538, 540, 549, 554. Also Wadsworth's notes &c pp 55.)

144

Sec 13
T. 46
R. 41
Mich.
Potsdam

Indurated Sandstone.

C. R. Vanhise Nov. 1883

Microscopic Description.

Feldspathic. Nearly all the grains of quartz show enbargements by secondary deposition - in some places this deposited quartz is of unusual width. Original rounded areas of minute interlocking quartzes, and quartz deposited as independent material in the interstices.

146
147
Potsdam
T. 46
R. 41
Mich.

Ferruginous Sandstone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

Much ferrite. No enlargements by secondary deposition noted.

9486
North shore
Lake Superior
Poplar Mt
Point
Minn

Ferruginous Sandstone.

C. R. Vanhise Nov. 1883

Microscopic Description.

Contains much ferrite as cementing material, and some calcite. The grains of quartz are uniformly small; yet many of them clearly show a second growth.

1105
St. Louis
River
Minn

Feldspathic Quartzite.

C. R. Vanhise Nov. 1883

Macroscopic Description.

Gray; schistose; composed of rather small grains of quartz and feldspar set in a fine matrix.

Microscopic Description.

Rounded grains of quartz make up most of the coarser part of the rock. They are not closely packed, and rarely interlock. The proof of enlargement of these grains, when angular, is not altogether complete. In a few cases faint lines, which are taken to be lines of division between the old and the new quartz, are seen, but they may be ordinary lines of inclusions. In two cases it seems tolerably certain that there are enlargements. In the first we have an oval area which is full of inclusions; suddenly these inclusions stop, but beyond them there is a more or less angular ring which polarizes with the first area. In the second case, a large grain contains many rutile needles which penetrate the grain in every direction. Beyond a line marked by a few inclusions, no needles are seen, although the grain continues quite a distance beyond this line.

The remaining large grains are orthoclase and plagioclase. The matrix consists of small interlocking quartz and flakes of kaolin and iron oxide, the first being of the most importance.

1111
1113
Midway
Creek
Minn.

Feldspathic Quartzite

C. R. Van Hise Nov. 1883

Macroscopic Description.

Darker gray than 1105.

Microscopic Description.

Differs from 1105 (1) in that no indications of enlargements were discovered, (2) in the presence of a greater quantity of orthoclase and plagioclase and (3) in containing in the matrix a good deal of chlorite. Calcite is present.

1207

Little Carp River Mich.

Sandstone.

C. R. Van Hise Nov. 1883

Microscopic Description.

Largely composed of porphyry detritus. Besides containing quartzes derived from a porphyry, some of which have enclosed matrix, it contains rounded fragments of feldspar, and of porphyry matrix. Quite a number of quartz grains show enlargements. One rounded grain occurs, which is composed of small granules of calcite. Much ferrite is present. Calcite has been largely deposited as a secondary material

12 15

Porcupine Mts
Mich

Feldspathic Quartzite.

C. R. Van Hise Nov. 1883

Macroscopic Description.

Grayish drab; of a uniformly fine texture.

Microscopic Description.

The rounded quartz grains are not closely packed, and ordinarily do not interlock; many of them, however, are more or less angular, and show enlargements. A good deal of orthoclase and plagioclase is present. The interstices are filled with Kaolin; chlorite; ferrite, and — perhaps the most abundant of all — fine interlocking quartz.

1217
1220
Porcupine
Mts.
Mich.

Fine Ferruginous Sandstone.

C. R. Van Hise 1883

Microscopic Description.

Contain much ferrite and basic detritus. No enlargements observed.

5

1223

Porcupine Mts. Mich.

Feldspathic Quartzite.

C. R. Vanhise Nov. 1883.

Microscopic Description.

The rounded fragments are quartz both simple and very finely complex (the former of these are often enlarged), feldspar (both orthoclase and plagioclase) and also chlorite, the latter probably altered from feldspar. The indurating material is mostly calcite, and as the grains are not closely packed, the original filling substance must have been dissolved out and the calcite deposited.

1225

Porcupine Mts.
Mich.

Feldspathic Sandstone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

Composed of fragments of feldspar (both simple and finely complex, mingled with epidote); epidote alone; magnetite; brown iron oxide; chlorite; porphyritic matrix, quartz etc. The latter mineral is in rounded grains, both simple and complex and many of the former show wide enlargements. The feldspars also, both the orthoclase and plagioclase are distinctly enlarged.

1562

Grand Portage Minn

Feldspathic Quartzite.

C. R. Van Hise Apr. 1883

Microscopic Description.

Resembles closely 1215. Like it shows enlargements of the quartzes and has complex quartz areas.

15.70

Portage Bay
Island
Minn.

Feldspathic Quartzite.

C. R. Van Hise Nov. 1883.

Macroscopic Description.

Light gray; of an even granular texture; earthy.

Microscopic Description.

Quartz grains, originally rounded, but now many of them greatly enlarged, angular and often interlocking, with some feldspar, both orthoclase and plagioclase, are set in a fine matrix. In one case the original nucleus of quartz is complex, and the enlarged portion, which extends all about the grains, has each part polarizing uniformly with the part of the complex nucleus next to it. Quite a good many of the original quartz grains are finely complex. The matrix consists largely of small quartzes mingled with much clay. A good deal of calcite is present.

1571

Portage Bay
Island
Minn.

Quartzite.

C. R. Van Hise, Nov. 1883.

Macroscopic Description.

Very light gray, compact quartzite.

Microscopic Description.

One of the best illustrations of deposited quartz yet seen. All of the rounded grains have been enlarged, some of them greatly, until now they almost everywhere interlock. Very finely complex nuclei of quartz have also enlarged, as is proven by their present angularity of form, and by the fact that in some cases the rounded nucleus is full of impurities, while the complex added quartz is very free from impurity. A few grains of feldspar are present and also a good deal of kaolin in rounded areas as if decomposed feldspar grains. As to proof that any of the original grains were crystals of a porphyry is met with.

1584 (a)

Feldspathic Quartzite.

C. R. Van Hise Nov. 1883.

Bay Minn.

Macroscopic Description.

Black; compact; fine grained; of a conchoidal fracture.

Microscopic Description.

Rounded or subangular fragments of quartz and feldspar, are set in a very fine matrix which consists of quartz, clay, chlorite and ferrite. The quartzes are both simple and complex, the former often enlarged. The feldspars are largely altered to kaolin and chlorite.

1584 (B)

Feldspathic Quartzite.

C. R. Van Hise Nov. 1893.

Bay
Minn.

Macroscopic Description.

Not so light colored as 1571; otherwise not different from it.

Microscopic Description.

Very like 1571; shows the enlargements of finely complex quartz nuclei, as in 1571 and the enlargement of coarsely complex ones, as in 1570. Contains a good deal of chlorite and ferrite. None of the nuclei have crystalline outlines.

1588

Pigeon Point
Minn.

Quartzite.

C. R. Vanhise Nov. 1883.

Macroscopic Description.

Dark brown; finer than 1571, and 1584(b) but not so fine as 1584(a).

Microscopic Description.

The quartz grains are enlarged and feldspar is quite plenty, though not in such quantity as in 1584(a). The matrix forms a large portion of the rock the larger grains being set apart from each other as in 1584(a). It consists mostly of small quartzes, but Kaolin, chlorite, and ferrite are important.

1593

Pigeon Point
Minn.

Augitic Quartzite.

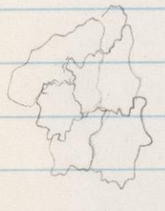
C. R. Van Hise Nov. 1883.

Macroscopic Description.

Black; compact; very fine grained; of a conchoidal fracture.

Microscopic Description.

So far as the quartz and feldspar are concerned, this rock does not differ materially from others heretofore described. The large quartz grains show the secondary growth and much quartz is present in the interstices in a finely crystalline form. However, the thing of note about the section is the presence of small rounded grains of augite in such quantity as to become an important constituent of the rock. Many flakes of biotite are also seen. The rock approaches very nearly a biotitic augite schist, and if these latter minerals crystallized in place, the steps from a sandstone to such a rock are all apparent. Chlorite is present in some quantity.



1616

West side of Thunder Bay Canada.

Quartzite.

C. R. Vanhise Nov. 1883.

Microscopic Description.

Chlorite and clay are very abundant. The quartz and feldspar are in small, distinctly fragmental particles. Thus the rock approaches a slate. The quartzes show enlargements.

1661

Quartziferous Limestone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

Fine interlocking quartzes and calcite make up the rock – the latter mineral much the most abundant. Most of the calcite is in a concretionary form, some of it bring about quartz areas, and some using itself as a nucleus, about which to form its bands. The calcite individuals often extend continuously from the center of an area to the outside, and the concretionary bands are only indicated by the varying amount of impurity which the solution held.

1678

North shore
Thunder Bay
Canada.

Chert.

C. R. Vanhise, Nov. 1883.

Microscopic Description.

Mostly composed of very finely crystalline or cryptocrystalline silica, deposited largely in a concretionary form. In some places the quartz grains of some size have served as nuclei for the depositing silica; in others there seems to be no particular difference between the center and outside of a concretionary area. The many concentric rings are marked by brown iron oxide, which is an abundant impurity.

1697

Thunder Cape Cliff

White Indurated Sandstone.

C. R. Yanbise Nov. 1883.

Microscopic Description.

Coarse grained. Everywhere enlargements of the quartzes are seen. Calcite is present as an indurating material. The section is mostly free from clayey substance.

1709(a)
Silver Islet
Landing
Lake Superior
Canada.

Red Ferruginous Sandstone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

Composed of grains of loosely aggregated grains of quartz, with some feldspar. Some of the quartz grains show small enlargements. The spaces between grains are occupied by ferrite, with some calcite.

1709(b)
Gibson Inlet
Landing
Lake Superior
Canada

Gray Quartzite.

C. R. Vanhise Nov. 1883.

Microscopic Description.

The grains of quartz are almost everywhere perfectly interlocking, but always by enlargements of once rounded grains. The interspaces left by the depositing silica are mostly occupied by calcite. There is comparatively little clay.

1724
East side of
Black Bay
Lake Superior
Canada.

Ferruginous Sandstone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

Composed of fragments of quartz and feldspar, the former sometimes enlarged. Interspaces occupied by calcite, ferrite and clayey material.

1747
Burnt Island
Bay
Canada.

Ferruginous Quartzite.

C. R. Van Hise Nov. 1883.

Macroscopic Description.

Pink, compact quartzite.

Microscopic Description.

The original rounded quartz grains by secondary enlargements now everywhere interlock either with each other or with the finely crystalline quartz which has been deposited in the interstices. Brown iron oxide colors the rock.

1792.
Near Atlantic Mill
Portage Lake
Mich.

Ferruginous Feldspathic Sandstone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

No quartz enlargements are seen; the quartz grains are usually sub-angular. There is much rounded orthoclase and some plagioclase. Ferrite fills the interspaces, occasionally with some calcite. One quartz grain is surrounded by a felsitic matrix, and others are cut into by deep enlargements of the same; evidently having been derived from quartz porphyries. In section the transition from large fragmental grains to small ones is abrupt, giving the clastic rock a porphyritic appearance.

1836

Quarry on Torch Lake Railroad Mich.

Sandstone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

The quartz grains were well rounded, but now they are more or less angular from enlargement. Many of the quartz grains include areas of the matrices of quartz porphyries, and one shows a negative crystal. Rounded feldspathic fragments are quite numerous; also rounded felsitic particles. Ferrite stains the rock.

1844

Douglas

Rim

Keweenaw Pt

Mich.

Feldspathic Sandstone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

A fragmental mixture of rounded quartzes (some of them showing slight enlargements), feldspars (orthoclase and plagioclase – a portion of the latter being microcline), pieces of felsitic matrix, much iron oxide, and some epidote.

1847

Eagle River
Keweenaw Pt
Mich.

Feldspathic Sandstone.

C. R. Vanhise Nov. 1883

Microscopic Description.

Composed of detrital magnetite, hematite, feldspar (both orthoclase and plagioclase), also fragments of porphyry and granitic porphyry matrices. There is also a little quartz in grains both simple and complex, but no enlargements were observed. Calcite; chlorite and epidote are also present.

1852

Near Copper Falls Mine Keweenaw Pt. Mich.

Sandstone.

O. R. Vanhise Nov. 1883

Microscopic Description.

Quartz porphyry and granitic porphyry detritus consisting largely of fragments of matrix and feldspar make up most of the rock. Large, clear quartz grains occur which show enlargements very nicely. Calcite is abundant as an indurating material.

1868

Bête Grise Bay

Keweenaw Pt

Mich.

Friable Sandstone.

C. R. Vanhise Nov. 1883

Microscopic Description.

Rounded quartzes, loosely cemented with ferrite, and showing no enlargements, make most of the rock. However, feldspar and quite large fragments of both granitic and basic rocks are important.

1879

Bête Grise Bay Mich.

Ferruginous Calcite.

C. R. Vanhise Nov. 1883.

Microscopic Description.

Composed entirely of calcite and feirite.

1969

Calumet Mine
Mich.

Ferruginous Feldspathic Sandstone.

C. R. Van Hise. Nov. 1883.

Microscopic Description.

Orthoclase and plagioclase are much more plentiful than quartz. No enlargements noticed. Much detritus of porphyry matrix and iron oxide are also present and calcite as indurating substance.

1975
Portage Lake
Mich.

Magnetitic Feldspathic Sandstone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

The quartz grains often show enlargements. Much feldspar and magnetite are present with some limonite, chlorite, and epidote. Independent interstitial quartz.

1976
Portage Lake
Mich.

Magnetitic Feldspathic Sandstone.
C. R. Vanhise Nov. 1883.
Microscopic Description.

Like 1975.

2504

Nonesuch Mine
Mich.

Ferruginous Feldspathic Sandstone.

C. R. Vanhise Nov. 1883.

Microscopic Description.

Feldspar and ferrite with fragments of porphyry matrix are all present in some quantity so that the three compose half the rock. The remainder is quartz, much of it showing enlargements. Some grains are greatly enlarged.

2505
Ironwood
Mine
Mich.

Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Fragmental mixture of quartz (both simple and finely complex and some showing deep embayments etc); feldspar (both orthoclase and plagioclase;) felsitic porphyry matrix; granitic porphyry matrix; chlorite; magnetite; metallic copper; and brown iron oxide.

2506
Nonesuch
Mine
Mich.

Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Same as 2505 with the addition of calcite.

2508
Nonesuch
Mine
Mich.

Feldspathic Quartzite.

C. R. Vanhise Dec. 1883.

Microscopic Description.

The quartz grains are much enlarged, often interlocking. There are also many finely complex quartz grains, and grains of half crystalline silica. Orthoclase, plagioclase (in part microcline) and felsitic matrix are present.

2523
Porcupine Mts. Mich.

Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Large fragments of basic rocks and of felsitic matrix are of most prominence. There is much quartz with no enlargements. Feldspar, brown iron oxide and some magnetite are present.

2535
Carp River
Porcupine Mts
Mich.

Sandstone.

C. R. Vanhise, Dec. 1883.

Microscopic Description.

Made up of unusually fine fragments of quartz and feldspar, with an interstitial matter consisting of ferrite, very finely crystalline or half crystalline quartz. No enlargements were noticed. Calcite and perhaps some clay are present.

2541
Carp River
Porcupine
Mts.
Mich.

Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Almost entirely composed of large fragments of felsitic matrix cemented by calcite and ferrite. There are a few single quartz and feldspar grains and one was noted of crypto crystalline silica.

2589

Carp Landing Lake Superior Mich.

Sandstone.

C. R. Vanhise. Dec. 1883.

Microscopic Description.

Composed of fragments of felsitic matrix, of granitic porphyry, feldspar and quartz. Some of the latter have enlargements. Whole cemented with abundant calcite.

2596

Cuyahoga
Landing
Lake Superior
Mich.

Feldspathic Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Fine grained. There is much feldspar. The quartz often shows enlargements. The iron oxide is very plenty.

2603

Feldspathic Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Mich.

Contains much orthoclase, plagioclase and kaolin with fragments of porphyry matrix. The quartzes are enlarged and often interlocking. Complex quartz areas are also enlarged. Chlorite, magnetite, and calcite are present.

2605

Big Iron River Porcupine Mts. Mich.

Feldspathic Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

The same as 2603, except that the filling material, calcite, chiefly in small rounded granules, compose about one-third of the rock. The quartz is not so much enlarged as in 2603. and on account of their wide separations do not interlock.

2606
Baby Mine
Mich.

Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

No enlargements seen. Calcite is present in large crystalline grains instead of in granules as in 2603. Otherwise the rock is not different from 2603.

2612
Sec. 5
T. 50
R. 39 W.
Mich

Ferruginous Sandstone.

C. R. Vanhise, Dec. 1883.

Microscopic Description.

Contains quartz grains which are often enlarged and independent interlocking quartzes in the interspaces. Feldspar, clay, chlorite, and ferrite are present.

2609
Sec. 23
T. 50
R. 34 W.
Mich.

Ferruginous Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Fragments of quartz and feldspar of widely varying sizes, the number of grains of each mineral rapidly increasing, as their sizes diminish. Cemented with brown iron oxide. No enlargements visible.

3011
Sec. 21
T. 51
R. 38 W.
Mich.

Feldspathic Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Feldspar, porphyry, detritus, ferrite and chlorite make up two-thirds of the rock. The remainder is quartz. No enlargements were noted.

3009
Sec. 21
T. 51
R. 38 W.
Mich.

Feldspathic Sandstone.

C. R. Vanhise Dec. 1883.

Microscopic Description.

Contains even less quartz than there is in 3011. However it is not materially different.

Analyses by Professor Daniells.

4409	SiO_2	79.44 % ;	H_2O	3.33 %.
6566	SiO_2	94.47 % ;	H_2O	0.10 %
6574	SiO_2	92.11 % ;	H_2O	0.87 %
6665	SiO_2	87.33 % ;	H_2O	1.33 %.