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Original Huronian and Laurentian, with Prof. Pumpelly: [specimens] 18709-18883 [Includes retyped portion of Books 109 and 110: Original Huronian near Garden River: specimens 25053-25063]. No. 112 189...

Van Hise, Charles Richard, 1857-1918
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U. S. GEOLOGICAL SURVEY

FIELD SECTION BOOK

Book 112

Original Huronian and
Laurentian, with Prof.
Pumpelly

C. R. Van Hise, 1891

18709-18883

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

1. Ordinarily at least two pages of this book will be devoted to one section. On the left-hand page, place a map of as much of the section as has *actually been seen.* Denote rivers, lakes, marshes, etc., by the usual topographical signs. Denote the ledges of rock, when no structure is made out, by cross-hatching, making the cross-hatching cover as nearly as possible the areas occupied by the exposures. If the rock is a massive one, but still more or less plainly bedded, use the same sign with a dip arrow and number attached, showing the direction and amount of the dip. Denote a shaly or other very plainly bedded ledge by right parallel lines, and a ledge having a secondary structure by wavy parallel lines running in the direction of the strike, with dip arrow and number attached as before. The greatest care must be taken to avoid confusing slaty or schistose structure with bedding, and in all cases where there is the least doubt about the true bedding direction, indicate it by a query. To each exposure on the face of the map attach the number of the specimen representing it. In mapping the section count each of the spaces between the blue lines as 100 paces, and twenty of these spaces to one mile, or 2,000 paces. Usually the southeast corner will be placed at the bottom of the page, or at the first black line above the bottom of the page, and at the right-hand side. If, however, for any reason, it is desirable to show portions of an adjoining section, the southeast corner may be shifted up, or the map may be turned around and the north placed at the left-hand side of the page. The ruling of the left-hand page is also arranged so that, if desirable, a smaller scale can be used, two inches, one inch, or even one-half inch to the mile. With the two-inch scale, the squares outlined in black represent sections, and those in red, quarter sections and "forties," while the space between the blue lines is 200 paces.

2. On the right-hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left-hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section, and the dip and strike when observable, for instance 4025, 250 *N.*, 300 *W.*, *Strike, N.* 6° *E., Dip,* 50° *E.* Then follow with as full a description of the ledge as possible. When topographical maps are used for locations this paragraph applies only in part.

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened, but chips of them must be taken. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small sized specimens, trimmed to a uniform size of 2 x 2½ x ¾ inches will be allowed, but in all other cases *large sized specimens,* trimmed to a size of 3 x 4 x 1 inches, must be selected, in accordance with section 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. In all cases collect chips for slicing. Specimens should not be placed together without protection in the collecting bag as the fresh surfaces, important in determining the character of rocks, are thus destroyed. They should be damaged by no temporary mark, but the numbers should be at once marked in at least two places upon the inclosing paper or cloth bags. It is desirable that specimens be permanently marked in camp by painting the numbers upon them in white upon a black background, using Silver White and Ivory Black oil tubes for color, with turpentine as a diluent.

4. On the last twenty-five pages of the book give, as may seem desirable, a general account of the examination of the region mapped in the previous pages, correlation of observations, sketches, cross sections, etc.

5. Forward this note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. Geologist, Madison, Wis.

112

September 26, 1891.

Original Huronian near Garden River.

25053 Granite from huge bluff separated by steep ravine from great conglomerate bluff; first prominent exposure to left of road on way from Sault to Garden River. All one side of this ledge is of this solid granite. Against this, and fallen down from it, is recomposed granite or granite stucco. Fragments are semi-angular, packed closely together, while the cement is of the same material.

25055 Pebble knocked out of recomposed granite.

25056 Recomposed granite from small ledge some distance to the north from the main granite mass. This material skirts the solid core of granite and the relations are believed to be the same as at the large bluff.

25057 Quartzite interlaminated with slate of slate conglomerate. The layers of slate and quartzite are without any pebbles. Their alternations gave a good determination of strike and dip as follows:

Strike N. 55° W.; dip, vertical.

The discovery of the solid bluff of granite represented by 25053 and the recomposed granite which grades up into the slate-conglomerate affords a second contact between the original granite and the lowest Huronian at this locality. At the basal portions of the conglomerate the matrix is so nearly like the pebbles that the recemented material and the recomposed granite loops almost exactly like the original massive granite that it is difficult to discriminate between the two except upon the weathered surface.

Here the matrix is less resistant and as a consequence of weathering the pebbles stand out as angular or semi-rounded fragments which gives an appearance closely resembling that of a Reibung's breccia;

yet the fact that this material grades into the ordinary slate-conglomerate in which the fragments of granite are rounded and separated by slaty matrix leaves no doubt as to the reality of the great physical break between the two. Also these unmistakeable relations at the large exposures make it more than probable that the relations are the same at the locality represented by the specimen 25056.

Between the large mass of solid granite and the great bluff of slate-conglomerate and recomposed granite is a narrow V shaped ravine which places perhaps 100 feet between the two. If time had permitted there is little doubt that the exact contact could have been found between the recomposed granite and the original rock.

The contact between the Lower and Upper Huronian was next visited.

25058 Limestone from Garden River quarry.

25059 Recomposed limestone from block fallen down from face of cliff about 40 rods east of contact observed and described in previous visit.

25060 Limestone bearing curious impressions which have a fossil-like appearance, from top of bluf.

25061 Basal limestone at north side of bluff; very siliceous

25062-3 Lower slate conglomerate carrying numerous fragments of ash-like material which Pumpelly suggests came from the lower chloritic slate. A chloritic slate is reported to occur north of Echo lake.

Bearing in favor of a considerable break between the Upper and Lower Huronian in the original area are:

(1) Difference of dip; Lower Huronian vertical, Upper Huronian not steeply inclined.

(2) Upper Huronian gently folded; Lower Huronian so closely folded as to give vertical cleavage in different directions so that the

conglomerate breaks up into polygonal blocks with parting planes in several directions.

(3) The Lower Huronian is semi-crystalline, while the Upper Huronian is little metamorphosed.

(4) Blocks of limestone in the Upper slate-conglomerate have a condition exactly like that in the original ledge; and also jasper fragments are contained in this upper conglomerate, and these must have been derived from the formation in the Lwer Huronian which had reached the condition of jasper before Upper Huronian time.

The likeness of the upper slate conglomerate to the lower is largely explained by the fact that is likely that the lower slate conglomerate has contributed very largely of its material to form the upper.

Garden Row Garden Row

Sault Ste Marie, Michigan.
August 6, 1891.

From the Canadian Sault we drove along the Garden river road until we came to a huge bluff on the left hand side. This is found
18709. to be slate conglomerate 18709.
18710. The same bearing fragments of chloritic schist.
18711. From a granite boulder one foot in diameter in the conglomerate.

This bluff continues for some distance along a side road running about northwest along the face of the conglomerate bluff.

After the bluff is passed,
18712. within a short interval 18712 appears, a red quartz porphyry which is in the form of a dike in the slate conglomerate cutting across the strike of the conglomerate.

Beyond the porphyry reappears interlaminated compact
18713. chloritic slate 18713.

18714. Quartzite.

18715. Specimens showing lamination of slate and quartzite.

18716) A band of slate conglomerate
18717) which is interlaminated with the slate and quartzite. The strike and dip are here, strike N 80 E dip 45 N.

The road turns a sharp angle to the right and goes up a steep slope that is along a course nearly north across the strike of the rocks. A little way up and to the right of the road the slate conglomerate has a steeper inclination and is contorted in its structure having minute waves.

Passing up a hill to the left of the road is a prominent
18718 ridge of greenstone 18718 which also cuts across the strike of the conglomerates.

Continuing up the hill

near its crown was found a basal conglomerate of recomposed granite which on the weathered surface shows beautifully its fragmental character.

1871. Granite from one of the bowlders of the conglomerate.

Immediately in contact with
1872. this is a coarse granitoid gneiss 1872.
and this a little way to the
north becomes nearly massive
1872. granite 1872.

The relations of erosive unconformability are here perfectly clear. The contact is between the Lower Slate Conglomerate of Logan and the granite. The inclination of the rocks adjacent to the contact is rather steep.

The quartzitic slates between the conglomerate bluff and the granite are the most crystalline of any which I have found

in the Huronians. Also this rock is very similar in fact almost identical with the Lower Slate Conglomerate found below the limestone northwest of Garden river. (see forward.)

There can be little doubt that the contact is between the Lower Slate Conglomerate and the Laurentious granite gneiss.

We now drove about two miles beyond Garden river to a limestone quarry.

The limestone is here a compact finely laminated gray
18722. rock 18722 interlaminated with pinkish layers. The strike here is N 30 W and dip 45 S W.

Passing along the south face of the limestone for some distance the dip continues about the same but then appears a sharp plunging anticline, the axis of which

strikes N 50 E magnetic and the dip of which is 43 S W. At the axis of the anticline the limestone is broken and brecciated and the layers are banded and contorted striking in all directions although a little way to the west the strike becomes regular.

West of the anticline about 20 or 25 paces appears the Upper Slate Conglomerate which from its position evidently overlies the limestone.

This conglomerate has a rough appearance of stratification and bears numerous fragments of the limestone, many of them more than a foot in length but all precisely like the original limestone in its present condition.

The conglomerate also bears numerous pebbles of schist, granite and a few of quartz, as well as

rarer jasper pebbles. The contact of the limestone and conglomerate was visible for only a few feet but appeared to follow somewhat closely the lamination of the limestone. The strike of the limestone at the point of contact is N 50 E and dip 50 under the conglomerate to the S W.

The strike of a band of non-pebbled conglomerate is N 45 W dip 45° S W.

To the dip of the conglomerate the larger flatter pebbles of limestone roughly conform.

The conglomerate is very coarse for a thickness of 30 to 50 feet and then passes upward into quartzite.

18728. Ordinary fine grained conglomerate.
18724-25. Conglomerate carrying limestone pebbles
18726. Parts of various pebbles from the conglomerate
18727. Quartzite into which the conglomerate grades.

We now returned to the limestone quarry and went across the strike of the limestone along the foot of the cliff in a north or northeast direction, we passing to lower and lower members of the formations. The bed of limestone was found to be of very considerable thickness probably of several hundred feet and the lowest member seen is a gray compact siliceous
1872. limestone 1872 and has a strike N 40° W and a dip 45 S W.

After an interval of about 50 feet in a northeast direction appears the Lower Slate Conglomerate. That this underlies the limestone there can be no question. No limestone pebbles were found in this conglomerate, although these were searched for. It is quite different in its character from the Upper Slate Conglomerate, bearing numerous

peculiar gray pebbles not found in the Upper Conglomerate.

Pebbles of greenstone are not so abundant and a light felsitic pebble is more abundant than in the Upper Conglomerate.

Those of granite are very plentiful.

18729-30. } Different phases of the
18731-32. } Lower Slate Conglomerate.

18733. Granite pebble and 18734 a part
18734. of white quartz pebble from this Conglomerate.

Friday, August 7, 1891.

We attempted to enter the Echo river with a steam launch but were stopped by the bar because of low water.

We then went down Lake George to Nedrish Island where we camped for the night.

18735 } Two phases of the Nedrish
18736. } quartzite (III) of Logan.

August 8, 1871.

In passing down the north channel of Georgian Bay the 3H of Logan red jasper conglomerate was not found in
18737. place but 18737 and 18738 represent
18738. specimens of this formation taken from bowlders near the place at which it ought to outcrop.

Passing along we next stopped at Mc Clennan's landing where the red quartzite (3G) of Logan outcrops.

18739. Three phases of this quartzite
18740. two of which are conglomeratic
18741. and bear rather plentiful fragments of red jasper. The latter approaches the character of the red jasper conglomerate.

This locality appears to be in the transition zone between the red quartzite and red jasper conglomerate.

We next went on to Campment d'Ours where is exposed the Upper Slate Conglomerate

18742. The fine grained conglomerate at this point.

18743. Conglomerate the fragments of which are somewhat coarser.

18744. A portion of a granite pebble at least a foot in diameter in this conglomerate. The conglomerate

18745. is cut by a dike of felsite 18745.

The contact of the conglomerate

18746. and felsite is shown in 18746.

Passing on to an island of considerable size which was supposed to be a conglomerate

18747. we found it to wholly consist of 18747 diabase or fine grained graywacke probably the former.

At the east end of Bruce mine bay is a large island which is composed of coarse

18748. diabase 18748.

Sunday, August 9, 1891.

We passed out to the islands off the first large island marked as the lower quartzite on Logan's map. This was found to be a beautiful exposure of the Lower Slate Conglomerate (?)

This conglomerate bears pebbles of the widest variety including many phases of granite, foliated and unfoliated; gneiss, well banded as well as that cut by veins of pegmatite; various slates and basic eruptives as well as quite frequent fragments of red jasper some of the latter being 6 or 8 inches in diameter. In short almost every form of boulder that could come from a granite gneiss complex was here found.

The conglomerate within the space of a few hundred feet varies from a coarse boulder conglomerate with fragments occasionally 3 feet in diameter to a fine grained

conglomerate the particles being about the size of peas set in a green matrix.

Passing along the east face of the island toward the main land the slate conglomerate bears comparatively few fragments and these are nearly all of red granite (the syenite of the Canadian geologists) and a little farther on the fragments are almost wholly from a gray granite. Here the exposure differs from that first seen in that the coarse pebbles are sparsely disseminated through a fine matrix.

18749. Rather fine grained conglomerate (the coarse phase could not be represented in any specimen which could be taken.)

18750-51. Finer grained phase of the conglomerate.

18752-53. Still finer grained conglomerate.

All from above exposure.

18754. Various pebbles taken from this exposure. The varieties obtained by no means completely represent the very great number of different kinds which here occur.

18755. Diabase(?) from large dike 20 feet or so across cutting conglomerate.

18756. Felsite(?) from another large dike about 10 feet across cutting same.

18757. Still another phase of dike material from same exposure.

Passing now to the north
18758. at the next exposure is 18758 slate conglomerate which bears
18759. sparse syenite pebbles and 18759 conglomerate bearing the gray granite.

18760. Slate without any pebbles.

All of the above are from the island just described.

This conglomerate exposure while mapped as Lower Slate

Conglomerate or quartzite by Logan is thought to be more probably the Upper Slate Conglomerate as indicated by the presence of the fragments of red jasper.

Passing east from the slate conglomerate is land above described is an island bearing fine
1876 1. grained gray quartzite 1876 1. intermediate in character between the slate conglomerate and the white quartzite.

We now passed on to the large island mapped by Logan as bearing the first gray quartzite.
1876 2. Various phases of these are
1876 3. represented by 1876 2 – 63 – 64 – 65
1876 4. The coarser phase 1876 2 are
1876 5. conglomeratic and bear separate grains of feldspar and quite large pebbles of chert. In places the quartzite becomes slaty. Alternation of these slaty phases and the pebbled beds gave a strike of N 78 E and the dip 18 N.

We now passed on to
18766. Thessalon where was found 18766
the chloritic slate of Logan
really a modified surface eruptive
rock.
18767. Amygdaloid from large dike
cutting 18766.
18768. Chloritic slate from islands
about two miles east of Thessalon
Bay. The chloritic slate here
shows beautifully a conglomeratic
appearance and contortions such
as leave no doubt that it is
a surface scoria and locally
actually a fragmental scoria.

For at least 3 or 4 miles
east of Thessalon the numerous
islands are either of the red
felsite or the fine grained surface
greenstone of Thessalon or finally
of the agglomeratic material all
belonging to Logan's chloritic slate.
These are cut by occasional
dikes of greenstone.

18769. Fine grained greenstone.
18770-71. Two phases of felsite.
18772. Coarse greenstone. All from chloritic slate.

Monday, August, 10, 1891.

We continued east along the coast.

The fine and coarse grained greenstone agglomerates and other varieties continue unchanged to about 5 miles (estimated) east of Thessalon when the quartzite and conglomerate appears.

18773. The greenstone at the last ridge before the quartzite appears.

18774. The quartzite which is first found.

At the next large island to the eastward is the great conglomerate 18775 and 18776 described by Irving, containing pebbles and boulders of granite of various kinds among these gray and red granite etc

18773. 18776.

When the conglomerate becomes fine grained at the south end of the island it is

18777. decomposed Granite 18777 which unless

the pebbles become large enough to
1877[illegible]. distinguish them 1878 and 1879
1879. it is difficult to separate it
from a genuine granite.

1880. Another specimen of supposed decomposed granite but may be a piece of a large bowlder from south end of this island.

The conglomerate island breaks off on the south end and the conglomerate is cut cut off by a huge greenstone
1881. dike 1881, 30 or 40 feet in diameter. Beyond the greenstone is the conglomerate again. The conglomerate is interlaminated with bands of quartzite, which show that the dip is in some places quite high apparently nearly vertical but in other places it is flatter. This dip is to the northwest. Above on the northwest and southeast side of the island quartzite appears.

That overlying the conglomerate, that is to the northwest in passing from the coarse conglomerate to the quartzite becomes finer and finer until it gets to be a fine grained quartzite at the water edge.

18782. Coarse quartzite.
18783. Medium grained quartzite.
18784. Fine grained quartzite taken in water, in passing from the conglomerate to the fine quartzite at this place.

This is the island described and figured by Irving: 7th. Annual Report, pp. 429–431, Plates 45, 46 and 47.

Photos 1101 and 1102 Showing great variety of pebbles in this conglomerate.

We now passed to the next island to the southeast a small low one the top of which would

scarcely be above the water at high water. On this is seen quartzite and conglomerate showing that the quartzite at the southeast side of the large island is but a wider layer in the conglomerate than usual.

Upon this small island is seen a contact between the conglomerate and granite-gneiss and there can be absolutely no doubt that here is an erosion contact. As this line of contact is neared the bowlders which are at first of many varieties gradually become more and more predominantly of the one kind of rock found on the southeast side of the island - the granite gneiss. In coming nearer to the contact the bowlders are found to become angular and finally to have moved but little from their original position.

Finally the transition phase

& the conglomerate differs only from the solid granite-gneiss in that the angular blocks are separated by cracks into which detritus has filtered and then these gradually die out until the conglomerate varies into the solid granite.

The change from unmistakable conglomerate to the granite-gneiss takes place in about 6 feet. The appearance can hardly be explained except by an encroaching shore line upon a crust which was perhaps disintegrated before the breching action.

18785. The conglomerate at a point where nearly all the fragments are of the adjacent granite.

18786. Part of a boulder and a little of the matrix near to point of gradation.

18787. Granite a few feet from gradation zone.

1878. Granite to the southeast end of the island perhaps 20 feet away from gradation zone.

Photo. 1103. Attempt to show the gradation between the conglomerate on the one side into the granite on the other.

We now passed to the next island to the south the outlying one of this group.

The conglomerate is here again found but on the north side it passes abruptly into
1879. a fine slate 1879. The
contact of the slate and
1880. conglomerate is shown by 1880.

North of the conglomerate of this island is again a
1881. great greenstone dike 1881 running in a direction parallel to the dike on the first island.

Passing now to the eastward a short distance is found

another island upon which is seen a contact of the conglomerate and the Basement Complex. The gneissoid structure of the granite at one place cuts at right angles against the contact; and at another place the two are roughly parallel.

The line of contact for a part of the way across the island strikes N. 40 W and dips S.W. Then a sharp bend occurs beyond which the strike is N 5 E and dip 60 W.

The conglomerate above the contact like that of the big conglomerate island shows a great variety of pebbles the major part of which are however derived from the adjacent granite gneiss complex. The granite gneiss is in part pink and in part white and contains numerous inclusions of fine grained gneiss.

18793. Shows a part of a black gneiss inclusion and a small part of the granite in which it is contained.

The red granite of the Basement Complex is exactly like the red pebbles of granite which are so abundantly found in the various conglomerates and which appear to play the part of pegmatitic veins.

1879Z. This red granite.

1879ZA. Pebbles or parts of pebbles from the conglomerate above the contact.

Photo. 1104. Contact of conglomerate and granite gneiss. The granite-gneiss occupies a larger part of the figure but a conglomerate is seen on the lower side. The knife is at the point of contact and the crevice which to the right is filled with water is along the contact line.

Photo. 1105. The granite gneiss carrying blocks of schist is shown on the upper right hand side of the photograph, these two representing the Basement complex. The

conglomerate is on the lower left hand side. The watch is near a block of schist included in the granite. The line of contact runs diagonally across the Photograph and is just above a depression which is filled with water.

Passing still farther east the Basement Complex is exposed on a large island was examined.

Here the granite was seen to cut the schists in a most intricate manner showing all phases of the change from solid granite to solid schist. In passing from the schist area little veins of granite first appear, then larger and larger veins until finally we have a matrix of granite in which the schist is contained in blocks and then these become less and less frequent until in the granite are only occasional blocks of the schist.

18794. Red granite from this island.

18795. From an included fragment of schist.

18796. Another phase of granite from this place, which includes

18797. blocks of pegmatized schist 18797

18798. Schist and granite the former much pegmatized and the whole resembling to a certain extent certain of the recomposed granites.

18799. Another schist cut by a small pegmatized vein included in the same granite.

18800. Schist inclusion from another place in the granite. This shows the irregular way in which the schist weathers and this is very characteristic of the appearance of the ledge; the schists decay much faster than the granite and they are seen as great pits within the granite the surfaces of which are exceedingly rough on account of this irregular weathering

Photo. 1106. Granite containing

very numerous blocks of the schist.

Photo. 1107. Granite containing very numerous blocks of the schist or gneiss showing the pegmatitic veins cutting the blocks of schist.

Photo. 1108. The transition zone between the solid schist and granite. On the lower left hand side of the figure below the knife the schist is scarcely intruded except by small pegmatitic veins. In the upper right hand side of the figure the schist is seen in irregular blocks which are cut by pegmatite and which are separated by granite.

These blocks are exceedingly angular all of one kind and the larger ones on the lower side of the figure are scarcely separated from the main mass of crystalline schist.

We next passed to a small island intermediate between the large area of the Basement Complex and the islands which show the contact.

18801. Here were taken 18801 red granite
18802. Pink granite.
18803. Gray granite.

General.

The gray granite-gneiss, the red pegmatitic veins and large masses, the complex way in which the dark colored crystalline schist or gneiss of various sorts is cut by the pegmatitic veins, the intricate manner in which the fragment like area of the gneiss are

included in the granitoid rocks correspond in all particulars to the descriptions of the contacts between the Laurentian and the Conchiching described by Lawson.

The complex is separate in its character from the true conglomerate by the following differences: in the Basement Complex the schist is so little penetrated by the pegmatite in places as to show without question that the gneiss is or was one mass which has not been moved from its original position. As the intrusive granite becomes more and more abundant the gneiss or schist is found in angular fragments which have moved as shown by a discordance in the lamination of the blocks.

Still farther removed from the contact zone the included masses of schists have become well rounded by absorption.

There could hardly be a better illustration than these islands of the intrusive relations of the granites and crystalline schists.

The intricate relations just described present a marked contrast to the relations between the conglomerate and the underlying complex.

The contact line between the two is curved sometimes within a foot or two as much as 50° or it is always a continuous line of contact which on one of the islands is perfectly sharp and which on the other takes place within 6 feet. The intrusive contact relations of the gneiss and the granite are astonishingly widespread being found on all the islands of the Laurentian which were visited there being at no place any regular arrangement of the parts so these

could be seen but at one place the included fragments are all of one kind and these are in each case exactly like the adjacent schist or gneiss.

In strong contrast to this the pebbles of the true conglomerate include the many phases of granite granite-gneiss and schist all confusedly intermingled but the predominant forms are like the kinds of rocks found in the adjacent underlying basal complex.

Although pebbles were seen which were not identified with any rocks found in this complex.

The only place in which the contact line is not perfectly sharp is on the island showing the contact near the great conglomerate and here it is evident that the granite surface has been broken and cracked. In passing to a higher horizon the blocks have

Yearly moved. In passing up they become slightly rounded then well rounded. When this stage is reached mingled with the boulders from the adjacent granite are also those from other sources.

The discrimination between the two classes of phenomena that is intrusion a true erosive unconformity rests: first, upon the linear character of the lower line of the conglomerate as compared with the wide spread and irregular character of the other contacts; second, upon the great variety of boulders adjacent to the contact line in the case of the true conglomerate as contrasted with the sameness in the complex immediately below; third, the crystalline schists included in the intrusive granite-gneiss

weather out more rapidly than the latter giving a pitted appearance to the complex, while in the conglomerate the bowlders and matrix are approximately equally resistant and the latter is much more resistant than the schist of the complex; fourth, that the conglomerate is later than the entire complex is farther shown by the occurrence in the case of the conglomerate of all the forms found in the basal complex as well also as others. There can be then absolutely no doubt that the history of the Basement Complex was finished before the true conglomerate existed.

The waters of Lake Huron are about 3 feet lower than high water mark, hence

the islands showing the contact the rest would be covered with water at high water mark, and such was the case when these islands were previously visited by Prof. Irving.

18804-5 Quartzites.

18806. Slaty quartzite interstratified with 18804 and 18803.

Strike N 80° E and dip 55 S.

18807. Greenstone composing a huge ridge which appears to strike in the same general direction as the quartzite. All the above are from the west end of the group of islands south of Missisaugui bay.

All the islands along the south side of this bay so far as seen were found to be of quartzite. They are cut by

rather frequent trap dikes.

At the east end of the large island at the passage into the open lake the
18808. quartzite 18808 and 18809 is
18809. again found interlaminated
18810. with slaty layers 18810.

The quartzite is again found at the east side of the point which is off the mouth of Blind river.

Tuesday August 11, 1891.

18811. Quartzite at point upon which we camped in Blind river bay. This quartzite is interlaminated with slaty layers and is cut by greenstone dikes. The strike is N. 80 W and the dip 75 S. Like the previous exposures of quartzite observed from Mississaugui to this point the quartzite is well bedded and gives accurate determinations of strike and dip.

We now passed over to mill dam of Blind river where is found a big dike of greenstone. Pacing north on the west side of the river are found in a single exposure from south to north 18812 quartzite.

18812.

18813. Conglomeratic quartzites which
18814. bears pebbles of quartz, of granite
18815. and of porphyry, as well as

numerous single crystals of feldspar; and then on the north side of the exposure appears
1881b. quartzite again.

It is evident that much of the so called Laurentian making the outer islands and shore from Mississaugui bay to Blind river and probably farther is really a part of the Huronian, since they are composed of bedded quartzites and slates identical with the Huronian to the west and wholly unlike the granite gneiss-schist complex unconformably underlying the Huronian.

It is probable that the area of Laurentians from Mississaugui to near Thessalon is an Anticline. On the south side of the Anticlinal a great quartzite formation just described may stand as the equivalent of several of the members of the Huronian on the north side.

Thursday August 13, 1891.

On West Gore road one mile north of La Chute.

The section was taken from east to west beginning with limestone passing through quartzite to gneiss and then again to limestone.

18817. Limestone at quarry showing evidence of much movement by its well laminated structure and by the drawn out particles of graphite.

18818. Another phase of same limestone farther up the hill.

18819. Coarsely crystalline limestone which escaped interior movement.

18820. From gneiss inclusion in the foregoing limestone.

18821. Calcareous quartzite west of limestone.

18822. Quartzite farther along ridge where it breaks off. Here the ridge strikes N. 16 E.

1882 3.
1882 4.
1882 5. Three phases of limestone taken within about 50 feet distance.

Passing still farther west
1882 6. are found other varieties of
1882 7. gneiss 1826 and 1827.

Then appears white
1882 8. quartzose gneiss 1828, and after
1882 9. this quartzose limestone 1829,
1883 0 and finally crystalline limestone which shows evidence of powerful shearing action by elongated graphite particles.

After passing the
limestone belt there is again
1883 1. found coarse gneiss 1831,
1883 2. and fine grained gneiss 1832, which continues for some distance.
1883 3. Is a local phase of gneiss along the road.

The following specimens were taken along the road running

from West Gore to Lake Louise.

18834. Fine grained gneiss, Township Hentworth, Range 2, (about) lot 5.

18835. Vitreous quartzite before reaching big limestone valley.

18836. Gneiss between quartzite and limestone.

18837. Limestone first found after quartzite. Range 2 lot 4 and 5.

18838. Coarsely crystalline limestone containing curious interlaminated

18839. layers of gneiss 18839, and nodules of gneiss and

18840. crystals of feldspar 18840, lot 9 Range near Hentworth.

Photos. 1109, 1110, 1110. Showing the intricate way in which the limestone and gneiss are interlaminated, and how nodules of limestone are contained in the gneiss, as well as nodules of gneiss in the limestone layer. This exposure approaches very close

in its appearance to the pseuds conglomerates of the Adirondacks, where in limestone are found numerous boulder like areas of gneiss. This locality very strongly suggests that as a result of dynamic action, which has gone farther in the case of the Adirondacks, these pseuds conglomerates have been produced from bodies of limestone which contained narrow belts of gneiss, the latter being broken up by the intense shearing action.

Photo 1112. Another photograph of the same closer up at a point where the gneissoid layers are broken up into blocks which resemble fragments in the limestone and give the whole a strongly conglomeratic appearance.

Photos 1113 & 1114. Other photographs from another place in the same

exposure showing numerous detatched crystals of feldspar in the limestone. These appear to be formed are a consequence of dynamic action of pegmatite veins in the limestones. These pegmatite veins are shown in 1109, 1110, & 1111.

18841 Garnetiferous gneiss on line between Trentworth and Chatham, lot 9, range 1, Trentworth.

Friday, August 14, 1891.

Specimens taken from a boat trip around Lake ——— We started on the northeast side of the lake, first went east, then crossed the lake, then west to its western end, then over to the north side, then back to starting point.

18842. Banded and contorted gneiss
18843. Limestone. Between 18842 and 18843

there are numerous gradations and interlaminations.

18844. A gneiss band from the limestone 18843.

18845. Red gneiss showing evidence of intense shearing action, and containing broken hornblende-gneiss bands, in pebble-like forms.

18846. Gray gneiss farther on.

18847. Laminated gabbro, "flaser gabbro" — the Labradorite of the Canadian geologist?

18848. Gneiss beyond gabbro.

18849. Limestone from an island. Strike nearly N and S; dip W.

18850. Hornblende gneiss east of island.

18851. Pegmatite vein in same.

18852. Red gneiss near the landing.

18853. Pegmatite vein in same.

All in going around lake from left to right.

We now left the lake and drove to Grenville.

18854
18855
18856
18857
18858
18859 Different phases of Sir Wm. Logan's syenite north of Grenville. Many

phases are very basic and the whole appears to grade into each other.

1860. Quartzose gneiss upon both sides of which was found the above eyenite.

General.

The parallelism between the Adirondack rock and those of the Laurentides is most remarkable. In both districts we have an identical coarse graphitic crystalline limestone. In both the limestone appears to be interlaminated with genuine gneisses.

In both these interlaminated bands become so small, that as a consequence of movement, they are broken up and show detached fragments in the limestone which have strongly the appearance of rolled pebbles. In both districts the gneisses associated with the limestones are strongly garnetiferous rocks of like character. In the

Laurentides the schists have partaken of the intricate folding which has affected the limestone; and upon both has been impressed a most complicated structure. In both districts in close connections with the limestones are also found quartzite or quartz-schists. In both are present gabbros, both in massive and a laminated form. In neither district have the observations of the writer enabled him to determine the character of the relations between the limestone series, which is almost or quite certainly of clastic origin, and an underlying coarse grained gneiss said to be free from limestone. The lowest gneiss of Sir Wm Logan was not seen.

Sunday, August 16, 1891.

Section from Magog along N.P. 12, one mile east of Eastbay.

18861 Graptolitic shale.

18862 Greenstone cutting above slates at another point

18863 From nodular portion of greenstone which appears to be amygdaloidal and has a peculiar nodular weathering suggesting a surface ash or flow.

18864 Diorite from south side of main mass of Mt. Orford.

18865 Greenstone from small dike cutting the same.

18866 Greywacke from cut on railroad on south side of Mountain Silley.

18867 The same, showing a pebble.

18868 Serpentine from a mass of same in railroad cut. On one ~~side~~ end of the cut is the slate; on the other the serpentine. Photo. 1415.

18869 Coarse graywacke-slate in cut farther on.

We next came to a cut containing a basic
18870 porphyry, which holds large round
18871 inclusions of 18871, baked slate according
to Ells. The porphyry is in contact
18877 with gabbro(?) 18872. In passing west
18873 this gabbro is cut by veins of felsite, 18873,
but these were not found to cut the
porphyry 18870. After passing along a few
18874 paces again the porphyry appears 18874.
Apparently the porphyry is the latest
intrusive at this locality.

In passing along the railway until
a trestle is reached at Eastway
slates are found which Ells calls the
Lower Cambrian. The major portion of
these are a peculiar knotted green
18875 slate 18875, but just as the bridge is
18876 reached appear 18876-77, quartzite interlam-
18877 inated with slates.

Beyond Eastway all the rocks are
considered as Pre-Cambrian by Ells.

From the first considerable exposure
18878 seen were taken green slate 18878 and

18879 gray slate 18879, which are interlamin-
18880 ated with 18880, calcareous slate.

The next exposure is one in which occur overturned folds described below.

18881 } Represent the calcareous slate on
18882 } the long steeply-inclined sides of
18883 the folds, while 1883 is from a quartzose layer in which the cleavage does not appear, being on the shorter arm of the fold.

This exposure is one of the handsomest instances of a series of overturned folds which I have seen. The slaty cleavage is in a common direction, but the bedding can be clearly traced through all its complications. Along the longer limits of the folds the bedding corresponds with the slaty cleavage and is about 65°, while on the east side of the folds the dip is only about 10°. Both of these dips are to the west. The axes of the

folds pitch about 15° to the north.

General.

The general course of the railroad for the day is about northwest. After leaving the graptolitic slate no fossiliferous rocks were seen, and so far as the section which we saw is concerned we have no method of determining the relative age of the rocks nor the absolute age of any. So far as we could see there was no reason for calling the rocks after leaving the graptolitic slates, Silurian, Cambo-Silurian, Cambrian, and pre-Cambrian in turn. The series as shown by the exposures west of Eastway are folded in the most intricate fashion. Upon the whole the clastic rocks become more crystalline in passing northwest, but this may be wholly due to close folding or deeper

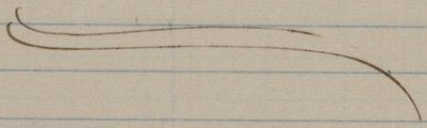
burying, or more abundant eruptive activity

The so-called pre-Cambrian slates are precisely the sort of crystalline schist which one would expect to be produced if the so-called Silurian and Cambrian graywackes were closely folded and consequently had suffered great interior movement and metamorphism; but even in the closely folded crystalline rocks supposed to be pre-Cambrian the quartzose layers along the shorter limits of the folds are almost identical with the ordinary Cambrian quartzites.

If this series of rocks is really discontinuous and is composed of two unconformable groups as supposed by Ells there is a most remarkable correspondence in appearance and composition.

The nodular eruptives appearing to be surface material is very like the fine grained dikes in the coarse rocks, and these rocks may

well may be contemporaneous
with the containing graywackes.




POINTE GOULAIS
GOULAIS
PENNEFATHER
AWERES
ISLAND L. 22
AWERES
TROUT LAKE
DENNIS
Root R.
TRENTORUS
PRINCE
KORAH
Root R.
SAULT STE MARIE
Pt Bridger
CAP
Little Carp R.
Big Carp
AWENGE
Cedar Point
St. Marys Rapids
Lt.
Pt Nolan
Prince
St. Marys River
CHENE I.
PARKE
MANN
POINTE AUX PINS BAY
Pointe aux Pins
Big Pt.
NEASVILLE
Lights
Black Pt.
LITTLE RAPIDS
SAULT STE MARIE
POINTE AUX CHENES
Brush Pt.
Lts.
ATLANTIC RY
SEYMOUR Rd
Salvo Island
CALDWELL
KNOX Rd
Six Mile Pt.
HAY LAKE
MISSION
ROUND I.
CEDAR PT.
MOSQUITO BAY
BAY MILLS
BIRCH PT.
Lts.
WAISKA BAY
WAISKA BAY Rd
GLADYS STA
BRIMLEY
WAISKA R.
McKNIGHT Rd
SHUNK Rd
RIDGE Rd
HAY LAKE Rd
ROSEDALE
ROSEDALE Rd
STEVENSBURG
DAFTER
STE MARIE
CHARLOTTE R.
McKEES
M'CARRON
LAKE Rd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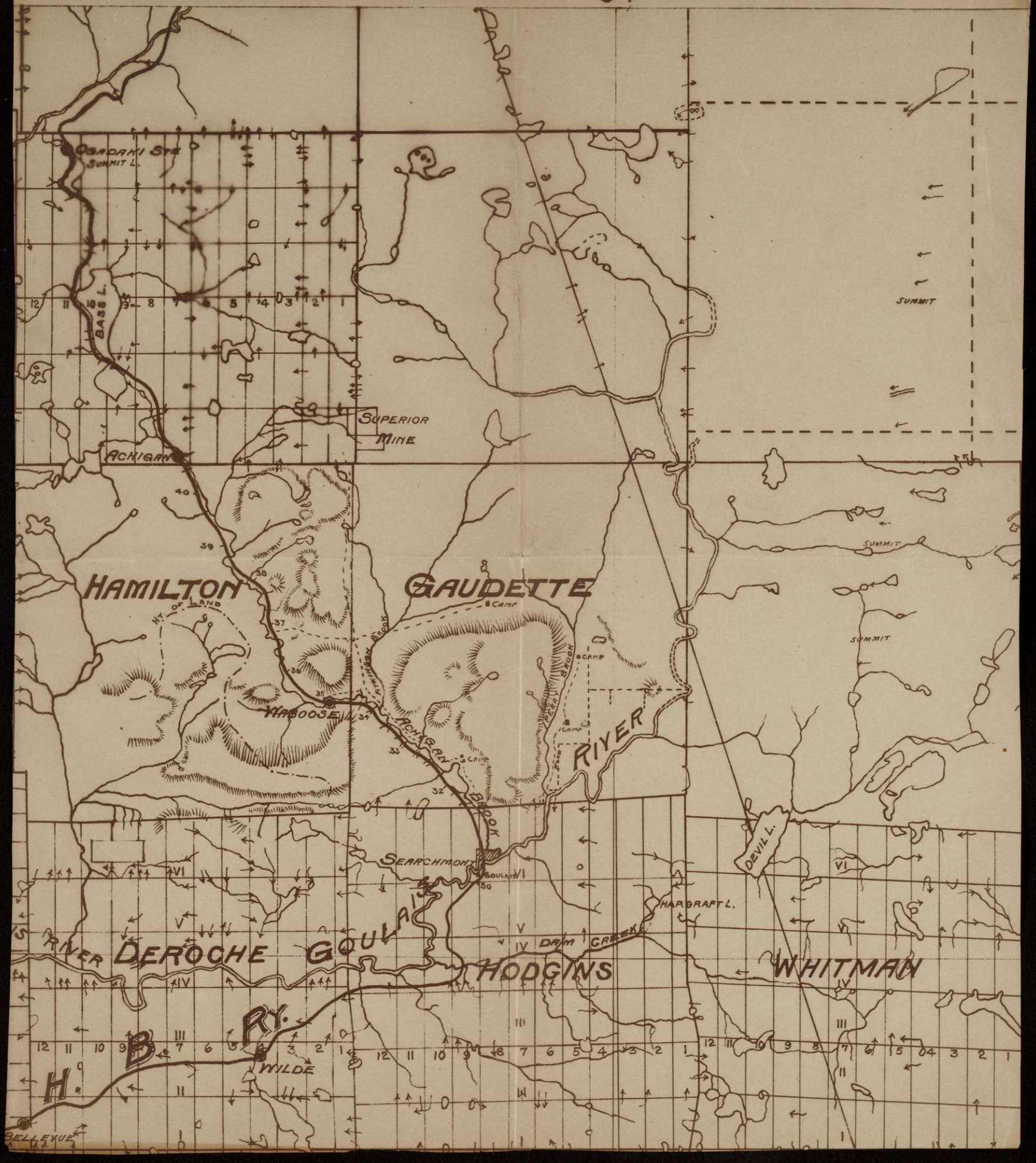
EVANS' L.
L. SAYERS
L. WALKER
RUDDER HEAD
HAVILLAND BAY
LEY
HAVILLAND
KARS
FENWICK
VANKOUGHNET
GOULAIS BAY
A. BEGLEY


OSADAKI STN
SUMMIT L.
BASS L.
SUPERIOR MINE
ACHIGAN
HAMILTON
GAUDETTE
HT. OF LAND
CAMP
CAMP
CAMP
MAHOOSE L.
ACHIGAN BROOK
BEAVER BROOK
RIVER
ACHIGAN BROOK
SEARCHMONT
GOULAIS
DEVIL L.
HARBRAFT L.
DAM CREEK
RIVER DEROCHE
GOULAIS
HODGINS
WHITMAN
B. Y.
H.
WILDE
BELLEVUE
SUMMIT
SUMMIT
SUMMIT