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Field notes of Frank Leverett,

Notebook No. 231 - Leverett

COUNTY

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Gogebic: 3-6

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Iron: 6-12, 14

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NO. 231

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NOTES OF FRANK LEVERETT

U. S. Geological Survey

September 21 - September 24, 1909

September 21, 1909 - Features along Montreal River in Wisconsin and Michigan

Ironwood, Michigan. 11:00 A.M. I cross to Hurley, Wisconsin and go north to the Falls where Montreal River cuts across the north range of hills in the N.E. part Sec. 14 to N.W. part Sec. 13, T.46, R.2E. The aneroid reads 1440' at top of falls. Then is very little falls in the stream from Hurley to here for it is a drift-filled valley. This valley seems to have had a pre-glacial course about 1/8 - 1/4 mile further west in a gap in the range or west side of Wagon Road in Sec. 14. This is filled here with morainic knolls to about 1475'. The falls have a small island with a pine tree and some bushes on it around which they cascade. The drop is probably 25 feet, a span of 30 - 40 feet, with a considerable fall in rapids below, probably 25 feet.

From here north to the Duluth South Shore and Atlanta Railroad, there is a drift covered, nearly plain tract with an occasional low swell or ridge 10 - 15 feet high. Boulders are not very numerous but in places, fine stones abound. It is a stony till with very little assorted material so far as exposed in the road gradings.

I went north to the Duluth SS and A Railroad on line of Secs. 2 and 3, 10 and 11, and S.E. part of Sec. 34. Then I followed the railway east to Montreal Station. There is very stony ground with some outcrops on the plain near Montreal. I took train west to first station beyond Saxon.

There is a bluff 30-40 feet above the Montreal River on the south side of Michigan for a short distance west of the State Line, but it soon drops off and the railway is a nearly plane ground past the stream that comes in from the south near line of Secs. 5 and 6. There is a swamp west of this

stream extending north into Section 31 as far as I can get a view.

West of it I come to a morainic ridge that lies on north side of track to the creek in Section 34 where I came out to the track September 17. There are a few scattered knolls and low drift ridges south of the track.

Features - Saxon to Gurney, Wisconsin

West from Saxon to Gurney the railway follows a low tract between moraines. The southern moraine follows the north side of Potato River as far as the edge of Sec. 18, T.46, R.1W. It does not turn south there but instead seems to make a northward turn. At least the country to the north from Sec. 18 is knolly and rough while to the south in Secs. 19 and 20, it is said to be very flat. Mr. Tinner, a large landowner operating a lumber yard at Gurney, says there are scattered knolls in Secs. 20 and 21 east of a south tributary of Potato River. Probably like the district outside the Saxon, morainic from near Saxon, past Kimball to the Montreal River on north side of the rock hills. It is a ground moraine topography rather than terminal moraine.

In Northern Ironwood and Eastern Ashland Counties, Wisconsin

There is a moraine between the D.S.S. & A. and the C. & N.W. Railroad north of Gurney. Its crest is reached in Secs. 4 and 5 near north side. Its south slope is undulating and hummocky so that one gets the impression when rising over it that he is on a moraine that was not covered by Lake Duluth. On reaching this crest, however, $\frac{1}{2}$ mile south of Cedar, sandy knolls appear and this beach is found above the level of those knolls on the north ridge that keeps north of the C. & N.W. Railroad. The lake seems to have covered the ridge on north side of Potato River as far east as Secs. 17 and 8 and part of Sec. 9. The east part of 9 seems to rise above it. From there the lake border is likely to run up Potato River as far as its bend in Sec. 15.

Then it must make a W-S.W. course to the southeast part of T.46, R.2W. in Secs. 25 and 26 to 34 and then run southward to Tyler's Fork in Sec. 9, T.45, R.2W. to which point I traced it from the west a few days ago.

* I am now wondering if the high tract that runs northward along the range line between R.1 and 2W, T.47N, may not be interlobate and have had ice on each side of it. The clay slopes on each side favor this view and the sandy crest is natural to it. Also, the pitted plain west of Hurley? falls in naturally as interlobate. It is more easy to account for this on the interlobate hypothesis than to find a natural continuation of the moraine west or north. The topography is such that a small lobe might have pushed up east of this ridge to Saxon while the large one was in the basin of Bad River. On this hypothesis the Saxon moraine is no younger than the newer part of the great system that encircles Ashland Bay.**

Studies near Ironwood and Bessemer, Michigan

September 22, 1909 - Ironwood, Michigan

I take road east toward Bessemer following the north slope of Iron Range. Drift is scanty and knolls are few on the slope of this range and on the range north of the Northwestern Railroad. The sag between is probably chiefly filled with drift but has a smooth surface.

In a creek valley in Sec. 16, T.47, R.46W., about $1\frac{1}{2}$ miles southwest of Bessemer, there are drift knolls 20-40 feet high of very stony material and some assorted material. The largest are in a stream $\frac{1}{2}$ mile south of the Wagon? ? , line of Secs. 16 and 21, and loop across the valley thus.



* Question of an interlobate spur.

** This interpretation seems rather doubtful.

There are scattered knolls north of this chain.

Boulders and large blocks are very numerous along the road in this gap, especially east of the creek. The north range of hills north of the railway is generally bare. Just west of Bessemer for two miles is very jagged.

I found N-S bearing striae on a ledge in a N-S road almost two miles west of Bessemer that leads south over a high granite hill. The aneroid read 1710 at crest of the hill. I think the rock is on line of Secs. 17 and 18.

Features near Wakefield, Michigan

Striae on rock boss south of Wakefield Station about due south - heavy grooves. There are small drift knolls along the South Branch of Black River west of Wakefield with numerous boulders. The topography however, is likely to be found morainic. Bare rock ledges occur both north and south of the stream. The iron range from the Ramsay mine at Black River eastward lies north of the C & NW Railroad. It lies a mile or so north of Wakefield; the rock ridge parallel with it on the south side of the railing is barren.

I continue east after dinner to Ross Siding in Sec. 30, T.47, R.44W., through a rather swampy tract with bare rock bosses, each rock rising in places 40-50 feet above the swamp. I passed a boss on south side of track in Sec. 24, T.47, R.45W., on which there is a fine exhibit of southward bearing striae on a surface rising southward. Those in Wakefield also are on a surface rising southward. There is an extensive spruce swamp around Ross Siding which extends from east part of Sec. 24 to where the railroad turns south in Sec. 32. and there is maple from Wakefield to the range line,

except where narrow swamps lie among the rock ridges.

The aneroid reads 60 feet lower at Ross Siding than at Wakefield (1551) though Wakefield is but little above the bank of S. Black River.

On Railway - Wakefield to Watersmeet, Michigan

I take train to Watersmeet. There are heavier deposits of drift east from Ross Siding. Around Dunham are knolls of gravelly drift 30-40 feet high (Sec.15, T.46, R.44W). From here to Marenisco there is an occasional knolly tract but this surface is largely swampy near the railway. At Marenisco the sharp turn in the railway is around a group of drift knolls west of the village that rise 30-40 feet or more along the station (1509). The railway then follows up Presque Isle River, a stream having heavy drift deposits with hummocky surface on both sides. I have seen no rock ledges this side of Dunham. The valley in places has flat swampy bed $\frac{1}{2}$ mile wide, but usually the drift knolls are close to the narrow east side. There is a high tract of scarcely a square mile rising 100-150' above the river east of the Watertank station near line of Secs. 35 and 36, T.46 and Secs. 1 and 2, T.45, R.43W. The aneroid reads above 1550 at the Watertank, and 1600 feet on the divide between Presque Isle River and the drainage to Gogebic Lake. On this divide are many low drift swells seldom 30 feet high, but in a few places large ones 60-75 feet above the swamps. A large swamp $1\frac{1}{2}$ miles wide is crossed west of Gogebic at altitude about 1560'. The station 1563' is about 3 feet above it. There is a rock boss south of the station a few rods, 15-20 feet high. East from here the drift is thin and rock outcrops numerous. There are extensive swamps near Thayer at about 1570-75 feet. Several headwater tributaries of Ontonagon River unite here. A ridge is in view to the north in Secs. 33, 34 and 35, T.46, R.41W. There is a rise eastward along the railway to about 1625' in Sec. 3, T.45, R.41W. The alti-

tude is about 1600 feet at a branch of Ontonagon River in Sec. 11, while neighboring knolls rise to 1650' or more. East from this stream there are large, flat areas at about 1630 feet. A few knolls near Mile Post 300 of glacial material 15-20 feet. To the east lower ones 8-10 feet. Near M.P. 299 are knolls 25-30 feet north of track with small lake south. Knolls numerous east from here.

At M.P. 298 is a sharp knoll 30 feet high, very bouldery. Much swampland 297 and 296. Flag station to west of M.P. 296 is on edge of a striking moranic tract of sharp knolls - 30 to 40 feet high. This varies E-NE. The railway crosses it at M.P. 295 and so on a flat tract of sandy land nearly to the railway junction at Watersmeet two to three miles. Altitude 1581 feet. There is a moraine south of the railway west from Watersmeet as well as north. The flat tract along the railway is only a mile or so wide.

Features near Watersmeet, Michigan

From Watersmeet eastward there is a sandy plain along the stream almost a mile wide and high, hardwood timbered ridges on each side. The sandy tract has been lumbered off. There are some knolls south of the railway of gravelly, sandy material that are lumbered off. The cuts show sandy material at top with cobbly material near base. The high tracts south of the railway are 50-75 feet or more above it. The hills are not so conspicuous for 3-4 miles N.W. of Elmwood. They become prominent a mile or so past Elmwood and continue so for several miles.

Some rock ledges are then passed and beyond this a lowland area much wider borders the stream and seems to be terraced. This is near Basswood that the ledges were passed. They are on edge and run east into the low tract from the high bend on S.W. side of the railway.

From here into Iron River the topography is of an ice sculptured type, with ridges and channels trending N-NE - S-SW, as may be seen by the Iron River Topographic Sheet.

R. C. Allen - Striae

Mr. R. C. Allen reports striae in Sec. 23 of T.44, R.36W in S.E. of S.E. $\frac{1}{4}$ - bearing S 32° W. Others are noted on the Iron River Sheet as follows: N part Sec. 6, T.44N., R.35W., - S 20° W; N part Sec. 3, T.44N., R.35W., - S 33° W; on line of Secs. 21 and 22, T.42N., R.35W., - S 4 - 12° W. There are numerous rock exposures on borders of Paint River in the northeast part of the quadrangle but he found no striae preserved.

Features near Iron River, Michigan

September 23, 1909. Iron River, Michigan. I take road known as Crystal Falls road NE to north side of Ice Lake and then east $2\frac{1}{2}$ miles to forks in Sec. 21, T.43N., R.34W, mapping in the drumlin like hills. I pass a short gravel ridge in SE part of Sec. 19 that runs SE from the road about 40 rods and is only 5-6 rods wide and 8-10 feet high. It looks like a little esker. There are low drift hummocks around it, 5-10 feet high, thickly strewn with boulders. In some cuts in knolls that are not definitely drumlin shaped, I find very stony material setting in at 2-5 feet above which is a silt with occasional stones and even large boulders. The drumlins usually run on uniformly stony to the top.

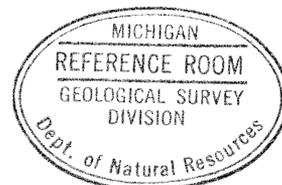
The till is of a pink color in places on the drumlins about a mile distant further east, so I can see no basis for Russell's setting this off as "gray" drift. I pass one of the finest drumlins of the region soon after turning northeast. It is about a mile long with south end in east part of Sec. 21 and north in SW part of Sec. 15, T.43N., R.34W. A small drumlin

lies west of its north end, separated from it by a space of only about 30 rods. This is a smooth sag literally lined with boulders. The large drumlin is 20-30 feet high and 40-60 rods wide. There is a small drumlin near the center of Sec. 15 on east side of road. Farther northeast there is only a slight shaping into drumlin form. The surface is morainic but not hummocky. It is a tract of thick drift clear out to the border of Paint River. This probably is to be classed as ground moraine.

Studies in Iron County, Michigan

Paint River in the east part of the Iron River quadrangle where its course is N-S is on a tract of loose, gravelly material with basins and low knolls standing much below the level of the till uplands to the west, much of it being only 1420-1440'. This is a strip a mile or so wide. East of it on the edge of the Crystal Falls quadrangle, there is a hardwood tract with rolling surface. The morainic aspect becomes greater to the north, and along and north of Hemlock River there is very strongly morainic topography with knolls so steep as to be difficult to cross over. They range in height from 50 feet down to little hummocks 5 or 10 feet. The boulders are exceedingly numerous on much of this moraine.

The rolling country extends into the NE part of the Iron River quadrangle north of Paint and west of Net River and also in the north edge west of Net River. (The topographic map does not look morainic.) It passes southeastward in the Crystal Falls quadrangle, being well developed for $1\frac{1}{2}$ miles south of Amasa and north of the village beyond the limits of the quadrangle. From high land $1\frac{1}{2}$ miles SW of Amasa, I could see the moraine to the east several miles beyond Amasa. The south edge of the moraine varies from Amasa to Swan Lake and then south to Paint River and then along the



river for a few miles. For I noted what seemed to be a fosse against the north edge of an outwash tract south of the river. At a valley that runs south to Fortune Lakes there seems also to be an ice contact near the Amasa-Crystal Falls wagon road where it rises southeastward from the Paint Valley north of Crystal Falls. (See notes taken last July.)

There is another gravel place 2-4 miles SE of Amasa around a small lake. There is moraine both north and southeast of it. The gravel hill $\frac{1}{4}$ mile SW of Amasa appears to be an isolated gravel area with bouldery moraine all around it. I take train to Balsam on CM & St.P. R.R. It enters a gravel place $1\frac{1}{2}$ -2 miles south and runs in it much of the way to Balsam.

One-half mile W-NW of Balsam on north side of CM & St.P. R.R. is a striated rock boss with heavy grooves S 15° W. Sort of conglomeritic with greenish color. The aneroid reads 30 feet higher than at Balsam station on top of the rock boss. About $\frac{1}{4}$ mile east and south of Balsam are sharp gravel ridges 20-35' high in a chain running NE-SW, looking in places like eskers.

About one-half mile S-SE of Balsam on each side of C & NW R.R. is a gneiss boulder 50 feet in circumference. Many gneiss pebbles in drift here. It looks different from the drift seen near Iron River and Amasa for that had very little gneiss.

About $\frac{3}{4}$ mile W-NW of Balsam another rock boss on south side of track is elliptical in N-NE-S-SW direction and the striae are on similar direction. One large groove bears S 35° W which seems to fairly represent the general trend. The boss is deeply fluted and grooved. It is a sort of greenish breccia or conglomerate rock. Just east of the one-mile post west of Balsam are highly polished rock bosses on north side of railway with striae S 20° - 25° W, the same greenish rock. The outcrop extends west past the mile post.

A knob 40 rods south is bare rock to height 8-30 feet. There are bare rock knobs out almost to the wagon road two miles west of Balsam and drift is very thin north for $\frac{1}{2}$ mile past the Gibson Mine.

There is a ridge 1-2 miles S-SE from Amasa that has a rock nucleus but drift knolls 15-30 feet high occur along it and it seems to be in the line of the moraine. Its crest is fully 1560 feet (See topographic sheet).

September 24, 6:00 A.M. Further Studies in Iron County, Michigan

I take the railroad track north through a tract of small, gravelly, cobbly knolls standing in swamps. In them are occasional large boulders of local trap rock. About $2\frac{1}{2}$ miles from Amasa just north of M.P. 255 is a rock ledge in cut which rises on east side of track 6-8 feet. It is striated on its north slope S 30° E or about 65° from the trend of some of the striae near Balsam only five miles distant. The aneroid here reads 1450'. There is a hill just east of track that rises 50' higher and probably has a rock nucleus. This is probably a local deflection of the under currents of the ice to follow the sag through which the railway passes. It is 50-75' or more lower than high tracts $\frac{1}{2}$ mile or so east or west.

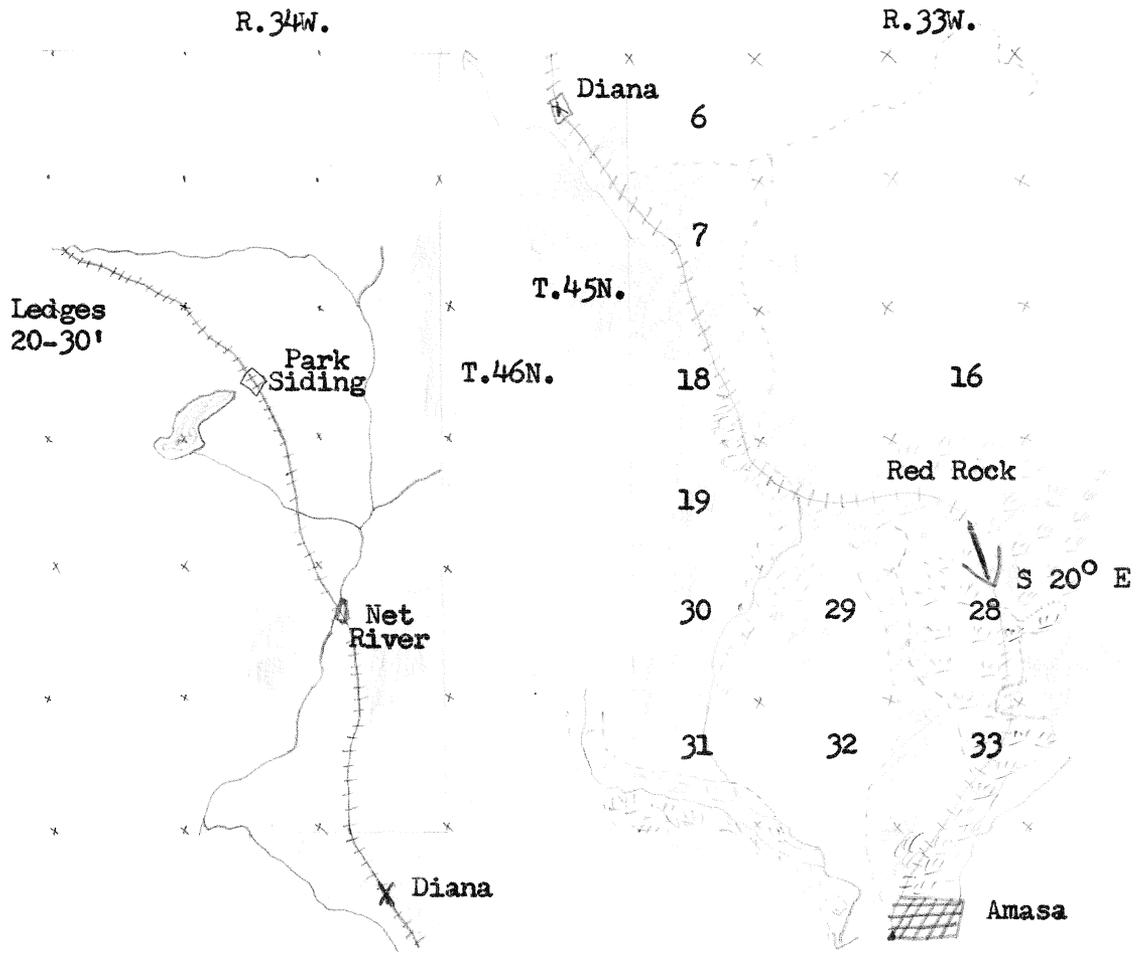
Where the railway thruns west to Red Rock, there is a large spruce swamp covering much of Sec. 20 and north part of Sec. 21, south of which is rolling hardwood land. There is a prominent tract east of the railway between Red Rock and Diana in Secs. 17, 8 and east edge Sec. 7 with hardwood, largely maple. It rises 30-50 feet above the nearly plane tract along the railway. There is a similar high tract west of Red Rock in Sec. 19 that extends south into Sec. 31.

Much of Secs. 7 and 18 and the sections west of them are nearly plane with a gravelly, cobbly drift and a few boulders. It was thickened with mixed pine, birch, spruce, etc. There is an occasional knoll 15-20 feet

high. Net River valley in SE part of T.46N., R.34W., has morainic tracts each side rising 75'+ above the stream and very little swampy bottom in Secs. 25, 26 and 35.

I am told by Mr. Foster at Net River P.O. in Sec. 25 that east from here the topography is strongly morainic for several miles. He thinks it is so, clear through to the other line of the CM & St.P. near Witback. Some sections had a little pine but hardwood is present everywhere in T.46N., R.33 and 34W. There are very few lakes and swamps are not extensive in T.46N., R.33W. But in T.46N., R.34W., they are more common and swamps larger. There is a great deal of swampy land in vicinity of Perch Lake in T.46N., R.35W.

The railway is in swampy land much of the way from Park's siding to Tunis. Rock ledges set in a mile NW of Park's siding on south side of the railway at 20-30' higher altitude. There are several places between there and Tunis where they show. I saw them from the train to Tunis. I then walked back 1/2 - 3/4 mile and examined a rock boss on east side of track for striae. It is much weathered but I think I found places where the heaviest grooves are not yet effaced and they bear about S 20° E. (See topographic sheets for the district between Tunis and Amasa.)



Features in Houghton and Baraga Counties, Michigan

There is a morainic belt north of Tunis filling the whole interval of six miles. The valley of Perch River in it is hemmed in by prominent knolls and ridges from about a mile north of Tunis. There is a very sandy drift on east side for a short distance back. The bluffs of sand are about 60-70 feet high about three miles north of Tunis. The valley is very bouldery and with large blocks of the local rocks, yet I saw no outcrops north of Tunis.

North of Sidnaw for a couple of miles there is a sandy plain with basins, but I am told that further north there is very hummocky land with deep basins among the knolls and considerable red, clayey drift. This extends up Sturgeon River about to the mouth of the Perch. It has hardwood, largely maple and birch with some hemlock and pine, while the planes to the south are pine and so also to the east on bend of Sturgeon on north side as noted last July.

I take train from Sidnow to Covington and am in moraine all the way and see few rock outcrops - they are on prominent hills south of track. (See notes of September 25.) From Covington I went up on the hill south which reaches an altitude about 1700 feet and got a view across the headwaters of Net River from north part of Sec. 27, T.48N., R.34W. I look over a swampy tract in Secs. 33 and 34 to a high ridge timbered with maple in Secs. 25, 35 and S.E. part of Sec. 34. This hardwood is said to cover Secs. 1, 2, 3, 11 and 12, T.47N., R.34W. South of here is a tract said to be largely poplar brush which is thought to have been an old windfall that had hardwood like the district north prior to the windstorm. It is rolling country. The tract with bare rock ledges and very stony land with blocks of rock in the soil that sets in near Vermillac runs south of a line leading from Covington to Summit station. North of that line is reported to be a good soil with maple forest. Rock outcrops are common there but drift has

filled depressions and covered slopes, about as in the district we crossed last July north of Covington. It seems likely that the ice border at one time ran from Tunis past Vermillac to Summit. North of this line is a morainic complex six miles or more wide. Another morainic tract lies south of Park Siding and runs east and west for many miles. Its south edge is near Diana. South of this is another with north edge near Red Rock and south edge near Gibson mine south of Amasa. There is still another near Paint River northwest of Crystal Falls as noted last July. Then comes the drumlin area that covers much of the Iron River quadrangle and S.W. part of Crystal Falls and extends to the Michigan-Wisconsin line.

