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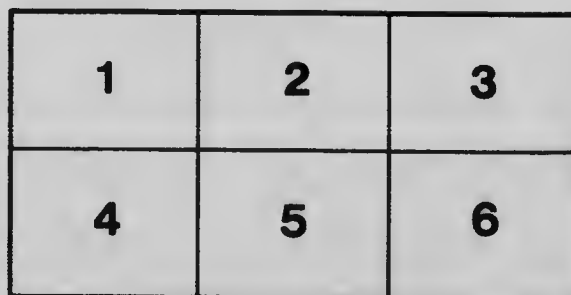
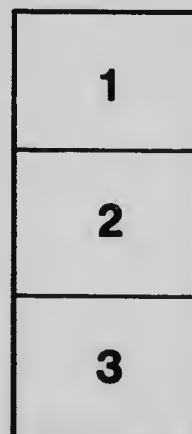
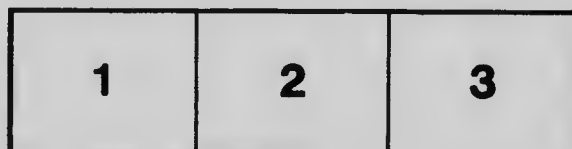
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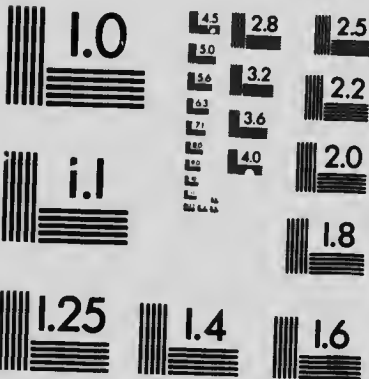
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NOTES ON THE NATURAL HISTORY AND  
PHYSIOGRAPHY OF NEW BRUNSWICK.

By W. F. GANONG.

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133.—THE GORDON FALLS, AND THE ASSOCIATED GORGES, ON  
POLLET RIVER.

134.—THE GREAT SNOWSTORM OF JUNE 5, 1914, IN CENTRAL NEW  
BRUNSWICK.

135.—THE MOVEMENT OF THE HEAD OF TIDE ON NEW BRUNSWICK  
RIVERS.

136.—THE WEST BRANCH OF THE SOUTH BRANCH OF NEPISIGUIT,  
AND THE CENTRAL PLATEAU.

137.—THE PHYSIOGRAPHIC APEXES OF NEW BRUNSWICK.

138.—A POST-GLACIAL GORGE SIXTY YEARS OF AGE.

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ARTICLE II.

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NOTES ON THE NATURAL HISTORY AND PHYSIO-  
GRAPHY OF NEW BRUNSWICK.

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BY W. F. GANONG.

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133.—THE GORDON FALLS, AND THE ASSOCIATED GORGES, ON  
POLLET RIVER.

Among the many fine post-glacial falls and gorges which New Brunswick so fortunately possesses, one of the most notable occurs on the Pollet River near Elgin, in Albert County. Though easily accessible by way of the railway to Elgin, it is comparatively little known in the Province. I have made some study of the place during two recent visits, with results herewith presented.

The earliest account of these falls that I have been able to find is the following very appreciative description, given by a surveyor, George N. Smith, in the year 1827, in a report published in a British Blue-book on Emigration of 1828 (page 44):

Recrossed the Paulet River at the Falls, to which I had been attracted by the noise of the cascade. It is one of the most pleasingly picturesque I ever saw, and has an air of peculiar elegance; its height is about thirty feet; the rocks are amazingly grand; and the character of the banks above the fall, and fine bit of distance, form a very perfect picture. I remained long enough to take a sketch. There are many lesser falls.

In 1863 Professor L. W. Bailey made a visit to the place in connection with his observation survey of the mineral deposits of the Province, and in his *Report on the Mines and Minerals of New Brunswick*, 1864, page 34, he gives so appreciative, accurate, and expressive a description of the Falls and their surroundings that it should here be quoted in full:

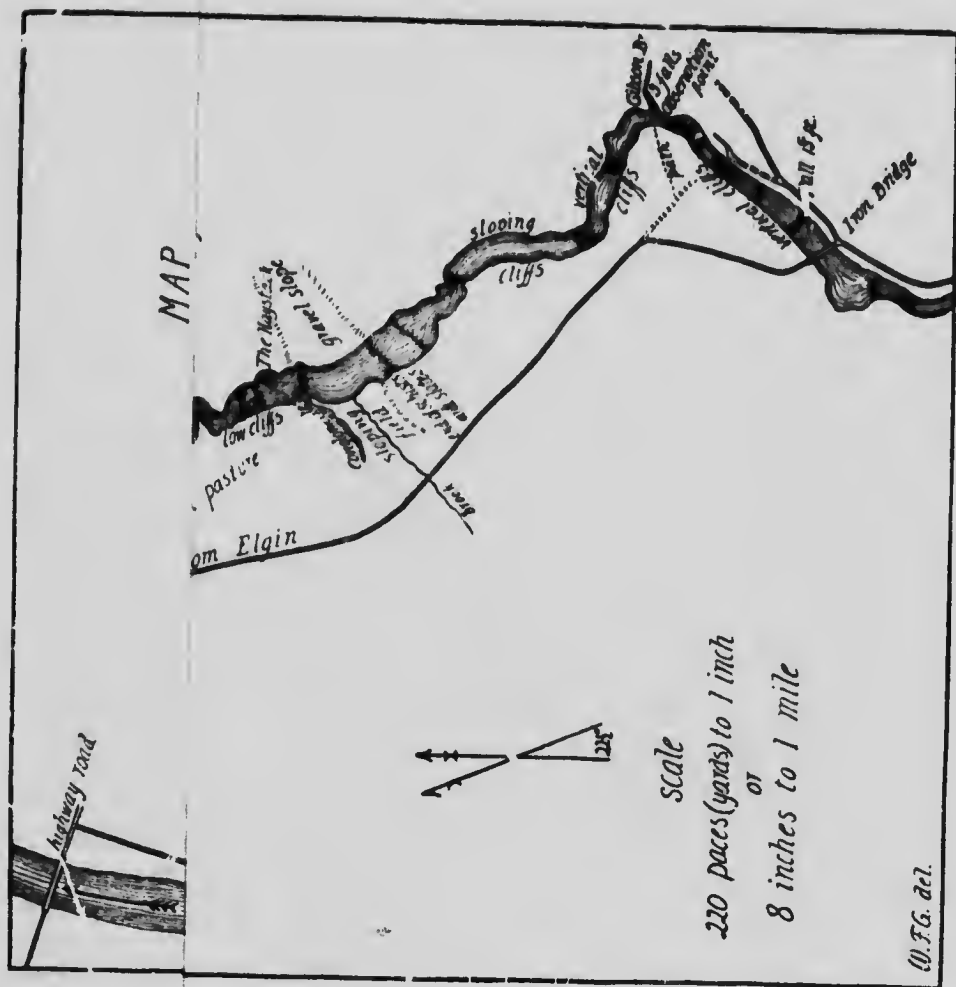
The gorge at and below the Falls, is a very wild and romantic one. The hills on both sides are high, almost mountainous, and thickly wooded to their

summits with a rich growth of hard wood. The cliffs forming the gorge are coarse conglomerates, upon which the action of the water has been very remarkable, working away deep caverns, and leaving overhanging ledges sometimes forty or fifty feet high. The bed of the stream is likewise conglomerate of the coarsest description, through which the water works its way by innumerable channels, now working out a deep and narrow gully, now undermining the rock and bubbling out again some distance below, now falling from rock to rock in delicate cascades. At one point, the water converging from several sides is suddenly poured perpendicularly into a deep circular hole of about ten feet diameter, where boiling and surging, it passes out below by some subterranean channel. There was, so far as I could discover, no visible outlet. This spot at once reminds one of the celebrated "Pool" in the White Mountains of New Hampshire. It is said that the depth of the hole is unknown, but this is probably due to the fact that any measuring line would not sink perpendicularly, but be carried off obliquely by the current into lateral channels.

These circular excavations are very numerous and of all sizes, generally holding at the bottom either few or many large cobble stones, worked loose from the original conglomerate, and now whirled around by the eddying currents, smoothing and polishing the holes which contain them, whose sizes they thus rapidly and constantly increase. The fall is about thirty feet in elevation, and in time of freshet must be very beautiful. At the time of my visit, however, there was not more than enough water to make a handsome double cascade. The curiously channeled rocks were to me a much more singular and interesting feature. It is strange that a spot so accessible, and so really beautiful, is so little known, even in its immediate vicinity.

This place has ever been a favourite with Professor Bailey, who refers to it often in his more general writings (*e. g.*, a description, with picture, in the *Educational Review*, XX, 1906, 119). It finds, however, but scant reference in the later Geological Reports, though there is a brief reference to the "very remarkable and picturesque gorge" in Bailey and Ellis' *Report* for 1876-7, 361, 371. But the Fall and gorges appear to have no other literature.

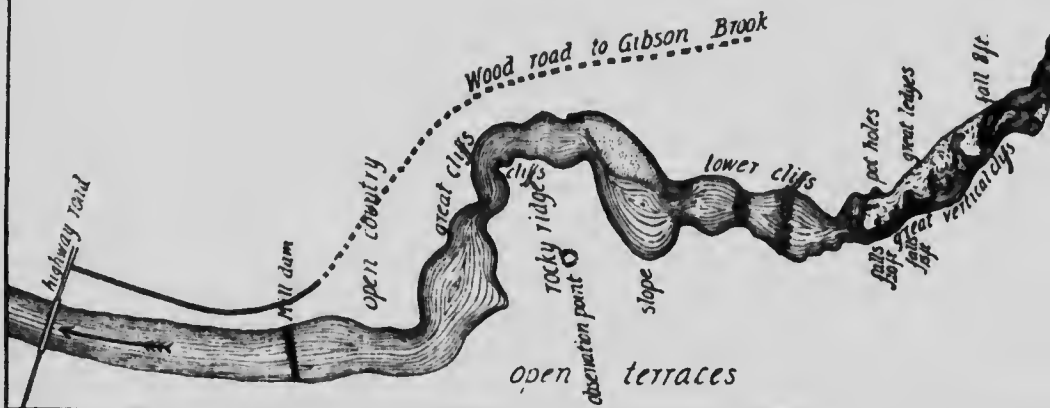
The principal Fall here mentioned is now called Gordon Falls, the name having local as well as literary usage. It was given in 1864 at the time of a visit made to Elgin by Governor the Honourable Arthur Hamilton Gordon, and it was suggested, in Governor Gordon's honour, by a member of his party, Mr. A. R. McClellan, then a representative of Albert County in the New Brunswick Legislature, and later Dominion Senator and



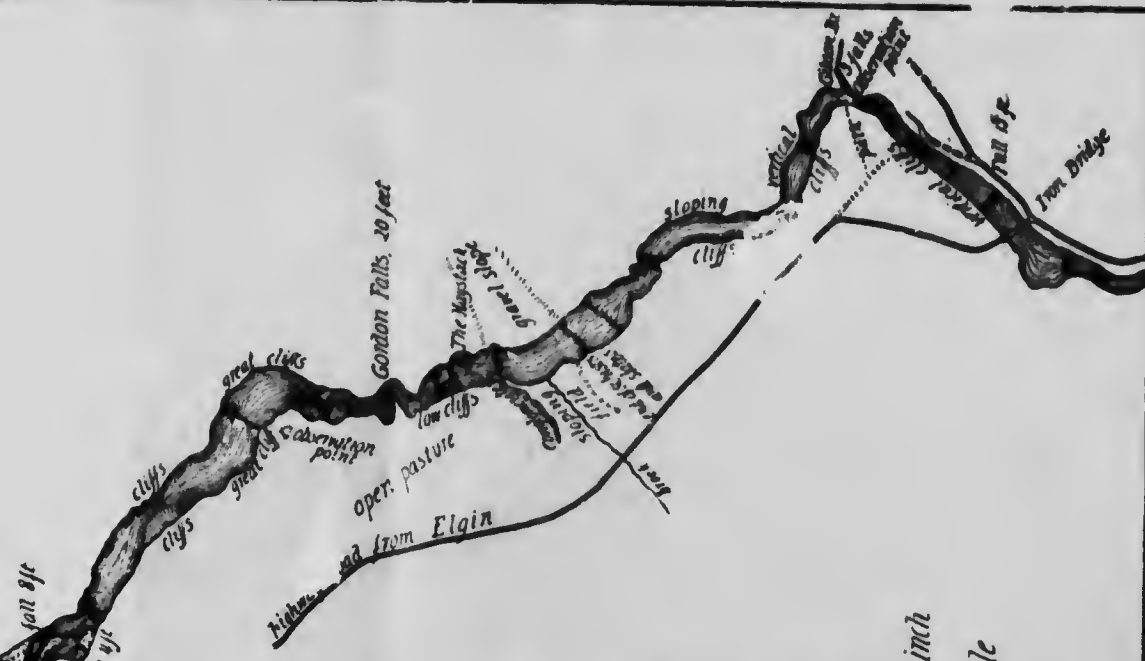
sible torrential water-course completely fills its floor. In most respects it resembles strikingly the well-known gorge of the Grand Falls of the St. John, though of course much smaller. Then it turns abruptly at right angles to the left, after which it widens a little, the walls fall off somewhat, and the stream



MAP  
of the  
Falls and Gorges  
on  
Pollet River  
New Brunswick  
from a sketch survey  
by  
W. F. GARDNER  
July, 1914

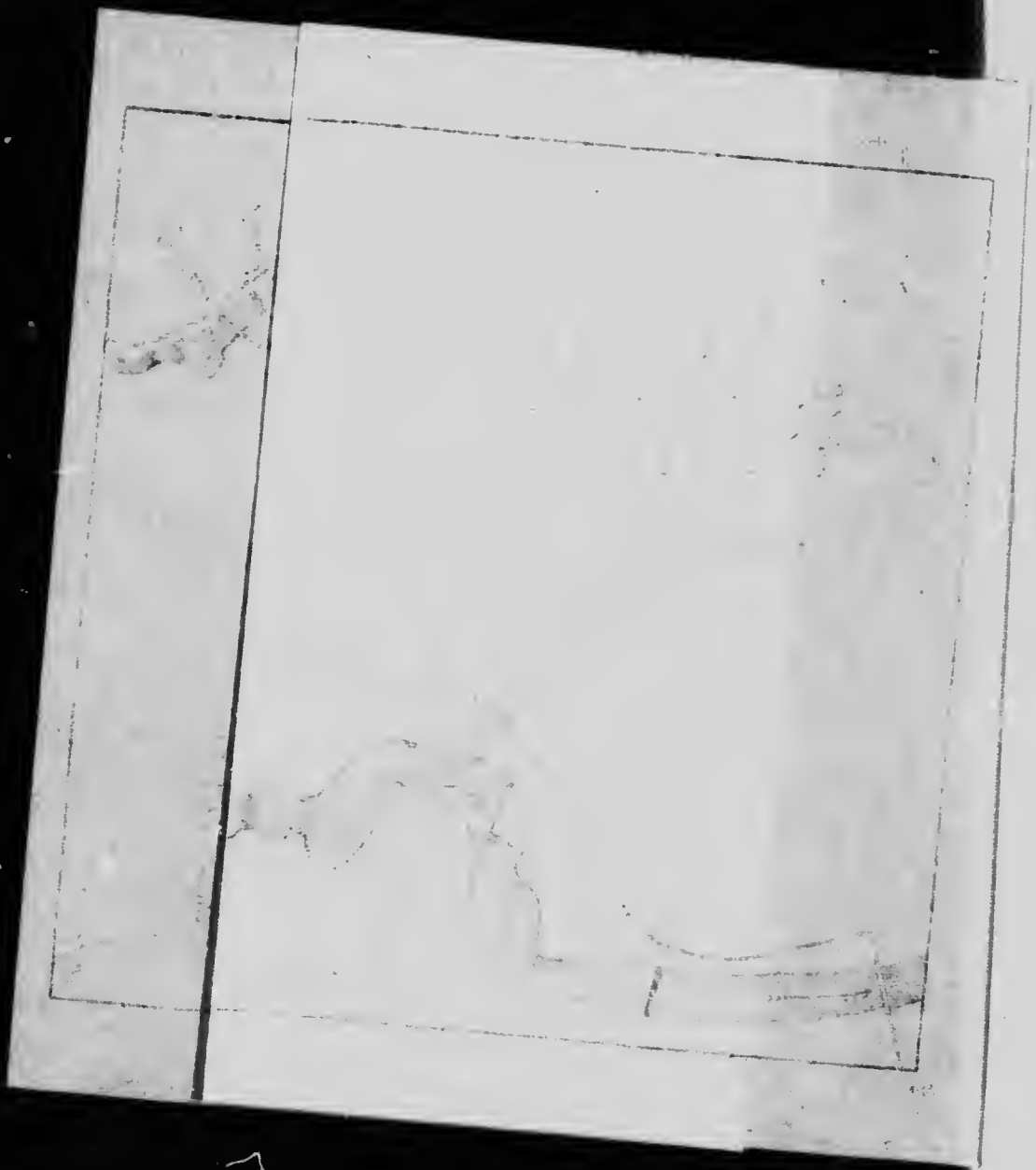


sible torrential water-course completely fills its floor. In most respects it resembles strikingly the well-known gorge of the Grand Falls of the St. John, though of course much smaller. Then it turns abruptly at right angles to the left, after which it widens a little, the walls fall off somewhat, and the stream



Scale  
 220 paces (yards) to 1 inch  
 or  
 8 inches to 1 mile

W.F.G. del.



Lieutenant-Governor of the Province. Mr. McClelan himself, now living in honoured retirement at Riverside, is my authority, and he has added in a letter, of October 14, 1914:

The basin of water at the foot of the cascade afforded a bathing place, which some of the party enjoyed greatly, and I made the observation that the falls be called the "Gordon Falls" and the name has remained.

The accompanying map is drawn from a sketch-survey of my own, made in July, 1914. The angles, taken by good compass, are approximately correct; but because of the rough and mostly inaccessible character of the valley walls, the distances could only rarely be measured (by pacing and intersections therefrom), but perforce are mostly estimated, and hence liable to considerable error. The reader versed in physiography will at once note the unusual fact (the one which led me to study the place with some care), that the principal Fall is not at the head of the gorge, as usually is the case, but midway of its course, though the explanation of this seeming anomaly is quite obvious, as will presently appear.

Pollet River rises on the plateau surface of the Southern Highlands of New Brunswick, flows northward, drops abruptly to the much lower Carboniferous Plain, and enters the Petitcodiac; and it is on the fall line that the Fall and gorge occur. Approaching the Fall, the beautifully clear River forms rapids over ledges and boulders in a valley deeply cut among wild wooded hills, and then, at the Iron Bridge a mile from the Village of Elgin, it drops into a deep wild, vertical-walled narrow gorge cut into hard schistose slates of early geological age. A little below the bridge occurs an abrupt fall of several feet, now improved by log slides for lumbering purposes, evidently the remnant of the greater fall which has cut this gorge. Downward the gorge is narrow, wild and rugged, with vertical woods-crowned cliff walls, backed by abrupt hills; while the inaccessible torrential water-course completely fills its floor. In most respects it resembles strikingly the well-known gorge of the Grand Falls of the St. John, though of course much smaller. Then it turns abruptly at right angles to the left, after which it widens a little, the walls fall off somewhat, and the stream

becomes quiet almost to a stillwater; and thus it continues down to the end of the slates and a cross valley, marked by a sloping field on the western bank. Just at the turn, however, occurs one of the most striking features of the place,— the little Gibson Brook, which, coming out of the lofty hills on the east, falls into the main stream in a gorge so narrow and deep as to form no more than a cleft. But in this cleft occur three vertical falls, of which two can be seen quite clearly in a very fine view to be had from the opposite bank of the River.

The schists and slates end abruptly at the cross valley, which is simply a gash in the hills filled with gravel drift. On the east the bank is steep, but on the west is a well-farmed slope centering in a little brook. Below, the cliffs again appear, but now are composed of coarse red conglomerate, showing that the cross valley is only a contact line between two very dissimilar formations.

In the conglomerate, which is evidently softer, as a whole, than the schists and slates above, the gorge is prevaillingly much wider. At first it is shallow, but soon the river plunges over the Gordon Falls, a nearly vertical drop of some twenty feet, in three separate narrow channels between flat ledges. The place is strikingly fine, for the beautiful fall is set in rugged surroundings of red conglomerate ledges and cliffs crowned by green woods, while the water itself, charmingly green-clear in the clean pools, is a perpetual joy.

Immediately below the Fall is the typical pool, and then a narrow pitch between flat conglomerate ledges, after which the river widens greatly and flows rather quietly between its great vertical cliff walls. Soon it swings around to the left and enters a quiet reach where the cliffs become lower. Then follow more flat ledges with a small fall, and a new part of the gorge begins.

The explanation of the apparently anomalous position of Gordon Falls in relation to the gorges as a whole thus becomes plain. The gorge in the conglomerate and the gorge in the slates are not morphologically one but two, placed end to end and meeting in the cross valley. They have had an independent though simultaneous development, and the principal falls in

each case are in the normal and usual positions near their heads.

With the flat ledges and small fall last mentioned a third distinct part of the gorge begins. Here the conglomerate walls are spaced well apart, and the gorge has a floor of great flat conglomerate ledges, into which, in a very narrow irregular channel containing many rapids and falls, the river is deeply cutting. Here are found the subterranean channels of which Professor Bailey speaks. For the most part this new channel lies close against the much loftier, and often overhanging western cliffs. Furthermore and this is a striking and important matter, the highest falls in this new secondary channel are not near its upper but its lower end, the highest of all lying at its very foot. It seems very clear that this part of the gorge displays two stages of evolution;—*first*, the larger gorge with its rock bottom (now the ledges), was formed either by a fall near its head now extinct, or else as is more likely, by the Gordon Falls; and *second*, some very recent geological change, whether removal of a barrier, formation of fault line, or the like, is permitting the River to begin the cutting of a new narrow secondary channel into the older rock floor. Thus we see the beginning of a phenomenon which has advanced a great deal farther in the case of the double gorges of the Sevogle River (Note No. 106 in this *Bulletin*, V, 1906, 545). In the latter case I attributed to the larger gorge an interglacial origin, thinking that only the smaller is post glacial; but this explanation obviously cannot apply in the present instance.

The contrast between the parts of the gorge, or rather, between the gorges, below and above Gordon Falls could hardly be greater. Of course, in large part this difference rests upon the different lithological structure of the two places. In this connection Professor Bailey has recently written me as follows (under date November 9, 1913:)

"I am myself very familiar with the locality, having visited it frequently . . . and I often referred to it in my lectures both in and out of college for the fine illustration it affords of the influence of geological structure upon the topographical effects of erosion,— the contrast between the comparatively wide and open valley at the lower Falls, with the lateral undermining of coarse conglomerates and formation of pot-holes and (as we thought), small subter-

ranear. channels, and the deep and narrow trough at the bridge above, where the rocks are highly inclined metamorphic schists and the wear is mainly vertical."

I am inclined to believe, however, that the important influences mentioned by Professor Bailey are not alone sufficient to explain the phenomena, especially in the lower section containing the new channel, and that other factors, of a tectonic character, must also be involved in the work. But the decision must await more careful studies. This much at least seems clear, that the place is one of exceptional interest in relation to the evolution of post-glacial falls.

Associated with these ledges and falls are several very interesting erosion phenomena. Chief among them is an assemblage of pot-holes, of unusually fine development and a considerable local celebrity. The fall which formed them must have occupied the whole width of the gorge at this place; but it is rather remarkable that while abundant just here, they occur but rarely above, though the ledges for a long way are similar. They are easily reached from the east bank of the river, where lower cliffs give ready access to the ledges. Again, just above the Gordon Falls, on the east bank, stands a remarkably regular isolated conglomerate cone some fifteen feet in height and spread, called locally "The Haystack," while another, almost as striking, occurs below the same Falls. In considering details, however, it is important to remember that a good deal of blasting has been done to improve the stream for lumber-driving purposes.

At the foot of the ledge-bottomed gorge just described, where occurs the principal pitch of the new-cutting falls, the valley rather abruptly opens out, the cliff walls become lower and broken, and the stream widens and flows quietly down to a great pool, where gravel bars and slopes mark the presence of another cross valley comparable with that above Gordon Falls. Here the one gorge ends, but another begins, for the River, now a deadwater as part of a millpond below, swings first east and then north and then west, narrowing meantime to yet another and very striking gorge, locally called Deep Hollow, exhibiting the highest and steepest cliffs of the entire river. Possibly

without the milldam, a rapid would exist at this place, but there is no room for a fall; and here we have a case of a gorge which is complete, with its causative fall extinct. It is, however, but short,—merely the distance through a high narrow rock ridge which here crosses the course of the river,—and below it the valley widens out and issues from the hills to begin its open course across the carboniferous plain to the Petitcodiac.

Reviewing the gorges as a whole, it becomes evident that we are concerned not with one but at least three, and perhaps four, all aligned in the same valley, but largely independent of one another in their development. Presumably each of the three (or four) parts would exhibit substantially its present characteristics were the others not existent.

We ask of course the pre-glacial condition of this part of the river. That this great valley contained a river in pre-glacial times, there can be no doubt. But although I sought for pre-glacial channels, I could not find them, at least with any certainty, and I doubt if any exist. In case of the uppermost gorge there seems no room for a pre-glacial channel; and I believe that the river flowed originally on the rock floor now represented by the rocky flat into which the gorge is cut, and over which runs the highway road from Elgin. The lower gorges may be paralleled by buried pre-glacial channels, concealed under the great level terraces which here form so striking a feature of the valley, though here also I doubt, except perhaps in case of the lowermost. But this matter must await the study of some future expert physiographer, whose monographic investigation of this place will yield both profit and pleasure in plenty. For him I leave my greetings.

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134.—THE GREAT SNOWSTORM OF JUNE 5, 1914, IN CENTRAL  
NEW BRUNSWICK.

One day in August, 1914, when coming through the woods of central New Brunswick, I met Henry Braithwaite, our premier woodsman, on one of his own trails not far from the Crooked Deadwater. He told me many matters of interest,



and among others described the remarkable snowstorm which occurred in that country on the fifth of June preceding. It began about noon on the fourth, and continued all through the fifth into the night, some thirty-six hours in all. At the close of the storm the snow lay more than half knee deep, but as it melted fast in falling, Mr. Braithwaite estimated a full two feet on the level. A great northwest gale followed right after, with such cold that water was frozen in places to the thickness of plate glass. Later the snow melted rapidly, disappearing from most places within two days, though persisting in some ravines for a week. The snow fall seemed to do no great damage, but the wind and frost which followed was fatal in four ways. *First*, most kinds of blossoms were killed, making this a poor year for berries. *Second*, the young growth of the trees was blasted, leaving the tips of the branches in spruces and firs all withered and red as if killed by disease, a fact of which my companion and I had frequently spoken without knowledge of its cause. *Third*, great numbers of trees were blown down, as described more fully in a later Note (No. 136). *Fourth*, innumerable song birds, especially warblers and hermit thrushes, were killed, while even a bird as hardy as the Junco suffered with the rest. Mr. Braithwaite said that the sight of the poor dead bodies of his favorite Hermit Thrushes which had crept to his camps for shelter nearly made him cry. He did not think that any survived, and it was nearly a week before he saw others, which appeared singly,— as late arrivals from the south, so he supposed. This destruction of the birds explained the silence of the woods that summer, on which we had often commented, without suspicion of the reason. Since birds tend always to return to their native places, it will probably take some time to restore to this region its former population. The storm prevailed all through the central woods of New Brunswick, though it was worst, as Mr. Braithwaite thinks, on the headwaters of the North Pole and Lower North Branches of the Little Southwest Miramichi.

Information fully confirmatory of Mr. Braithwaite's has since been given me by others. Mr. Charles Cremin, of

Fredericton, who was also in the woods at the time, found eighteen inches of snow at his camp on the morning of the sixth of June, and also estimates a fall of fully two feet. The song birds were entirely killed in his vicinity. Mr. Arthur Pringle, who was also in the woods at the time, noted the same phenomena precisely. He says that nearly all of the summer birds were killed, especially Warblers and Swamp Robins. Mr. George E. Gough confirms independently the evidence of the others.

The only record in our annals of a comparable storm, so far as I know, is contained in Dr. W. O. Raymond's paper on Madawaska published in the *Collections of the New Brunswick Historical Society*, III, 1914, 413, where he writes, speaking of the year 1816:

"In the Madawaska region snow fell on the 7th June, to a depth of nine inches. The spring birds from the south were chilled and died in large numbers and crops were everywhere destroyed."

### 135.—THE MOVEMENT OF THE HEAD OF TIDE ON NEW BRUNSWICK RIVERS.

The many great river valleys of New Brunswick exhibit in their approach to the sea the distinctive character known physiographically as "drowned"; that is to say, owing to a subsidence of the land since their formation, the tide flows far inland along them. The distance thereof varies from little all the way up to a full ninety miles in the case of the Saint John. On the Fundy slope the smaller rivers for the most part possess such a structure that the tide ends against a waterfall, as described already in these Notes (No. 8 in this *Bulletin*, IV, 1898, 52); but along the North Shore, on the contrary, the rivers mostly lack such falls, and the tide meets the fresh water very gradually on valley bottoms which are almost level. On these rivers, accordingly, the tide head must shift considerably with any change in the level of the land in relation to the sea. I have long been interested in this subject, partly for its own sake, and partly for its possible bearing upon the still-vexed

question of a progressing subsidence of our coast. As I pointed out in a recent Note (No. 127 in this *Bulletin*, VI, 1912, 450), "a valuable criterion of coastal movements would be afforded by a comparison of the position of the head of tide on our rivers as shown by the earliest plans and its position at present." Accordingly I have been gathering such data as I could, both from the records and upon the ground; and although the results are meagre as yet, I present them here as a foundation for the further investigation of this interesting subject.

The difficulties of the study are, however, considerable, chiefly because of a certain indefiniteness in the tide head itself. Thus, while all agree that the head of tide is not simply the upper limit of salt or brackish water, but is the upper limit at which the fresh water of the river is perceptibly raised, or its current checked, by the damming back it experiences from the incoming tide, this limit varies with neap, spring, and extraordinary tides, giving points considerably spaced apart upon rivers of small slope. Again, I find that it varies also with the pitch of the water in the river, being farther down stream with a high pitch of water than a low one. There is thus possibility for some difference of conception as to just what constitutes tide head, and this difference is probably reflected in the plans made by the earlier surveyors.

Thus much for the difficulties upon the ground. On the other hand the old plans are likely to be somewhat untrustworthy, not only for the legitimate reason just given, but also through carelessness or error. Thus, there is a plan in the Crown Land Office which marks the head of tide on the Saint Croix at the Falls at St. Stephen, whereas it is perfectly plain, as attested both by other plans and by different evidence, that the head of tide was then as now at The Union, a mile above. Accordingly, for investigation one must state with great precision the meaning he attaches to the phrase "head of tide,"—a matter which I have attempted to illustrate in practice in my study of the Petitcodiac, given below. One must also be on guard lest changes in the place of tide head have resulted from

bridge-building, lumbering operations, or other purely artificial cause, since the plans were drawn.

While the exact head of tide is thus difficult to determine, I believe that in practice its location is roughly marked by one or the other of three features,—*first*, the uppermost clearly perceptible lifting of the fresh water level; *second*, the lowermost rapid that is "drowned out;" and *third*, the presence of water-logged wood which is usually abundant at the place where the ordinary tides make a deadwater of the river.

The data which I have to present are the following:

*The Saint John.* The head of the tide on the main river is, as well known, somewhat above Springhill, six miles above Fredericton, and therefore ninety miles from the sea. The tide ends against rapids, as Professor Duff has described in this *Bulletin*, XV, 1897, 70, where he shows from measurement a tidal range, at Springhill, approaching five inches. The Foulis Report on a survey of the Saint John made in 1825 (published in *Journals of the House of Assembly* for 1836-7, Appendix No. 18), reads thus in connection with Springhill,—“The channel [going upwards], shoals to six feet, but soon again deepens to seven, ten, twelve, and fourteen, to the foot of Chapel Bar, this being the highest part of the river where the influence of the ocean's tides are felt, which vary from two to seven inches.” I made some examination of this place, from this point of view, in early September, 1916. Chapel Bar appears to be the old name for the long gravel bar which lies between the head of Hart's Island [the Island just off Springhill] and the mainland on the south, over which bar falls the lowest heavy rip on the River. Below these rips comes a deadwater pool, extending down to Springhill village, and in this pool, I was told by a resident, the influence of the tide can occasionally be seen at very low stages of the river, though the range, he thought, was only some two inches or so; and it never runs above the rapids. It would seem clear from the evidence that the highest tides die out against the rips over Chapel Bar.

These data apply to the southern channel of the River. It is possible that the tide runs much higher on the northern side of the Islands, for in Bent and Grant's Report on the River Saint John (published in the *Journals of the House of Assembly* for 1850) occurs the statement—"The rise and fall of the ocean tide is felt as far as the head of Savage Island [the next Island above Hart's,] from whence to Springhill, a distance of about  $1\frac{1}{2}$  miles, the River is divided by a series of Islands, Shoals and sandbanks." Evidently the entire subject needs more thorough investigation from the present point of view.

*Salmon River, and Grand Lake.* In a Note on this River (126; this *Bulletin*, VI, 1912, 442), I pointed out that one characteristic sign of the head of tide, the presence of waterlogged wood, appears about half a mile below the mouth of the Gaspereau. The fact, however, that the deadwater extends upward a full mile above the Gaspereau to a rapid, makes me think that the influence of at least occasional tides will be found to extend that far. On the other hand, Mr. I. T. Hetherington, below mentioned, who has investigated this point for the Dominion Government, tells me he has fixed the head of tide at Salmon Creek, some two and a half miles below the Gaspereau (compare the map at page 422 of *Bulletin* last mentioned). The subject evidently needs more exact study.

Very interesting phenomena of tidal changes of level must occur in the thoroughfare between Grand and Maquapit Lakes, according to information which Mr. McIntosh has given me, and which it is to be hoped he will himself lay before the Society. Little River, and especially the Portobello, should yield interesting results in this connection.

*The Oromocto.* I was able to examine the head of tide on both branches in July, 1916. As locally well-known, the tide flows on both branches above the main forks, which lie some eighteen miles from the Saint John.

As to the South Branch, in descending that stream, the long stillwaters and gentle rips below Back Creek are found to end in a deadwater pool a little above where the South Branch

railroad siding stands on the bank, some half mile above the railroad bridge and nearly three miles above the forks. In the pool opposite the siding I found some traces of tidal action, while below are no more rips, and sodden banks and water-logged wood are frequent. Hence I inferred that the very highest tides affect the deadwater pool at the South Branch station, and die out against some rips a short quarter of a mile above, though ordinary tides probably do not reach much, if any, above the railroad bridge. Since my return, I have found these deductions fully confirmed by local testimony, for, in response to my written inquiry, Mr. P. J. Smith, postmaster at Central Blissville, has written me, "The tide ebbs and flows in South Branch Oromocto River as far up as South Branch siding on spring tide," and adds that ordinarily "the ebb and flow of the tide does not pass the Railway bridge, and would be only a few inches, not more than say three inches."

As to the West Branch, the tide head is less easy to identify because of the much heavier rush of water through the narrow intervale channels, with consequent removal of the best signs. Going upward, however, the many traces of tidal influence are found to occur for a good three-quarters of a mile, and seemingly as high as a place on the left or north bank where occurs a fine clean sand beach and bar, just above which comes a heavy rip over gravel. The place is further marked by the entrance of a creek on the right bank,—a cut around an island, I think. I infer that the very highest tides reach this sand beach and die out against the rip, while ordinary tides would not reach so far, though I have not been able to test my deductions by local inquiry. A sand flat, where the river current is checked by the opposing lift of the tide, may indeed constitute another good sign of tide head.

*The Washademoak.* In descending this river by canoe, a few years ago, I thought I saw evidences of the head of tide a little above Ingleden's Islands, four miles above Coles Island; but, as I have recorded in Note 131 (this *Bulletin*, VII, 1913, 20), Mr. I. T. Hetherington, who has made special study of this question, and who, as he lives at Jenkins, a few miles below, has

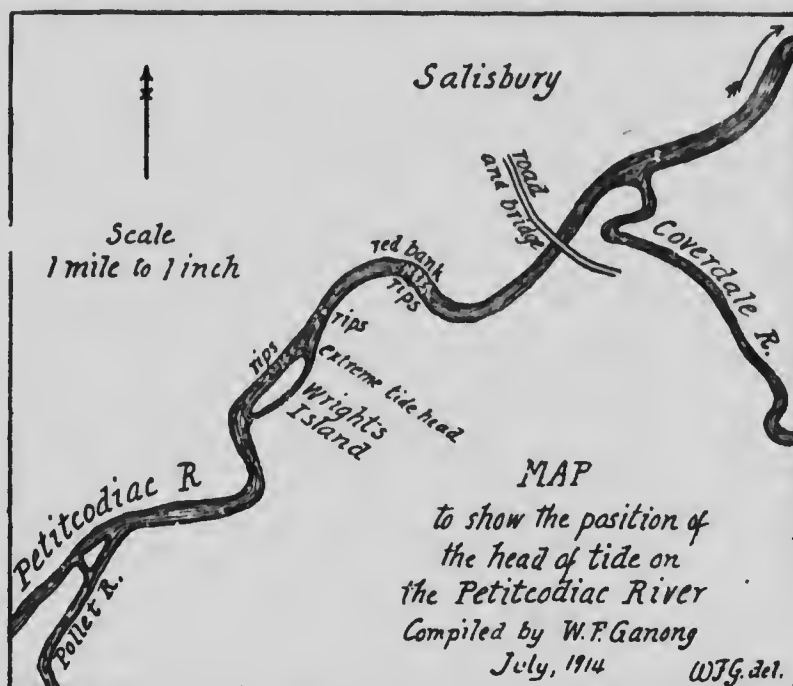
exceptional opportunities for the study of the subject, tells me he has located the head of tide at Flat Rock, (marked on the map accompanying the aforementioned Note), about six miles above Coles Island, where there occurs a rather abrupt rapid.

From Mr. Hetherington I have received another interesting item. In a letter describing various phenomena of Washademoak Lake, with which he has had a life-long intimate acquaintance, he volunteered this statement; "In 1848 at spring tide in the month of September, to settle a dispute between father and a neighbour, I watched the tide and found a rise and fall of four inches; in 1907 for Professor Goodrich I found a rise and fall of twenty-two inches." In reply to my natural inquiry whether his figures did not contain some error of transcription or the like, he later replied,— "The tides there rose (in his early days) four inches, now twenty-two inches. The cause, the wearing of the Falls lets in more water now than then; consequently the tides rise higher and the salt water is every year coming farther up the river." This statement of an interested, and disinterested, observer like Mr. Hetherington, confirming independently that of another informant mentioned below, inclines me to believe that the range of tides may really be increasing on the lower Saint John, although I set no great store by the explanation which they give.

*The Kennebecasis.* During a voyage down this river in my canoe in July, 1914, I kept alert for the first sign of the tide head, and think that I found it a little above the mouth of Patticake Brook, nearly five miles above Hampton; but I could not then make any more detailed study of the matter.

Here, however, is an item which I think worth recording. Two years ago an old resident of Gondola Point volunteered the statement, as we were watching the waters there, that the tides range much higher than formerly; that in early times they only ranged about six inches vertically at Gondola Point, while now they rise nearly four feet; and he explained the change as due to the wearing down of the Falls at Saint John. I do not of course give this statement with any endorsement, but I think some higher tidal range may be true.

*Petitcodiac.* The phenomena in this river are of special interest on account of its well known great tidal range. In Note 127 of this series occurs the following statement;—"I have been told, also, by the residents of the Petitcodiac that the head of tide on that river has moved over a mile up the river within historic times." Seeking confirmation or otherwise of this statement, I have been able to find but a single plan marking tide head on this river; but that is important. In the Intercolonial offices at Moncton are preserved the original plans of



the surveys made in 1847 for the St. John to Shediac, now the Intercolonial railway, and on one of these, made by John Wilkinson, most careful and competent of New Brunswick surveyors, the words "Head of Ordinary Tides" is marked about half way between the mouth of Coverdale River and the Salisbury Bridge (see accompanying map). Now there is no question whatever that the head of ordinary tides today lies above the Salisbury Bridge, so that we seem to have good



confirmation of the local statement that the head of tide is moving up stream.

On July 24, 1914, I was able to make a study, long eagerly anticipated, of the present head of tide on this river. I descended the Petitcodiac from Pollet River in my canoe, carefully examining all signs, as far as the highway bridge at Salisbury, which is well within tidal influence; and thence I returned up the river, carefully re-observing the various points.

At the Salisbury highway bridge the tide ranges nearly a foot, as shown by the several inches of red slimy mud, of the typical Petitcodiac sort, rising above the stony beaches to the grassy intervale. At low tide and a good pitch of water the river runs swiftly in rips down to this bridge, the bottom being stony with mud only in the shelter of the stones, whence it can be raised in a cloud by the canoe pole. Up stream the mud along shore and in sheltered hollows of the bottom becomes less abundant but is still plain for a half mile, to the beginning of a long steep red bank on the north shore, (see the accompanying map), where, at low tide, there occurs a stony rip or rapids, the shores meantime presenting the sodden appearance which one comes to associate with tide heads. Above this bank is a quiet reach, again with sodden banks, but with none of the mud except in a small cove on the south side, where I found traces of the typical Petitcodiac variety, which goes only with the salt water. Hereabouts, also, occurs some of the water-logged wood which is another of the marks of tide head. Then follows a very small rip, and finally a quiet pool at the foot of the long island called Wright's Island. Here, however, the river has wholly a fresh-water aspect, with no sign of tide that I could see.

At the foot of Wright's Island, I had the good fortune to meet a well-informed and interested resident who gave me some welcome information. He said that the ordinary tides show no effect upon the fresh water at this place, but that several times a year, especially in late summer or early fall, the tide does back up the fresh water in the pool at the foot of the Island. The matter depends much on the height of the water in the river; if the river is high no change is visible, but if low then the tide

backs up so as to check the current. Occasionally the mud, showing the influence of salt, or at least brackish, water is seen in the quiet reach just below, but has never within his knowledge reached the pool opposite his house except on one occasion, about ten years ago, when on an extremely high tide the mud became visible there. Furthermore, once in a great while, a combination of an extraordinarily high tide with very low water in the river will partially or even wholly drown out the marked rips between the foot of Wright's Island and the north bank of the river; but that is the extreme limit of known tidal influence. He has no reason to believe that the head of the tide is advancing up the river.

*Memramcook.* The tide runs very near to Calhoun's Mill, perhaps to the mill dam itself, as may be seen from the railroad.

*Misseguash and Tanramar.* References to tide head occur in an account of the Salt Marshes in the *Botanical Gazette*, XXXVI, 1903, 170-2.

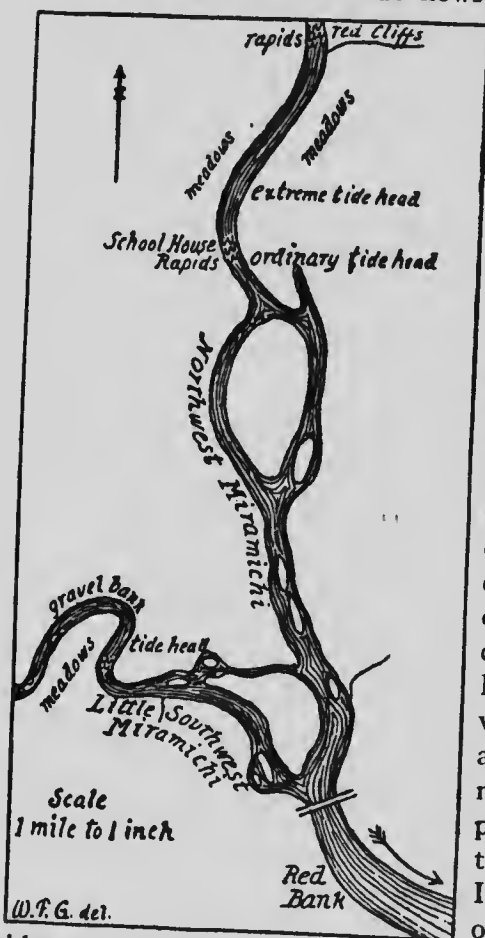
*Buctouche.* The tide ends at Coates Mill, against a mill dam, some twelve miles up this River, as mentioned (in part) in Note 132, this *Bulletin*, VII, 1913, 35. It ends also against a milldam on the Shediac, and probably on others of the North Shore rivers.

*Richibucto.* The tide head lies high up this river, some twenty-five miles above the town, and only about five from the railroad; but I have not yet had opportunity to study it.

*Kouchibouguac.* I was told at this village in 1906 that formerly the tide ran to the Salmon Hole, a mile above the highway bridge, though now, owing to changes made by the mills, it runs only half a mile above the bridge.

*Miramichi, Main Southwest.* In Note 127 (this *Bulletin*, VI, 1912, 45<sup>1</sup>), I mentioned,—“a survey plan and document, later to be published in the *Collections of the New Brunswick Historical Society*, which shows that the head of tide on the Main Southwest Miramichi in 1786 lay considerably below its present position,

which is close to the mouth of the Renous, or a little above. The plan marks 'Rapids' nearly half a mile below the Renous, where now the tide flows without any break." This



particular map was not, finally, reproduced in the *Collections* above mentioned (viz., Vol. III, 1914) but I have it now in my possession. The map, (the original of which is in the "Land Memorials" belonging to the New Brunswick Government), was made by some person familiar with the topography of that region; and as these rapids had a connection with the salmon fishery, then the chief industry of Miramichi, their location was doubtless marked with considerable accuracy. But unless both my observation and my information are in error, there is now no noticeable rapid at that place. Locally the head of tide is now placed between Indian Brook and the Renous, while extremely high

tides are recognized to run a little above the latter. I have seen the statement in print that Old Squaw Rock, a conspicuous boulder in the middle of the River well above the mouth of the Renous, marks the head of tide.

*Miramichi, Little Southwest.* This river enters the Northwest a little above the village of Red Bank. On an early undated large-scale plan showing Indian Reserves, in the Crown

Land Office, the head of tide is marked in the middle of the abrupt northerly bend about a mile above the river's mouth. In August, 1915, I was able to examine the place. The lower course of the river is swift at low water and rather narrow, on which account all water-logged drift is washed away. Just above the first abrupt turn (see the accompanying map), is a gravelly bar in the river over which the water ripples; and a well-informed local authority told me that sometimes, though rarely, the tide flows over this bar and drowns out the rips. Above, there is a long smooth swiftwater of considerable pitch sweeping against the high gravel bank which forms the next bend; and in this swiftwater between bar and gravel bank the highest tides must die out. Accordingly the present extreme head of tide of this river appears to be just where the old plan marks it.

*Miramichi, Northwest.* I have found no plan or map which marks head of tide on this river, but I will here place on record some observations I was able to make in August, 1915. The approximate site of tide head was fixed by local information as a little above the great Island shown on the map about two miles above the junction with the Little Southwest. Descending the river one passes a fine line of red bluffs on the east bank (as shown by the map), where a considerable rapid occurs. Then for a long half mile the river runs through meadows, with a quiet current showing some suggestion of rips, down to a marked small rapid called locally, I believe, School House Rapids. Just above this rapid, on a sand bar on the east side, appear water-logged stumps, logs, and other materials such as usually mark the extreme tide head. Above this point, along the still-water for some distance, occurs other scattered debris of this kind, but it soon becomes scarce and vanishes. Below the School House Rapids, however, the signs of tide head are abundant, in water-logged wood, sodden banks, fresh pools on the sandy shores, and so forth. From these facts collectively I infer that ordinary tides do not rise over the School House Rips, but the highest tides flood them, and die out in the long quiet reach above without affecting the rapids at the red bluffs. Unfortunately

I was unable to confirm these theoretical deductions from local authority.

*Tabusintac.* In the earlier Note on this river (No. 101, this *Bulletin*, V, 1908, 522), it is said,—“A mile or two above Trout Brook (and not below it, as shown on the plans in the Crown Land Office), the well-nigh imperceptible current of the river merges with the tide, with hardly a sign to mark their union, save only some water-logged wood upon the bottom.” The statement about the plans is true, but I have since found that another plan in the Crown Land Office, showing the Luffbury grant, marks the head of tide, very precisely, above Trout Brook, though much less than a mile, so that some movement seems apparent since then. This case should be re-studied more carefully.

*Tracadie.* In the earlier Note on this river (No. 94 in this *Bulletin*, V, 1906, 433) no special mention is made of this matter; but on a map containing my notes made during my trip along this river I find this,—“Head of tide is now certainly 200 or 300 yards higher up than Sadler marks it — but perhaps he did not try to be accurate.” Sadler’s map, which is in the Crown Land Office, was made in 1838. This case should also be studied again more carefully.

*Pokemouche.* The head of tide is now about a mile above the Maltempec Basin, at or near a fine fishing pool, as mentioned in Note 102, *Bulletin*, V, 1906, 524. Tide head on St. Simon involves a notable salt marsh (*op. cit.*).

*Nepisiguit.* The tide ends about three miles up this river (Note 33, *Bulletin*, IV, 1901, 319),—at a low fall, if I remember correctly.

*Jacquet River.* I examined this place in August, 1915. A resident placed tide head about 300 or 400 yards below the Big Rock, a well-known and conspicuous landmark about a mile and three-quarters up the river. The Big Rock stands at the head of a long pool below which is a rapid of a foot or two drop, followed by a long stillwater with quickwaters below. The

highest tides, another resident said, come into this stillwater, but ordinary tides do not. Hence ordinary tide head is somewhat over a mile up the river. The stream is so swift that water-logged wood has no chance to collect at the tide head proper.

*Restigouche.* The head of tide is marked on the Geological Survey map. Its exact study in light of old records should give especially interesting results, in view of the magnitude of the river, and because of the remarkable way in which the river and tide meet over extensive sandy flats.

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136.—THE WEST BRANCH OF THE SOUTH BRANCH OF NEPISIGUIT,  
AND THE CENTRAL PLATEAU.

Near the center and highest part of the Central Highlands of New Brunswick, lies the considerable stream named in the title of this Note. It is very sketchily indicated on the maps, and I have long desired to study it. Already on previous trips, I had seen both its source and its mouth, but in August, 1914, I was able to traverse its length, when I made the observations which follow.\*

The mouth of the stream was first marked on Berton's MS map of the Main South Branch, of 1837, as noted in the description of that stream (Note 77; this *Bulletin*, V, 1903, 215), while its source was first laid down on the MS. plans of 1881-2 by Samuel Freeze, who was the first to run the timber block lines in that remote region. These plans, which show the source lake and also a survey of some four miles of the north and

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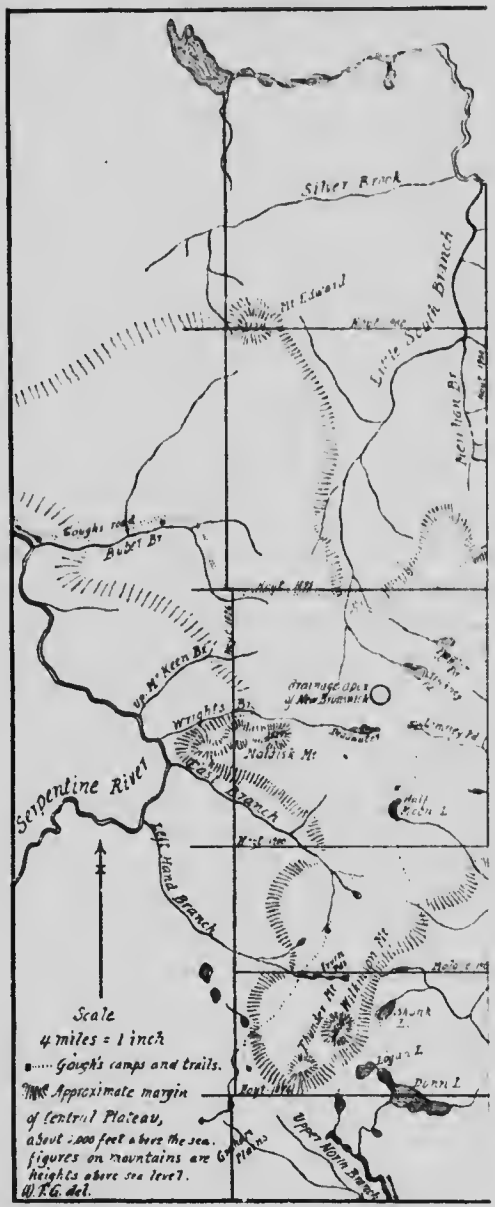
\*I traversed the stream from mouth to source as part of a journey, from Bathurst to Boiestown. I was accompanied by my friend, Mr. Leonard W. Smith of Grangeville Kent County, and we carried our own outfit and provisions. We were driven from Bathurst to the Basin below Grand Falls; thence we crossed on foot to Gordon Brook, Portage River and Tomogonops and north to Nepisiguit, and Nine Mile Brook. After descending to the Iron Mines for more provisions, we ascended the Nepisiguit on foot, mostly on the portage roads, to above Devil's Elbow, crossed the great bare hills southward to Paradise Pond on the South Branch Nepisiguit, followed this Branch to our West Branch, ascended the latter to its source, went southwest along hunting trails to Half Moon Lake, Skunk Lake, Hough Lake, Gover Lake, Big Lake and the Crooked Deadwater, and thence along Henry Bralthwaite's portage to Pleasant Ridge, whence we were driven to Boiestown.

south part of the stream, are of course the basis of the crude sketch of the stream on Loggie's map of 1885 and the Geological Survey map of 1887. In the years from 1895 to 1900, another surveyor, W. B. Hoyt, ran the remainder of the network of five-mile block lines over the rough country lying between Serpentine, Nepisiguit and Miramichi waters, and sketched in the streams, including our Branch, between them. Both Freeze's and Hoyt's plans are of course preserved in the Crown Land Office, and they form the foundation of the accompanying map, upon which, however, is included all of the information I have been able to gather from various sources, including of course my own observations.† Except for the four miles surveyed by Freeze, the stream is simply sketched from observation.

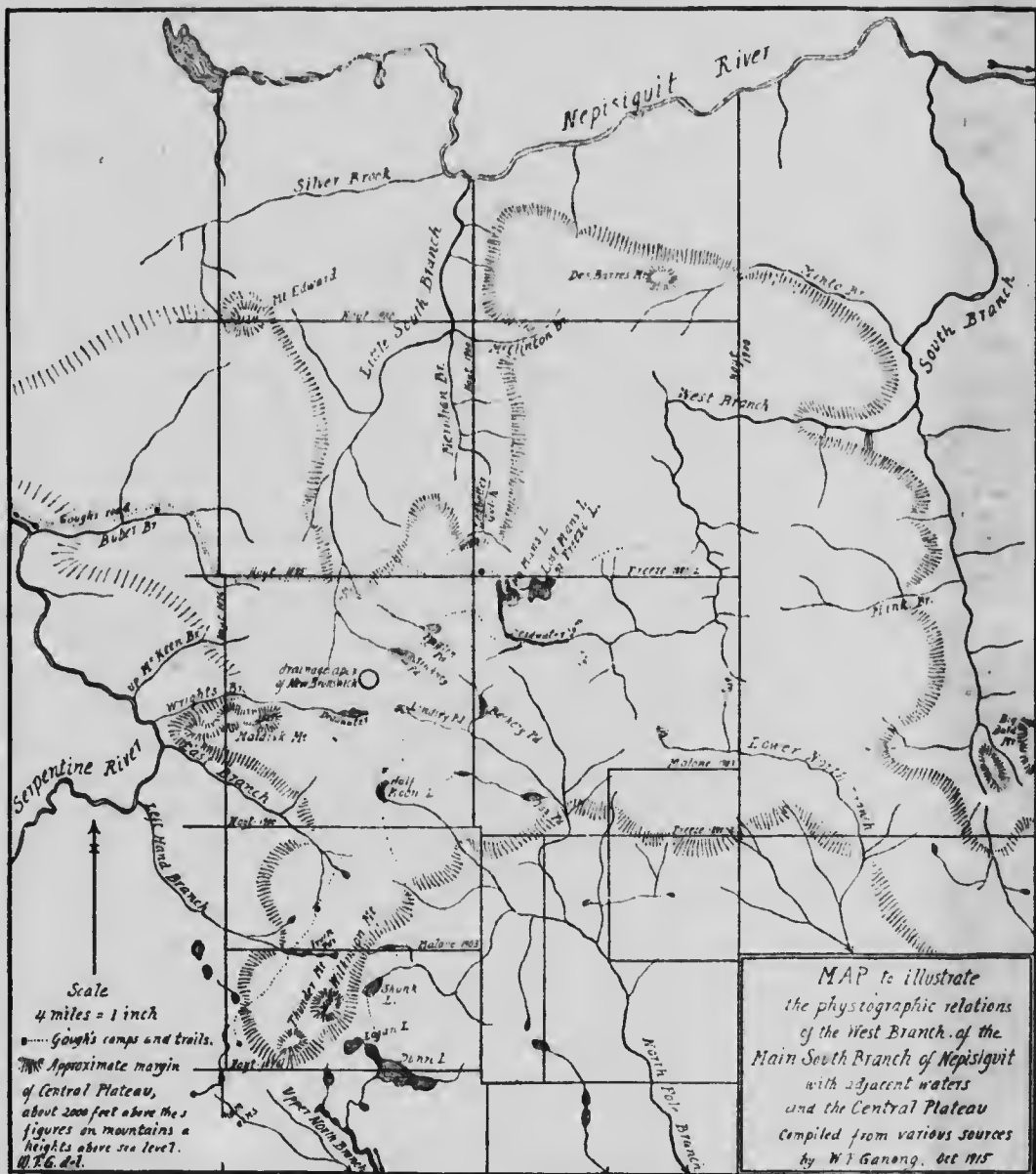
An interesting reference to this region, though not concerning our Branch directly, is contained in a series of articles by E. Hough, published with a small map in *Forest and Stream* for October and November, 1902, wherein is described, in much detail and exuberance of statement, a winter trip on snowshoes up the Little South Branch and across country to Half Moon Lake, and thence out to Boiestown along Henry Braithwaite's trails. The region was formerly a part of the hunting grounds of Louis Bear, a famous Indian hunter of whom tradition has much to tell, and concerning whom some interesting notes are given by Hough in his articles just mentioned (October 18, 308); compare also our earlier Note 123. The region embraced on our map falls partly within the hunting grounds of Mr. Braithwaite, who formerly hunted as far as Lost Man's Lake, though most of the territory shown on the map is hunted by Mr. George E. Gough, of North View, Victoria County, who takes sportsmen every year to his several comfortable camps, shown on our map.

†I have been in correspondence with Mr. Freeze and Mr. Hoyt, both of whom have replied most obligingly to my requests for information. I had thought that their pioneer surveys in that very interesting region would have yielded incidents or adventures of a character worthy of record, but apparently they did not. Mr. Freeze gave no names within the limits of our map, but Mr. Hoyt tells me he named *Freeze Lake*, of course in honor of his predecessor, *Meridian Brook*, for its due north direction, *McClinton Brook*, for another surveyor, *Minto Brook* for the then Governor General, *Mount Edward* for King Edward VII. The remaining names on the map are explained in earlier Notes, or else are of obvious origin. Mr. Gough tells me that the personal names on the ponds, etc., are mostly those of sportsmen who shot the first moose there.

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Mr. Gough, like Mr. Braithwaite and Mr. Arthur Pringle of Stanley, who hunts on the Main South Branch, have been most kind and helpful in sending me full information which has rendered possible the comparative completeness of the map.

The West Branch has its source in two small lakes as shown by the map. Upon Hoyt's plans the two are merged erroneously to one, which is named *Freeze Lake*, — a name which is not now in use by the hunters. Of the two I have seen only the westernmost, which is a shallow marsh-and-bog bordered pond lying in a small depression of the plateau at an elevation above sea level which must approximate, as shown by aneroid measurements, close to 2,000 feet. Presumably the other has a similar character, since they are close together in the same kind of country. They are certainly the most elevated lakes or ponds known to occur in New Brunswick. At the time of my former visit, in 1906, they could well be described as the most remote and inaccessible in New Brunswick, but in 1907 Mr. Gough cut the portage road and build the camp shown on the map.\*

The outlet of the Lake flows sluggishly for a mile through an alder and bog basin, indicating a former much greater extent to the Lake; then it falls for a quarter mile through a little bouldery ravine which would resemble a mountain torrent were it not for the turbid pond water. These boulders are evidently part of a morainic dam which holds up an extensive old lake basin. Then the stream becomes quiet, and finally a deadwater winding through a great alder and bog basin, with some open moss barrens, representing collectively another ancient lake basin, in the midst of which the stream swings to the eastward. It then flows as a sand or gravel bottomed, alder-bordered, gently rippling stream, one which could be travelled easily by canoe, through a flat upland fir-clad country, for some five miles, receiving several streams, including one of large size from the south. All this part of the stream is most pleasant, a fact

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\*This former visit was made in 1906 as a special side trip from an expedition to the sources of the Lower North Branch of the Little Southwest Miramichi, as described in Note 104 (*this Bulletin*, V, 1907, 527). My sole companion at that time, as upon many other journeys into the interior of New Brunswick, was my friend and colleague Professor Arthur H. Pierce. He died of pneumonia on February 20, 1914.

appreciated by the big game, of which the trails along the river are wonderfully well-trodden, to the great benefit of the explorer on foot.

After some four or five miles of this easterly course, the stream swings abruptly to the north and keeps that direction for some six or seven miles, about four of which were surveyed by Freeze as noted already. In this part the stream has much the same character as before, though enlarging. The current is everywhere gentle, over a sand and gravel bottom, while the borders of alders sometimes broaden out into extensive basins. The immediate banks are low, though rising to a somewhat abrupt ridge immediately on the eastward. Occasional rock exposures occur, showing felsites and a slaty schist, such as are characteristic of this region. The country is all clad with fir and moss, lacking timber of any value, though game trails and beaver works abound. These, however, are the only "works" that are visible, for no signs of human activity were met with.

After some five or six miles of northerly course, the stream swings abruptly to the eastward, receiving in the angle a small clear brook from the northwest. Down to this point the descent is so gentle that I doubt if the fall equals a hundred feet from Freeze Lake, making this point not under 1,800 feet, so that the stream still lies on the plateau. For a little way to the eastward it remains smooth, then gradually assumes a very different character, for it drops more and more rapidly over a bed increasingly stony and bouldery between valley walls which become higher and closer, until finally it forms a rough tumbling torrent in a deep rather narrow valley. The valley is all very rough, though not at all post-glacial, and is clothed with dense moss and valueless fir woods, making travel very difficult; and the stream itself has little of the attractiveness of others in the region. Occasional rock exposures occur, consisting of schists, sometimes with quartz, and in one place, two miles above the mouth, a fine red granite; but the only other feature of interest we noted was some fine spring brooks from the south side, of which in one place no less than four come in close together. The torrent character is kept by the stream nearly down to its

mouth, when it gradually becomes quieter and finally swings around to join the Main South Branch, which it seems fully to equal in size,\* at a low angle in a flat basin. The elevation of this junction is about 1,400 feet, as shown by data on the detailed map of the Main South Branch given with Note 77; and accordingly the stream falls at least 400 feet in this easterly part, this fall representing, obviously, the drop from the plateau to the next lower level.

An incidental feature of the stream, impressed upon us by resultant difficulties of travel, was the presence along its banks of great areas of trees blown down by a recent storm. We found them in several areas,—first near the mouth of the Branch, here and there on the way up to the southerly turn, and especially a mile or two up this part, where they were at their worst. We met them again from time to time still higher, and along the hunting trail from the source Lakes to Half Moon Lake. In places the trees were not only blown down in great windrows, but were thrown about at all angles in a way to show that it was not simply the strength of a wind from one direction that levelled them, but twisting effects due to some unusual influence. In places, indeed, there stood trunks of which tops had been simply twisted off. The particular storm which caused this destruction was the great one of June 5th, 1914, described in a foregoing Note (page 111), as I am told by Mr. Gough, who writes:—"The big wind, from the northwest, was at night after the big storm during the day. The snow was soft, and loaded the trees. This weight on the trees, and the heavy wind, with the ground soft around the roots of the trees, combined to uproot them." That such a phenomenon is not unique in this region is shown by a note on the Freeze plan of 1881-2, which reads thus for a place just south of the big northerly turn,—"The growth of wood here has evidently been blown down by a hurricane from the North West. It is now covered with a thick growth

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\*Indeed, on sketch plans sent me by Mr. Gough, the West Branch is named Big South Branch. This name is used by him, I presume, for convenience of distinction from the Little South Branch northwest of his principal camp, rather than in conviction that it represents the main stream. It is a question which carries the more water or has the longer course, but geographically the main stream is the one which rises near Big Bald Mountain.

of young firs;" and I have myself seen these thickets of young firs elsewhere in that region. Of course the brittle fir woods with their very shallow rootage on the omnipresent rocks must offer a far less effective resistance to wind storms than do other woods.

We summarize now the physiographic origin of this stream, which has four parts. *First*, its source is evidently the overflow from a shallow lake basin held up in a southerly-sloping hollow of the plateau, by a low moraine, over the lowest dip of which the waters escape. *Second*, its easterly flowing part, parallel with other valleys of the region, seems to have its course determined by the ridges, which happen to have here an east and west course. *Third*, its northerly flowing part lies probably in an old valley which formerly continued northward into the Nepisiguit, or into the Nictorian valley just south of it (Note 77), parallel and homologous with the Main South Branch on the east and the Little South Branch on the west. *Fourth*, its lower easterly-flowing part clearly occupies a gap through which the stream happened to find its lowest point of exit from the plateau when its northerly outlet became somewhat closed. Thus the West Branch is almost wholly a plateau stream, and as such, is much the largest in New Brunswick.

It is thus evident that this stream bears intimate relation to the plateau on which it rises. The Central Highlands of New Brunswick consist really of an ancient plateau or peneplain much dissected into blocks, ridges, and hills, of which fragments the central, and one of the largest, falls within the limits of our map. This block has a general elevation of about 2,000 feet above the sea, with many swelling ridges rising to a greater height, while Wilkinson and Nalask Mountains probably exceed 2,500 feet (Notes 40 and 95). The margins of this block have been largely described and mapped from observation in earlier Notes of this series. The southern margin (Notes 87, 99, 104), presents a steep and definite drop of from 400 to 500 feet, down which the streams fall in torrential valleys and gorges. The southwestern margin is also clearly marked (Notes 63, 87). The eastern margin is here mapped in greater detail than in Note 77

from information kindly sent me by Mr. Arthur Pringle, of Stanley, who hunts in that region. The northern margin is formed in part by the *Nictorian Valley* earlier described (Note 77).\* As to the remainder of the margin, I have these data to present. Westward from Gough's camp, his portage road, after first rising considerably, makes an immense descent, of 400 or 500 feet I judged, into a great valley occupied by the Little South Branch of Nepisiguit which evidently cuts as deeply into the country as the main South Branch to the eastward. Further, Meridian Brook lies also in a deep valley, apparently connecting with that of the Little South Branch, as shown by data sent me by Mr. Hoyt, who says of this brook,—“standing in the hills above its source and looking in the direction of the true meridian, you take in the whole valley to its junction with the Nepisiguit,” and some aneroid measurements he has sent me fully confirm this statement. Moreover Mr. Gough tells me that three-quarters of a mile north of his camp, this brook makes a great drop into a very deep gully. Hence the northern margin of the plateau must lie approximately as drawn on the map, though perhaps I have made the Little South Branch Valley too great. Farther west I know from various sources that a tongue from this plateau extends north between Bubar Brook and the Little South Branch, though I am uncertain how far. Presumably it is continuous with Mount Edward, though it cannot extend much farther, since, as Mr.

\*In addition to the statements concerning this *Nictorian Valley* given on page 224 of Note 77, Mr. Hoyt has sent me the following information;—“Silver Brook, with its right hand branch, rising near the head of the Mamozekel, pursues a remarkably straight easterly course down to the bend, about a mile or a little more from its mouth, occupying throughout its course a deeply cut channel between high mountains. At the turn it enters a flat, which flat continues easterly across the northerly base of Feldspar Mountain and the mouth of Little South Branch Nepisiguit and keeps easterly along the northerly base of the Mount Walker range. Further east, on my most easterly line I crossed, about three miles south of the Nepisiguit, a deep dry ravine. A mention in my field notes estimates it as 500 feet deep and about one-half mile wide. This ravine has every appearance of an ancient river bed though now perfectly dry. It stretches away easterly and westerly as far as the eye can reach, and coalesces, I think, with the Main South Branch a mile or two east of my point of observation. The tops of the hills on each side are characterized by moraine-like patches of boulder. Westerly I have every reason to suppose it runs along the northerly base of the Walker-Gould-Marie range until it joins the valley before spoken of as Silver Brook.” These localities are made plain by the detailed map accompanying Note 30. The same ravine is mentioned by Professor Balley in his account of his explorations in this region. (*Canadian Naturalist*, 1864).

Hoyt has told me, Silver Brook cuts right across this country, separating this plateau block from that fine one, also earlier described (Note 29), from which rises Mount Carleton, the highest land in the Province. Northwest of Nalaisk I have not specially traced the margin of the block, but I presume it continues somewhat as shown on the map over towards Mamozekel. Of course our Central Plateau block is separated by the streams afore-mentioned from others, which, for clearness, are not shown on our map. But I purpose to map them all, as far as I can, in a forthcoming Note.

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137.—THE PHYSIOGRAPHIC APEXES OF NEW BRUNSWICK.

Theoretically, any country containing, as does New Brunswick, three interlocking drainage systems, has three physiographic apexes. *First*, there is the point where the three drainage planes met at the time the present drainage cycle was established. *Second*, there is the point where the present drainage systems center. *Third*, there is the point which is the highest at present in elevation above the drainage base level,—the sea. Borrowing a terminology from the biological sciences, we may describe the three points respectively as the morphological, physiological, and anatomical physiographic apexes. Originally, in theory at least, all three are coincident, but in course of time, with irregular erosion and tectonic movements, they move apart; or, to be accurate, the second and third move from the first, which of course is permanently fixed. How is it with respect to these three apexes in New Brunswick?

*First*, the morphological apex, at which our Fundian, Northumbrian and Laurentian river systems originally met, would lie between the Odell, Munquart, and Teagues Brook waters, according to data presented in an earlier Note (No. 75); but later studies have modified somewhat that conclusion, and seem to show that the point lies outside of the Province in Maine, as will later appear.



*Second*, the physiological apex, at which the three drainage systems meet, lies within the limits of the map accompanying the preceding Note, as there marked; for here occur sources of the Nepisiguit (a true Laurentian River even though now affluent to Baÿ Chaleur), of the Miramichi, a Northumbrian River, and of the Serpentine, a Fundian River. When this region will have been mapped more accurately, one will have only to note the extreme sources of the streams in question and find the highest point in the triangle between them, and then, if he will, he can place his foot upon this very apical spot.

*Third*, the anatomical apex, the highest point above sea level lies without question at approximately 2,700 feet, on the summit of Mount Carleton, south of Nictor Lake, as shown in Note 72. This elevation apex lies about fifteen miles northwest of the drainage apex shown on the foregoing map.

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#### 138.—A POST-GLACIAL GORGE SIXTY YEARS OF AGE.

While descending the North East Branch of the Magaguadavic River by canoe last summer . . . attention was caught by a pretty little "post-glacial" gorge . . . crossed by the highway bridge at York Mills, southwest of Harvey in York County. It has a fall, now dammed, at its head, and vertical rock walls, with a rough rapid bed filled by the stream. I estimated its length as some fifty yards, with a depth of some twelve to fifteen feet, and about the same width. Thus the gorge is only a miniature, but is otherwise very perfect and typical in its characteristics. Looking about, from force of habit, for a "pre-glacial" channel, I found it a few rods to the eastward, crossed by a high stone dam and roadway. It showed, however, an unexpected feature, for it was deeper and wider than the post-glacial channel, while completely unobstructed except for the modern dam. Why then should the waters have cut through the ledges? Deeply puzzled, I sought counsel from the proprietor of the grist mill at the dam, who immediately provided the solution. The

post-glacial gorge is newer than the dam, which was built only some sixty years ago (or a little more). It originated in a spillway opened on top of the ledge rock at this place to provide an outlet for superfluous water from the millpond. The rocks, however, are very soft, and the rush of the water, with aid of the frost, gradually cut the gorge now so striking. Further, this channel worked so far back that it threatened to drain the pond,—on which account a dam had to be built across its head. A new spillway has recently been opened over the ledges a few yards farther west, and presumably will repeat the history of the first, giving origin to a second gorge.

