BULLETIN

OF THE

NATURAL HISTORY SOCIETY

OF

NEW BRUNSWICK.

No. XXIII.

VOLUME V. PART III.

PUBLISHED BY THE SOCIETY.

SAINT JOHN, N. B.:
BARNES & CO., PRINTERS, PRINCE WILLIAM STREET,
1905.

CONTENTS.

BULLETIN

OF THE

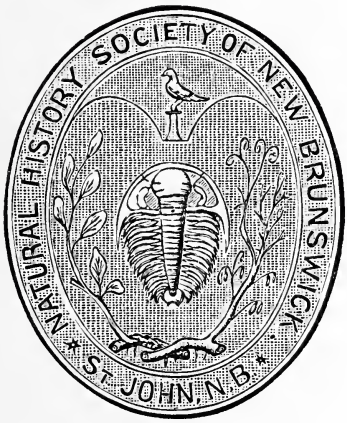
NATURAL HISTORY SOCIETY

OF

NEW BRUNSWICK.

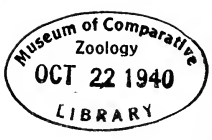
No. XXIII.

VOLUME V. PART III.



PUBLISHED BY THE SOCIETY.

SAINT JOHN, N. B.:
BARNES & CO., PRINTERS, PRINCE WILLIAM STREET,
1905.



ARTICLE I.

NOTES ON THE NATURAL HISTORY AND PHYSIOGRAPHY OF NEW BRUNSWICK.

By W. F. Ganong.

81.—New Brunswick Animals and the Animal Romancers.

Read by title December 1, 1903, and in full March 1, 1904; re-written Jan., 1905.

The last quarter of a century has seen a remarkable development in that form of literature which consist of charming popular writings about animals and their doings. A leader of this movement in America was John Burroughs, whose work combines literary grace with scientific truth to a degree not surpassed by that of any other modern nature-writer, and there are several others of similar spirit. Recently, however, there have arisen somewhat suddenly into prominence three writers on nature subjects whose works enjoy a popularity far surpassing that gained by any of their predecessors or contemporaries. These three are Mr. Thompson Seton (earlier known as Seton Thompson), Mr. W. J. Long and Mr. C. G. D. Roberts. Of the former, I know little, but since the two latter have written extensively of New Brunswick animals I have been much interested in their works, and I propose to make some comments upon them from the point of view of New Brunswick natural history.

In examining the books by these graceful writers, two questions naturally arise: first, as to the cause of their surpassing popularity, and second, as to their worth as natural history. The cause of their popularity is, I believe, easily evident. It does not lie primarily in their literary charm, for in this they do not so far surpass other nature books, but it consists in this, that it tells about animals not as they are, but as people like to think they are. Ample evidence of this is found in the fact that the warm praise awarded these books for their fidelity to nature, their accuracy

of observation, etc., comes from reviewers and others who have themselves no real knowledge of the matters concerned, while those who actually know the subject are either silent or very unfavorable in their comments. It is the humanization and idealization of animals, which, under the influence of the remarkable literary skill of these authors, has made their animal stories so popular. To accomplish this end, they have had to cut loose from the trammels of fact which hampered their predecessors, and have given their imaginations full play, thus producing fascinating works of fiction disguised as natural history. It is, however, this disguise which constitutes the ground of criticism against these works. We all agree that the use of animals as the heroes of romances, or of other imaginative writing, is perfectly legitimate; it is only when such works profess at the same time to be accurate in their natural history, thus misleading their readers and pretending to a character to which they have no honest claim, that they become open to scientific criticism.

Mr. Long has published five books on animals, containing many references to New Brunswick. He claims repeatedly that his works are records of accurate fact discovered by his own observation in the field, and there is no question that he has given much study to animals in their native haunts. The most characteristic feature of the books, especially of those later-written, is the remarkable number and marvellous character of the experiences the author claims to have had in his observations of animals, and such wonders grow steadily through the series. The aggregate of his reported observations, both as to quantity and character, is such that, if all he states is true, he must have seen more widely and deeply into animal life than all other students of animal habits taken together. There is, of course, nothing inherently impossible in this, but its probability is emphatically denied by his writings themselves, which seem to me to show that he has little idea of the nature of evidence or of logical proof, and that he possesses neither the temperament nor the training essential to a disinterested observer. I have no proof, with the single exception noted below, that any individual statement of Mr. Long's is untrue; but an experience in the New

Brunswick wilderness at least as great as Mr. Long's has given me such a knowledge of the difficulties of observing wild animals in their native haunts that I cannot believe that any one man has had all of the remarkable experiences reported by Mr. Long. Furthermore, the one case in which I happen to know personally the evidence on which Mr. Long bases a statement, does not allow me to entertain a high regard for his accuracy. In his book, "School of the Woods," he claims to have seen fish-hawks catch and wound fish which they then dropped back into the water in order to teach their young to dive for them. This statement is criticised by Mr. Burroughs in his article on "Real and Sham Natural History," in the *Atlantic Monthly* for March, 1903, and in his reply to this article in the *North American Review* for May, Mr. Long re-affirms it, and adds: "Mr. Mauran Furbish, who probably knows more of the New Brunswick wilderness than any other man, has told me since my book was written that he had seen the same thing." Thinking I knew the incident on which this statement was based, I wrote Mr. Furbish, who has been my companion in two journeys into the wilderness of New Brunswick, asking what statement he had made to Mr. Long; he replied that he had simply told Mr. Long of our finding one day a wounded gaspereau floating at the foot of a lake, and that Mr. Long "had furnished all the romance and the reason for their being there." This incident, I believe, gives the clue to the character of much of Mr. Long's work. He does not deliberately invent, but some trifling basis of fact happening to fit in with some theory developed by his sympathies is accepted by him as confirming his surmises, which he thereupon considers and publishes as proven. Mr. Long's books undoubtedly contain a great deal of valuable fact, but this is so mixed with matter that cannot possibly be accepted simply on Mr. Long's statement, that it makes his work practically valueless as natural history.

Mr. Roberts has thrown most, or all, of his writings upon animals into the story form. In his earlier works he made no claim to a first-hand knowledge of these animals, but a belief in such knowledge naturally became widely prevalent among his reviewers and others, and he took no steps to correct the impres-

sion. But in the prefatory note to his latest book, "The Watchers of the Trails," he uses language which must lead the reader to believe that he possesses a thorough personal knowledge of the animals, based upon long and careful study of them in their native haunts. Yet those who know Mr. Roberts are aware that the requirements of his literary work for several years past have not permitted him to make those journeys into wild New Brunswick essential to the study of its animal life, and that his few earlier trips had not this object in view, and were not of a character to permit it. The experiences of his boyhood in the wilderness about his home, to which he refers in his latest preface, must necessarily have been confined to the smaller and commoner forms found near the settlements, and could not have included the moose, caribou, bear, lynx, and other great animals about which he chiefly writes. His knowledge of these animals must have been gained mostly in the public libraries, museums, and menageries of New York City, and his interpretations of their psychology, upon which latterly he lays some stress, can have little basis other than in his own imagination. In his later works Mr. Roberts apparently makes every effort to follow the best authorities on his animals, thus making a great advance over his earlier writings, which paid scant attention to some of the elementary facts of natural history. It is, of course, perfectly proper to use the accumulated knowledge of others as a basis for one's one work, but it is honest to use it in a way to imply, and especially to claim, that it is one's own? If Mr. Roberts would but state in the preface to his books that his studies are, for the most part, not based upon personal observation of their subjects, but are as accurate as he can make them from other sources of information, he would not only be dealing fairly with his readers, but he would, in my opinion, greatly enhance, through the added grace of sincerity, the value of his really remarkable imaginative works.

To the unscientific reader it may seem of slight account whether a pleasing and powerful writer obtains his knowledge at first hand from experience, or takes it from reliable books on the subject. As a matter of fact, however, it makes a vast difference

in the permanent effect produced upon the reader. The compiler of knowledge can never possess that sense of proportion, that balance, that caution which enables the original student to give correct impressions of the objects and scenes he describes. Hence the work of the compiler is little trustworthy in comparison with that of the original student. The pictures which Mr. Roberts gives of the forest and its animal dwellers are extremely vivid and very pleasing, but they do not represent the woods and the animals of reality, and the reader ought not to be led to believe that they do.

So opposite are the standpoints from which the scientific and the literary man view animal life, and so entirely indifferent are they to one another's standards, that the two are not only nearly impossible to one person, but they are well nigh mutually exclusive. The charm of the study to the man of science is the triumph of demonstrating the truth. He makes this his sole standard, as it is his sole reward. Slowly, patiently, laboriously, indifferent to popular opinion as to popular applause, he makes his resistless advances, aiming to prove each step before a second is made. He naturally has little regard, therefore, for showy leaps from scanty fact to sensational generalization, and he has no respect at all for a pretence of scientific knowledge not based upon an honest foundation. The new nature writer seems to view nature chiefly in the light of a fresh supply of literary material, and he values her phenomena in proportion to their adaptability for interesting and clever treatment. To him the truth is not of first importance, and imagination is allowed to improve upon nature whenever she can thereby be made more available for literary uses. All this may be legitimate in literature, but it is not in science. It remains to be seen whether works thus insincere in their foundation can be given long life by literary charm alone.

NOTE.—A vigorous discussion of Mr. Long's work was inaugurated by Mr. John Burroughs in a severe criticism in the *Atlantic Monthly* for March, 1903, under the title "Real and Sham Natural History." Mr. Long's reply followed in the *North American Review* for May. His defence was also taken up by his publishers, Messrs. Ginn & Co., of Boston, in an illustrated pamphlet, containing numerous complimentary

reviews of Mr. Long's work, reviews mostly quite worthless in this connection, since they are usually by persons quite without real knowledge of whether the works are accurate or not. Several very severe criticisms of his work from the scientific standpoint, marred in some cases by impatient and even intemperate language, followed in *Science*,—by W. M. Wheeler, in the number for February 26 (1904), by F. M. Chapman, on March 4, by the present writer (this note in somewhat different form) on April 15, and by W. H. Davis on April 22. Mr. Long's reply, notable for its dialectical skill, is in the same journal for May 13. The present note, in somewhat different form, was published in the St. John *Globe* for March 5; Mr. Long replied to it in the number for March 19, and I answered briefly in the same paper for March 26.

82.—On Vegetable, or Burr, Balls from Little Kedron Lake.

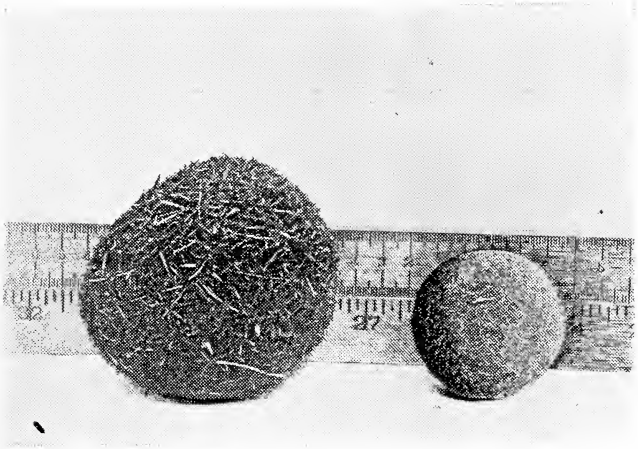
Read May 3, 1904.

Two years ago Professor Bailey showed me at Fredericton a ball of vegetable matter, almost spherical and some four inches in diameter, which had been given him by Mr. P. H. Gillmor, of St. George, and which was said to have been found in Kedron Lake. Applying to Mr. Gillmor for further information, he referred me to Mr. Wellington Davis, of Brockway, York Co., who sent me a similar ball, with letters, which read in part as follows:

I am sending you the best ball I have. It is not a very good one. . . . . I cannot tell you very much about it. It is found in the north end of the Little Kedron Lake in a small cove. No wind can strike the cove but from the southeast. It is surrounded with fir and spruce which hang over the water. The bottom is a clear sand. The spills (*i. e.* leaves or needles) drop from the fir and spruce and lie at the bottom. Then the water washing them from side to side forms the ball. There is no heavy swell comes in there. These balls can be found in no other place in the Little Kedron Lake, nor in Big Kedron Lake. Sometimes we have found them from six to eight inches through. . . . . There is a small underground spring-book running into the lake, just where we find them.

A photograph of the ball here referred to is given herewith.* It is composed chiefly of the leaves of fir and spruce, but with some other vegetable matter, such as small twigs, etc., in addition, all interlocked together.

* For the use of the cut I am indebted to the editor of the *Educational Review*, in the August (1904) number of which journal this note first appeared.



BURR BALLS. That on the left is from Little Kedron Lake, that on the right is a small specimen from Flint, or Sandy, Pond, in Massachusetts. The upper ruler shows centimetres, and the lower shows inches. (About one-third the true size).

Face page 304.

It is a coincidence that I was asked by a correspondent a year or two earlier whether the mode of formation of somewhat similar balls which occur in Flint or Sandy Pond in Lincoln, Massachusetts, is known. The balls which occur there, as shown by the small specimen photographed beside the Kedron Lake ball, are of much finer texture than that from Kedron Lake, and they are apparently composed chiefly of the tangled stems and leaves of the Duckgrass (*Eriocaulon septangulare*), with perhaps also some other materials. They are homogenous in structure, without any apparent nucleus. They are described by Thoreau in his "Walden" (Chapter IX), who shows (and the observation is confirmed by two correspondents who have written me concerning them), that they are formed upon a sandy bottom much as described by Mr. Davis. From these two cases one would infer that such balls must be of frequent occurrence in shallow sandy lakes. Having, however, inquired of my botanical friends without learning of any other localities or of any published description of their mode of formation, I inserted in *Science* for April 8th a letter of inquiry, asking for information as to other localities, local names for them, published references to, or descriptions of them, materials of which they are composed, etc. In response, I have received but very scanty information, including only a single reference to another locality for them—a lake in Idaho.

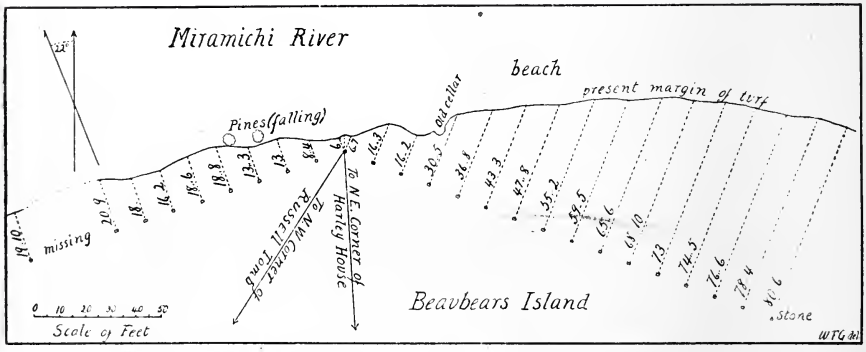
It would be remarkable if no description of these balls other than Thoreau's, nor any account of their mode of formation, has been published, yet such appears to be the case. Presumably they are nothing more than the result of the rolling about of vegetable fragments on hard sandy bottoms by the action of the under-water parts of waves. Probably, as one of my correspondents suggests, the material collects first in ripple-marks, there becoming somewhat matted together in short loose cylinders; as these enlarge they are rolled out and over the bottom, where, gathering other material, they gradually become larger, rounder, and more compact. It is not improbable that micro-organisms develop within them, and, by forming zoogloea or other glutinous matter, help to fasten them together. It would be worth while,

however, to trace out precisely how they start and under what conditions they may be formed. It happens that Dr. Hay and I were at Little Kedron Lake in July last (1904); had we known then of the existence of these balls there we might now possess some answer to these questions.

83.—A Measure of the Rate of Recession of the New Brunswick Coast Line.

Read November 1, 1904.

All available evidence appears to show that the coast of New Brunswick is slowly sinking beneath the sea, the anomalous case of Grande Plaine on Miscou Island being, as I shall later show, no real exception. The evidence on the subject is summarized in an earlier note (No. 43), where also a case permitting a rough measure of the rate of recession of the upland, accompanying this sinking, is described. This summer I noticed another and much better opportunity for such a measurement, which is as follows.



The lower or northern end of Beaubears Island at Miramichi is a cleared field (except for some scattered pines and spruces) a few feet above sea level, and it is obviously being rapidly eaten away by the sea. A little back from the margin of the turf there stood formerly a strong fence, the squared posts of which have been cut away close to the ground. As these posts are likely to remain untouched for the future, and as they are fairly sound, it

occurred to me that if offset lines at right angles to the line of posts were now measured and recorded, it would be possible by remeasuring those lines at any time in the future to determine the amount of recession of the land in the interval. Accordingly with the aid of a companion I measured such lines with a tape measure; and the results are plotted on the accompanying diagram. The lengths are expressed in feet and inches, and represent the distances from the edge of the wood of the posts (which are on the average somewhat under fourteen feet from centre to centre) to the present edge of the turf over the bank. Unfortunately the measurements are not exactly accurate, since I had not the means at hand to make the offset lines geometrically at right angles to the post lines, though they are as nearly so as they could be made by eye; and again it is difficult at times to determine just where the edge of the turf is. But nevertheless the figures are sufficiently accurate to enable us to obtain a fairly good idea of the rate of recession of this field when compared with similar measurements in the future. Of course the rate of recession is not a measure of the rate of vertical sinking, but the two are correlated, and the former is of much interest in itself. It is producing constant changes in the contour of our coasts, especially those of the North Shore, which are mostly low and but little above sea-level.

To the evidence of subsidence earlier mentioned (Note 43) may be added the case of groves of trees standing on sea beaches and now dying. An excellent example of this is found on Manawagonish Beach, near St. John, and another is at Point à Barreau, near Tracadie, in both of which instances the nearer approach of the sea, with its advancing beach, seems to be the cause of the death of the trees. It is possible that we have another illustration of the same thing on the beaches of the lower St. John, where large elms may sometimes be seen surrounded with beach gravel in situations where no saplings are to be found. Furthermore, we possess direct historical evidence pointing in the same direction. Thus, the maps made by Champlain in 1604 show the presence of upland and woody vegetation upon the bars at Advocate Harbor, and at Sand Point, St. John, in both of

which places at present the bars are only of bare sand submerged at the highest tides. Again, the map of the North Shore made by Jumeau in 1685, that by Franquelin-DeMeulles made in 1686, and that by an unknown surveyor made in 1754,* all show the presence of small islands lying off the eastern entrances of both Miscou and Shippegan Gullies, where now are nothing but shoals.

While the subsidence of the coast of the province is permitting the sea to invade and wash away the land, there are two places in which the sea is conspicuously building up the land, aside from the familiar cases of sandy points and bars. The one is at the Fundy marshes, where the tides are doing the work, and the other is at Grande Plaine on Miscou Island, where the sea is rapidly building extensive sand plains. At first sight the latter process seems to require an elevation rather than a sinking of the coast, but there is one fact which proves this not to be the case, namely, the inner and older beach lines are, as a rule, lower than the outer and newer. There are some exceptions to this, but these are cases complicated, I believe, by dune-drift phenomena. These great beaches are being built, apparently, by materials derived from the washing away of the coast in the vicinity, and brought here by the coastal currents. But the subject is one needing much closer study than it has yet received.

84.—New Aneroid Measurements in New Brunswick in 1904.

Read November 1, 1904.

In July and August last I spent several weeks on the headwaters of the Little Southwest Miramichi and Renous rivers, and made many measurements for altitudes with the results that follow. They were made with excellent aneroids, synchronously with the barometric readings of the government stations at Fredericton and Chatham (from which they have since been checked for weather corrections), and with the precautions and corrections for temperature, index error, etc., described in earlier notes

* These maps are all given in my Cartography of New Brunswick in the Transactions of the Royal Society of Canada, Vol. III, 1897.

(Nos. 53, 62, 76). As before, I believe these measurements are as accurate as can be made with aneroids under New Brunswick conditions, and I do not think their error will be found to exceed a few feet.

In checking results from the Fredericton and Chatham stations I have found the same discrepancy as before between the two, amounting in this year's readings to an average of 32 feet, precisely the same that I found in 1902 (Note 62). As to its cause, I have nothing to add to the suggestions already made in Note 76. As to the practical question of allowance for it in my results, I have adopted the plan this year, since most of the places are roughly equidistant from the two stations, of giving equal value to the readings from the two stations. This I could the better do since, although I think the Chatham readings give results too low, I am inclined to think my instruments read, if anything, a trifle high.

The locations of the places mentioned in the following list may be found on the maps accompanying subsequent notes (Nos. 85, 86, 87). None of the places mentioned have ever been measured heretofore. The italic face type gives the elevation above mean sea-level.

Gover Lake. Mean of twenty-eight measurements, checked from Fredericton 1308 feet, from Chatham 1276 feet; hence *1292* feet above the sea.

Dunn (or *Logan*) *Lake.* Mean of five measurements, checked from Fredericton 1601 feet, from Chatham 1552; hence *1576* feet above the sea.

Mitchell Lake. Mean of seven measurements, checked from Fredericton 1381 feet, from Chatham 1352; hence *1366* feet above the sea.

Crooked Deadwater. Mean of seven measurements, checked from Fredericton 1367 feet, from Chatham 1333 feet; hence *1350* feet above the sea.

County Line Mountain. By direct measurement 695 feet above the Crooked Deadwater, and hence *2045* feet above the sea.

Indian Lake. One measurement checked from Fredericton gave 1607 feet, and from Chatham 1616 feet; hence 1611 feet above the sea. A direct measurement above Crooked Deadwater gave 263 feet above the latter, and hence 1613

feet above the sea, a remarkable agreement with the measurement checked from the stations; hence we may accept *1612* feet above the sea. This beautiful lake is therefore higher than Milnagek (Note 56), heretofore supposed to be the most elevated lake of any size in the province. But Indian Lake is also exceeded by the following.

Moose (or *Rocky Brook*) *Lake.* By direct measurement, 323 feet above the Crooked Deadwater, and about 60 feet above Indian Lake; hence *1673* feet above the sea. This height was so surprising, not only as worked out roughly on the ground, but as determined more exactly since, that I have inclined to keep all my figures conservative, and I am sure it is at least this height, and perhaps somewhat higher. This makes it the highest lake of any size yet measured, considerably exceeding Milnagek (Note 56), hitherto the highest known, as well as Indian Lake, also higher than the latter.

Parker Lake. By direct measurement 95 feet over Indian Lake, and hence *1707* feet above the sea, and the highest pond or lake yet measured in New Brunswick. It is hence higher than the preceding, but is merely a shallow pond, like so many others on the top of the central peneplain.

Height of land between Parker and Indian Lakes (on the hunter's trail). By direct measurement 165 feet over Indian Lake; hence *1777* feet above the sea.

Height of land between Moose Lake and Indian Lake Stream, (on the trail). By direct measurement 389 feet over Crooked Deadwater, and hence *1739* feet above the sea.

Ridge South West of Crooked Deadwater, (on the trail). By direct measurement, 189 feet over the latter; hence *1539* feet above the sea.

Height of land on the Holmes-Renous Portage, 150 feet over Holmes Lake; hence *1286* feet above the sea.

Renous Lake. Mean of six measurements, checked from Fredericton 1183 feet, and from Chatham 1170 feet; hence *1176* feet above the sea. My attempts to make direct measurements between this and Holmes Lake (the latter of which I made 1136 feet in 1901, Note 55), were foiled by the very changeable weather, but they seemed to show no great difference between the two, with Renous somewhat the higher. Hence we may accept the figure above given.

Pond at the old driving dam, 1½ miles above the Little South Branch. Mean of two measurements, checked from

Fredericton 942 feet, from Chatham 882 feet; hence *912* feet above the sea.

Forks of Little South Branch. By estimation 50 feet below the preceding, and hence *862* feet above the sea.

Forks of Main South Branch. Mean of two measurements, checked from Fredericton 301 feet, from Chatham 217 feet; hence *259* feet above the sea.

Mouth of Dungarvon. By estimation 10 feet below a station which, partly by checked measurements and partly by estimation, is 90 feet; hence *80* feet above the sea.

85.—On the Physiographic Characteristics of the Renous River.

Read November 1, 1904.

One of the least known, scientifically, of New Brunswick rivers is the Renous. In August last (1904), in company with my friend, Professor A. H. Pierce, I descended it in a canoe from near its source in North Branch Lake to its mouth in the Miramichi, and made the observations which follow.

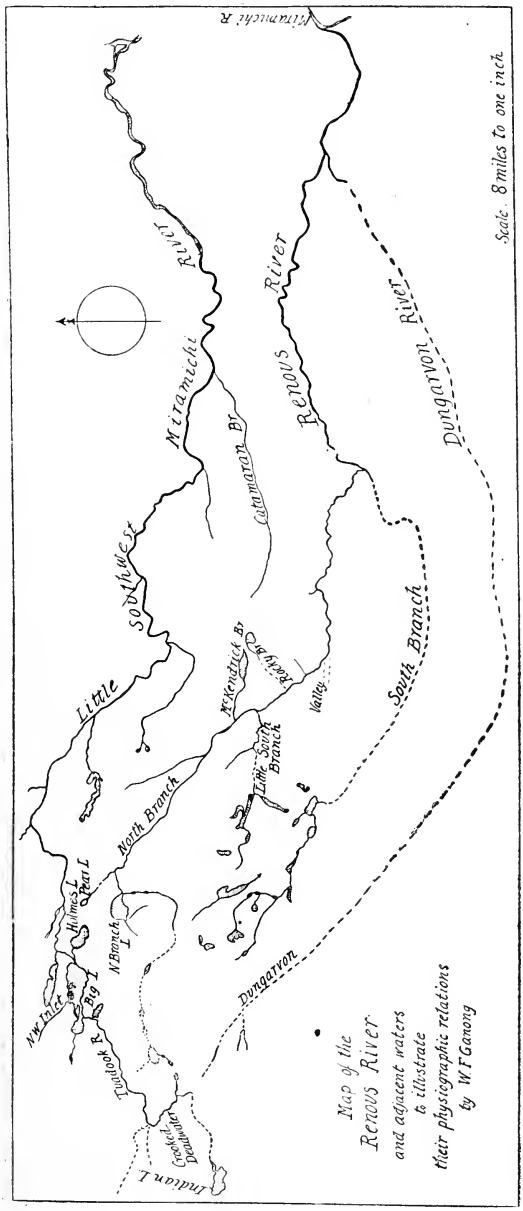
The development of our knowledge of the river may be briefly traced. Its first appearance is upon the remarkable Franquelin-DeMeulles map of 1686 (often mentioned earlier in these notes*), where it bears the name *Elchiquek,* the Dungarvon being called *Chibouchich.*** Following this map, it is shown, though very imperfectly, upon later French maps, while its modern representation begins with Bonner's map of 1820, where its lower course is clearly shown. It and the Dungarvon are sketched well up their courses on Baillie's maps of 1832, though with their names curiously transposed, but it is first laid down from survey, and to near the head of the South Branch, on Saunders' map of 1842, following surveys by Jouett in 1828 (from the mouth to above

* As under Note 77 (this Bulletin, No. XXII, Vol. V, 215).

** The modern Micmacs call this river *See-bo-o-sis* (plainly the same as Chibouchich), meaning "a little brook," which is curiously inappropriate. Its South Branch they call *El-de-gek,* which is probably the same word as DeMeulles *Elchiquek,* in which case DeMeulles has the names transposed, as he has in other cases. The name *Renous* is without question the possessive of the name of the Indian chief and family (Renou) living at the mouth of this river at the first settlement of the country. Its great branch, the Dungarvon, a longer river than the Renous itself, I hope to consider in a future note.

the grants) and 1836 (thence to the South Branch), and by Berton in 1838 (South Branch from the mouth of the lakes), though curiously enough, this map does not make use of Berton's survey of the North Branch also made in 1838. The latter survey is, however, used on Wilkinson's map of 1859 (though placing its head too far to the eastward), which also indicates the presence of lakes at the head of both of the South Branches, laid down in part from timber-line surveys of 1837 by Jouett. No substantial improvement over this map was made until very recently, even Loggie's of 1884 and the Geological Survey of later date making only slight and unimportant additions. It was the timber line surveys of recent years which mapped the lakes at the head of all three branches, the North Branch lake and water flowing into it* being laid down by Fish in 1894; and these are shown, though crudely, on the Crown Land Office map of 1898. The lower part of the river from above the South Branch to below the Dungarvon was re-surveyed (a sketch survey with distances estimated) by Loggie for the Renous and Dungarvon Salmon Club (now extinct), in 1896, and his large-scale plan is in the Crown Land Office. I have tried to utilize all of these materials in making the small-scale map accompanying this note. Turning from geographical to other recorded information, I have found surprisingly little. The geological map of the river is colored from observations made by Dr. Ells, who ascended the river to the Upper Falls in August, 1881, but he gives only two references to the river in his report (Report for 1880-1882, D, 9, 16). Dr. Chalmers appears, from references in his Report of 1894, to have ascended it as far as Dungarvon, but he makes no special mention of it. There are, of course, references to the river in many general works treating of the province, but none of them are of special importance. It does not appear to be mentioned in any of our sporting literature, aside from a brief reference to a visit to "the Renous lakes" by Dashwood in 1863 in his *Chiploquorgan* (110), and an article by Risteen, "The Phantom Loon of Louis Lake" in *Outing* for August, 1900. It is not a specially

* Excepting at the extreme head, which I have added from a sketch given me by Mr. Henry Braithwaite.


Map of the
RENOUS RIVER
and adjacent waters
to illustrate
their physiographic relations
by W F Ganong
Scale. 8 miles to one inch
Miramichi River
Renous River
Dungarvon River
Southwest
Little
North Branch
South Branch
Catamaran Br
Indian L

good river for game or fish. The river is settled thickly to above the Dungarvon, and sparingly still higher, chiefly by the descendants of Irish immigrants who came here from the lower Miramichi after 1832. Above it is a wilderness which has yielded great quantities of lumber.

The river falls naturally into parts as follows:

1. *From its source to North Branch Lake.*—I have not myself seen any portion of this section of the river except its mouth in the lake; but the timber line surveys, together with sketches given me by Mr. Henry Braithwaite, show its course to be approximately as indicated on the accompanying map. As will be shown in the next note, this valley appears to be morphologically an extension of that part of the Tuadook valley above the Crooked Deadwater, and, as there is low ground to the westward of the North Branch Lake, it is altogether likely that preglacially it flowed in a direct line into the lake instead of by its present circuitous route. The origin of this valley will also be discussed in the next note.

2. *North Branch Lake.*—This attractive lake (1176 feet above the sea) is pear-shaped, a mile in length by a half in breadth, rock and sand rimmed, and apparently deep. It lies in a considerable basin surrounded by heavily forested hills, though its immediate shore has been deforested by the damming of the lake. It exhibits two noteworthy features; first, its inlet is close to the outlet and occupies a marked valley extending to the southeast; second, its northwest shore is composed of extensive ledges of mica schist,* which have a strike in the direction of the aforementioned inlet. Since now, as will presently be noted, the present outlet is typically post-glacial, there is no question, I believe, that this lake basin emptied pre-glacially into the lakes to the south-east along the lower course of the present inlet, and the ledges mark a part of the old valley wall. This

* Determined from my specimens by Professor L. W. Bailey, who has kindly identified also the other rocks mentioned in this note. Of some huge boulder-like masses, some fifteen or twenty in number, of a remarkable dark granitic rock lying on a shoal on the southeast side of the lake, he says, they are composed of a mixture of horneblende mica and quartz, the dark metallic-looking constituent being mica, and it is probably intrusive. Evidently these masses have not been brought from any great distance, if indeed they are not simply detached parts of an underlying ledge of this material.

raises the question as to the location of the old head of the valley. The general morphological courses of the rivers in this section would imply that this old valley originally extended along the course of the portage to Holmes Lake, or else directly into Big Lake, and thence perhaps to Northwest Inlet. But the lowest point in the gap leading to Holmes Lake appears to be of considerable height, since the portage road rises some 150 feet above the lake, though of course this may be in part over drift. This part of the subject must await more careful study than I was able to give it.

3. *The Outlet of the North Branch Lake, to Pear Lake Stream.*—This part of the Renous flows through a gap in the hills east of the lake, over a bed of mica schist ledges, with heavy rapids and small falls down to its junction with Pear Lake stream, a distance of a mile. It is typically and without question post-glacial, and is the more interesting since it is the only post-glacial portion of valley throughout the whole extent of the river from the lake to its mouth.

4. *The Pear Lake Stream.*—This I have not seen above its mouth, but the appearance of the valley there, its precise continuation of the course of the valley below this point, and other considerations given in an earlier note (No. 55), all combine to show that this is the true morphological continuation of the Renous, and that in pre-glacial times it emptied the Tuadook lakes into the Renous. Closer study will be needed to determine its precise morphological head.

5. *From Pear Lake Branch to Little South Branch.*—Starting with a considerable deadwater, the river enters a boulder district, where it breaks up among islands and spreads out widely for a mile or two; it then traverses a series of deadwaters and pools separated by abrupt rips for a mile or more, after which it gradually becomes smoother with less fall and approximates to the gravelly type with stillwaters and pools, winding about amid occasional intervales, extremely pleasant to the canoeman. It continues to improve down to the old driving dam, where the boulders abruptly re-appear with much fall, making the river very rough; but gradually the boulders diminish, and the river becomes smoother down to the Forks of the Little South Branch.

Throughout this extent, including with the Lake Branch some 11 miles in length and 314 feet of fall (or under 30 feet to the mile), the river flows always over drift, though occasionally washing against ledges on one or the other (usually the left) valley wall, and no part of the river is post-glacial. In many places the valley is greatly narrowed by great heaps of drift, but nowhere does this fill the deep valley, so that the river was able to cut it out without being forced from its old course. The country has the peneplained character, the hills, densely forested, being well back from the stream, especially in the upper part of the valley, where they are 300 or 400 feet above the river; but they appear to lessen in height downwards, reaching not much over 150 feet, at least near the river, near the Forks. The physiographic origin of this part of the river seems, therefore, plain; it is in an old, pre-glacial, valley, no doubt one of the ancient radiating series from the central highlands. There is, however, an interesting possibility suggested by the curiously reentrant direction of McKendrick Brook, which enters the Renous in a pleasant basin, namely, that at one time this river emptied along the course of this brook, through Rocky Brook Lake and Catamaran Brook into the Little South West. I was not able to test this possibility by further observation of those waters, but it would be quite in harmony with other facts in the courses of the rivers in this region.

All along the river are frequent ledges, consisting above of the same mica schist which appears at Renous Lake, giving place, however, to fine-grained sandstone or quartzite lower, and somewhat ferruginous slates still lower. In only one place did I find granite in situ, namely, about three miles below the Pear Lake Branch; while half a mile below it the same schist as above reappears. The granite belt on the geological map should therefore be greatly narrowed.

6. *Little South Branch.*—This Branch I know only from hearsay. It has many small lakes at its head, which have been described to me by a lumberman as "very fine lakes." It is an insignificant stream at its mouth, much smaller than the North Branch. The general appearance of its valley here, combined

with the general river directions of this region and the presence of an apparent old valley at the big bend four miles below, suggests the possibility that the present Little South Branch is recent, if not post-glacial, and that its old course was into the above-mentioned bend.

7. *From Little South Branch to (Main) South Branch.*— For a mile below the Little South Branch the river continues open, pleasant and smooth; then abruptly its bed becomes choked with great numbers of huge boulders and acquires much fall, which conditions continue, with few and only local intermissions, down to within two miles of the Main South Branch, making this part of the river extremely difficult for canoe navigation, particularly at low water. The fall in this distance, 14½ miles, is some 603 feet, an average of over 41 feet a mile. This part of the Renous is without doubt the roughest piece of river of its size and length, at least in which the roughness is due to boulders, in New Brunswick. The bed is, however, invariably of drift, though ledges occur often upon one side or the other. The valley itself continues of much the same character as above, though apparently in places somewhat narrower. Its character is finely shown by the extensive views allowed by some elevated burnt country three miles below the Little South Branch. Here the country may be seen extending as a great plateau in every direction, remarkably level to the south and east, but rising somewhat into loftier ridges to the west, where, just below the Little South Branch, an elevated region appears to cross the river, doubtless continuous with the similar region described in an earlier note (No. 54) as crossing the Little Southwest Miramichi. Into this plateau the river has cut a somewhat wide and moderately mature valley, some 300 or 400 feet deep, so abruptly that one must needs be close beside the valley before he could be aware of its presence. Two miles above the main South Branch the river issues suddenly from this elevated region of ancient hard rocks into the much lower open country, formed by the Carboniferous sandstones, the edge of the former, as seen from the latter, presenting almost the abruptness of an escarpment. Thence the river flows more

and more smoothly, but ever swiftly, over coarse drift amid intervales and islands down to the South Branch.

Throughout this extent the ledges are always of slate or conglomerate (conglomerates resembling somewhat those of the Carboniferous appearing eight miles above the Forks, though giving way again to slates below), never of granite; yet the boulders which fill the river are mostly of the latter material, derived no doubt from the granitic interior, though their distance of transport is notably great.

The origin and development of this part of the river seem in general plain. It is wholly long pre-glacial, and no doubt a continuation of the old valley above, though it may be, in part at least, younger than the latter. Two possible former differences in the valley may be noted. There appears to be an old valley extending westward from the big bend four miles below the Little South Branch, through which the latter may originally have emptied. In this case it is very possible that the pre-glacial course of the waters of North Branch Lake was via the Little South Branch lakes to this point, as suggested by the map. Again the directions of the river suggest that formerly this river may have cut across from two miles above the South Branch by a shorter route to the river below, joining it a mile or two lower than at present.

8. *The (Main) South Branch.*—This branch I know only from hearsay. It has several lakes at its head, described to me by a lumberman as some ten or twelve in number, and "very fine lakes." At its mouth it is a beautiful smooth-flowing stream, apparently somewhat larger than the North Branch, and it is said to be easily navigable for canoes as far as the Lower Falls.

9. *From the Main South Branch to its mouth.*—Throughout its extent, this part of the river has the typical characteristics of all of our rivers flowing through the Carboniferous formation. In its eighteen miles to the Dungarvon it falls some 179 feet, or less than ten feet to the mile, while in the remaining eight miles to its mouth it falls 80 feet, or at about the same rate, a great contrast to the upper part of the river. It winds about over drift among intervales and terraces in a wide low-walled valley;

its bed is of shingle or sand, with occasional boulders; there are many long stillwaters separated by short rips of moderate fall, or by long smooth gravel reaches; the bank vegetation is dense and attractive; and altogether we have an extremely pleasant river. Two distinct types, with correlated beds, banks and scenery occur upon all these rivers in more or less regular alternation. There is, *first,* the intervale type, with low banks, elm and maple clad, often backed by level river terraces, with bed and banks of smooth gravel, sand and even mud, and with many stillwaters separated by gravel rips. *Second,* there is the clay bank type, in which the banks are steep, rounded terraces of boulder clay, bearing white birch, while the river bed is swift, shallow and obstructed with boulders left by the washing away of the finer materials, and forming often heavy rapids. In the settled district, the intervale type is well settled, while the clay bank type is not. Extensive ledges occur here and there upon one bank or the other (often forming considerable cliffs), and even partly in the bed of the river, but in no case does the river flow completely over ledges, and in no part is it post-glacial. In general, the valley becomes broader downward, and in its lower part it is thickly settled, especially on the intervales and terraces, and it becomes a very attractive river and very much larger than our maps imply. On one of its most typical parts the Dungarvon enters, apparently a smaller river than the Renous. Finally it empties through a somewhat narrower valley by a rather insignificant mouth into the Miramichi, forming, in all probability, as earlier pointed out (Note 50) the true morphological head of the part of the Miramichi below it.

In general the physiographic history of this part of the river seems plain. It is one of the ancient parallel series crossing the Carboniferous plain from southwest to northeast. One possible alteration of the original course may be noted. About half way from the South Branch to the Dungarvon the direction of the valley changes, its upper part pointing off to the Little Southwest Mirimichi; it seems possible that it may at first have had that course, the part thence to the Dungarvon being newer, and the Renous below the Dungarvon originally belonging to the latter river.

Such appears to be in outline the probable development of the Renous. With the exception of the lake at its head, its entire course has had from very early times a homogenous development. It is a remarkable fact about it that it has been so little affected by later changes, and especially that, except at its very head, it has nowhere been turned from its course by glacial changes.

86.—On the Physiographic Characteristics of the Southwest (Tuadook, or Crooked Deadwater) Branch of the Little Southwest Miramichi River.

Read December 6, 1904.

Our published maps give very erroneous impressions of the relative sizes of the larger rivers flowing from the interior highlands of the province. This is partly because their headwaters are so defectively, or even not at all, shown, and partly because their representation by single or by double lines, from which we largely infer their relative sizes, is not determined by actual size, but rather by the extent to which they are known and used. A conspicuous case of this error (aided perhaps in this instance by the presence of the word "Little") is found in the Little Southwest Miramichi, which is a far larger river, and geographically more important, than our maps imply. Rising as a small mountain stream on the Central Plateau, it is very soon enlarged by the entrance of great branches, of which two are of especial size and importance,—the Upper North, or Walkemik Branch, described in the succeeding note (No. 87), and the Southwest, or Tuadook Branch, in part described in an earlier note (No. 55), and in part now to be considered. Two other large branches, the North Pole and the Lower North Branch, are, I believe, approximately correctly shown on existing maps, while the very interesting development of the lower course of the river has been considered in another note (No. 54).

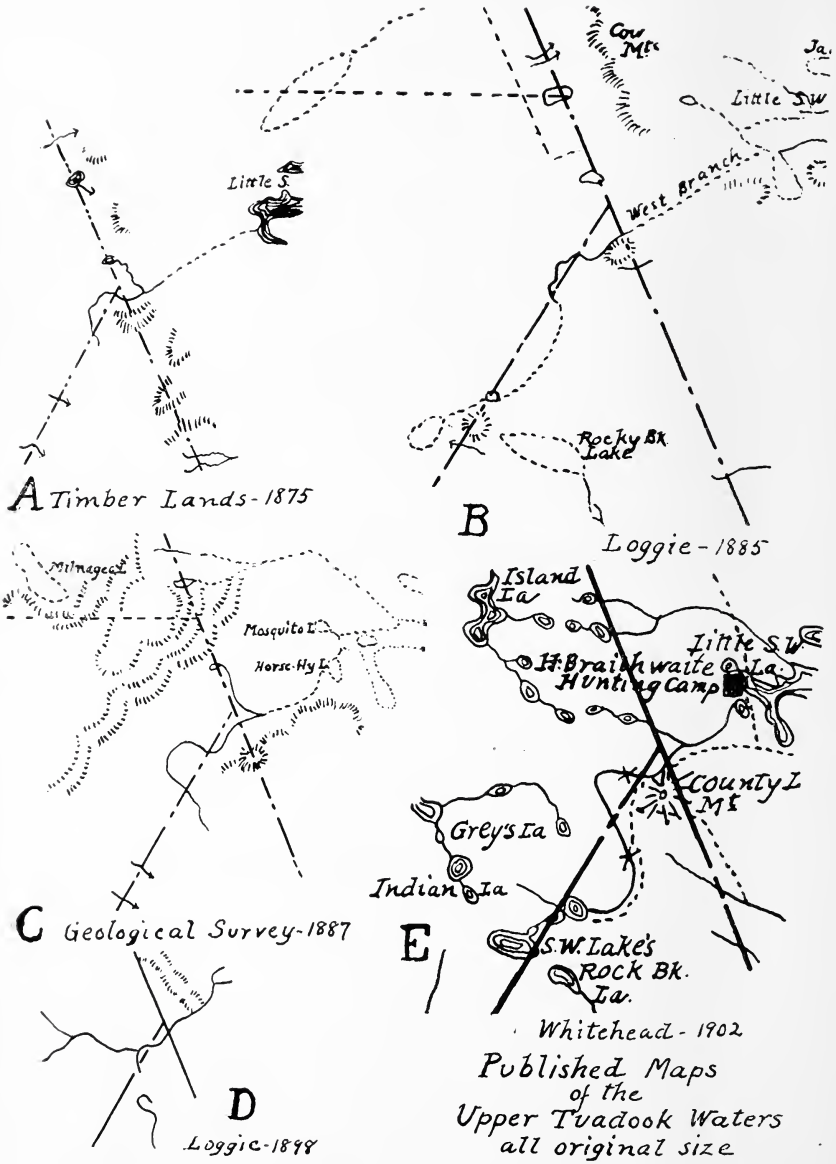
The Southwest (Tuadook, or Crooked Deadwater), Branch is composed of four distinct parts: (1) Indian Lake and its stream to Crooked Deadwater, (2) Crooked Deadwater, (3) the rapid stream thence to Big Lake, and (4) the Tuadook group of lakes.

The latter were treated somewhat fully in an earlier note (No. 55*), while the three former I shall here consider, following observations made on my visit to them in company with Professor Pierce in August last (1904). Their study was of particular interest to me, and long eagerly anticipated, because of their anomalous position directly across the general river trend of this region.

We consider first the development of our knowledge of these waters, and, because of their remoteness and difficulty of access, we find it all very recent. Their very first appearance in records is, as far as I have been able to find, as late as 1873, all maps prior to that time being an absolute blank in this region, and no published work of any kind making any reference to them. But in that year (1873) the Northumberland-York County line, surveyed by Malone, crossed the stream below the Crooked Deadwater, fixing its position; and later in the same year the York-Victoria line extended to meet it by Garden, crossed and located the Crooked Deadwater in two places, as well as minor streams in the vicinity. These surveys are the source of the first printed representation of this stream, that on the Timber Lands map of 1875. (See accompanying copies of published maps, A). It makes no other appearance until 1885, in which year Loggie (Map, B) adds on his map sketches of Rocky Brook (Moose) Lake, and Indian Lake (without name), without doubt from information supplied by Edward Jack, who, as will presently be noted, was here in 1883. The later Geological Map of 1887

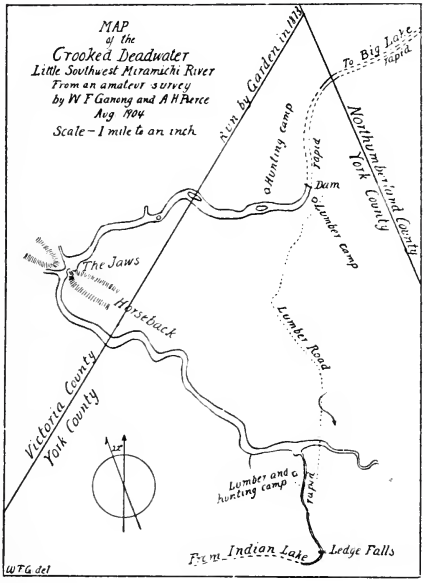
* To which certain *addenda et corrigenda* may be noted. The visit of Messrs. Long and Cox to the lakes, a little over a week instead of several weeks in length, is described by the former in *Outing* for October, 1902. I find also that Dashwood visited the lakes; he gives an interesting account of his trip in his *Chiploquorgan*, page 100 *et. seq.* Edward Jack ran a timber line across them in 1873, and was there again in 1883, as recorded later in this paper. Before that Colonel Maunsell with a party including two ladies, portaged from Long Lake to Big Lake and descended the river; he gives an account of his trip in some journal not at present known to me. There is also a very interesting narrative of a hunting trip to these lakes in *Forest and Stream*, December 22, 1894.

Dr. Ells tells me that he was not at these lakes, though he was at the Big Deadwater to the northward. A note in a paper by Mr. Jack mentions that Holmes, for whom Holmes Lake is named, was a lumberman who cut pine timber here. Also I do not correctly repeat Mr. Jack's remark about the absence of rock exposures in this country; he does not say there are none, but simply that he did not see any.



Published Maps of the Upper Tvadook Waters all original size

(Map, C), keeps, however, to the earlier representation, as does the Crown Land Office map of 1898 (Map, D), though it adds a sketch of the branch running up towards Gulquac. No further advance was made until 1899, in which year Malone, in running a timber line for the New Brunswick Railway Company, located and sketched more correctly Indian and Moose Lakes (without names), though he introduced an error in the stream below. From this source Whitehead's crude representation (Map, E) in his Sportsman's map of 1902 was apparently in part taken. No survey, however, of any part of these waters was made during this time, the representations being based solely on the intersections of streams with surveyed lines, supplemented by sketches. Accordingly our survey of the Crooked Deadwater, this summer, presented in the two accompanying maps, is the first of any part of these waters that has been made.* Turning from cartographical to other recorded information, we find equally little to note. The first account, or even mention, of the region I have found is in a very interesting MSS. lecture on a surveying trip to the Tuadook Lakes by way of the Crooked Deadwater, in 1883, by Edward Jack, which gives not only a very interesting narra-



* It was made from a canoe, with the angles taken by compass, and the distances estimated. It was then checked by adjustment to Garden's County Line survey. The remainder of the larger map is compiled from various sources, including the surveys above noted, personal observations, and especially a very detailed and valuable sketch map sent me by Mr. Henry Braithwaite, to whom I am indebted for much information, as well as other courtesies. No connection of these (Tuadook) waters with Tobique waters has been made, so that the map is probably inaccurate in this respect.

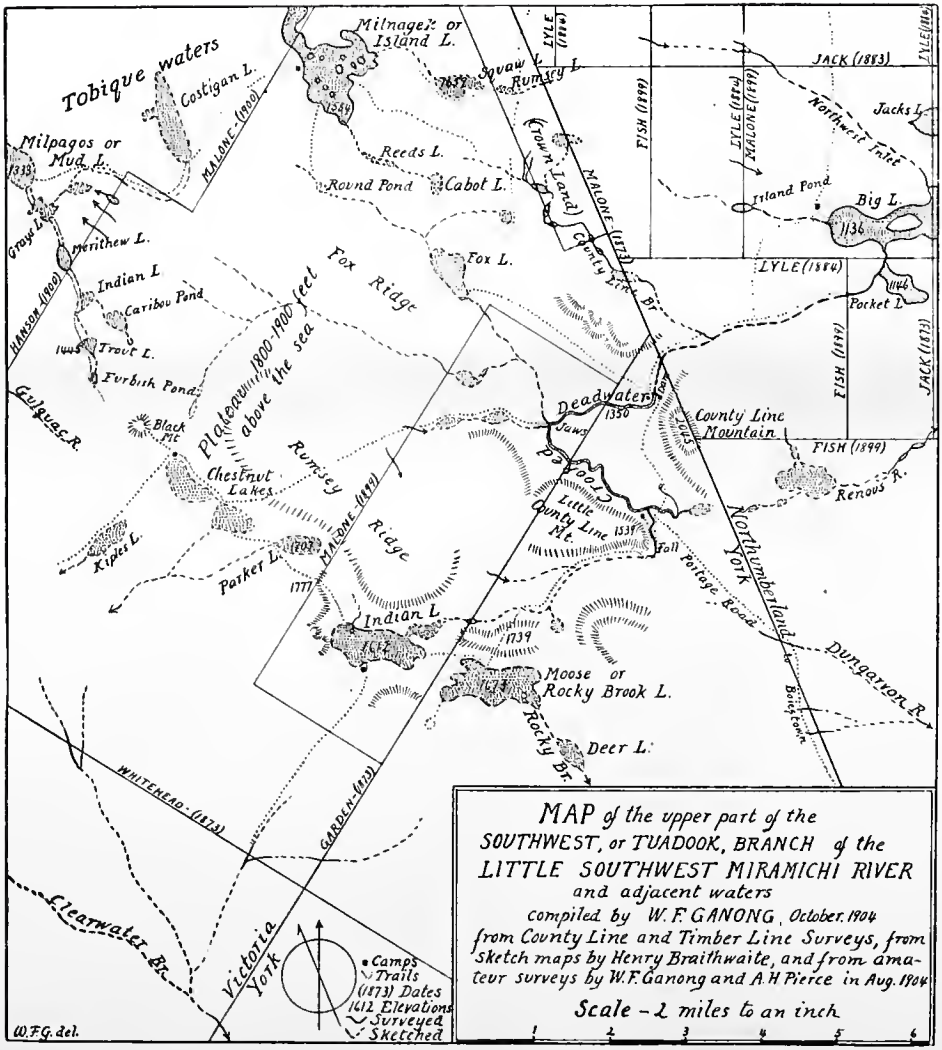
tive of his journey and notes descriptive of localities, but various observations on natural history as well.* No professional naturalist or geologist has hitherto reached the region, the representation of its geology on the geological map being simply inferential. The Crooked Deadwater has, however, been several times visited in recent years by the sportsman-writer, Frederic Irland, who refers to it in several of his writings, notably in "The Coming of the Snow," in *Scribner's* for January, 1897, and in "Hunting with Henry Braithwaite," in *Forest and Stream*, February 1, 1902. It is also mentioned by E. Hough, who was here in the winter, in *Forest and Stream* for November 1 and 8, 1902, and I have also seen other scattered references to this famous hunting ground in the same journal and elsewhere, though none of importance. The region is of course unsettled, but Mr. Braithwaite, doyen of New Brunswick guides, has hunted here since 1874, or earlier, and has several camps in the region, to which he takes sportsmen every year. Recently it has been lumbered for spruce, leaving camps and a dam as noted on the maps. All of the lands represented on the map west of the Northumberland County line belong to the New Brunswick Railway Company, with the exception of a small area shown on the map, which, with all of the lands to the east of the afore-mentioned county line, are Crown Lands.**

We consider now the several parts of this interesting river.

1. *Indian Lake and its Stream.*—Indian Lake is one of the most charming, as it is one of the most remote, of New Brunswick lakes. It lies in an east and west direction in a nook, as it were, well up (1612 feet above the sea) towards the summit of the great Central Plateau, which nearly surrounds it with finely forested hills, culminating in three prettily wooded summits some

* The MSS. is in possession of Mr. D. R. Jack, of St. John, to whom I am indebted for the use of it. It is to be published with annotations in an early number (probably April, 1905,) of the magazine, *Acadiensis*.

** The place-nomenclature appears to be entirely descriptive and recent. Most of the names, perhaps all, have been given by Mr. Braithwaite; some are obviously descriptive, and of the others he tells me *Parker, Chestnut, Rumsey, Kipler* (as it should read on the map) are for sportsmen he has guided there, and *Indian Lake* commemorates his finding fourteen Indians camped there on his first visit.



four hundred feet over its surface and closing its western end. These hills show four breaks. First there is a gap towards the southwest in the direction of the Clearwater, and it may indicate some former connection with those waters. Second, there is a valley entering from the north-northwest; it is apparently occupied by the only inlet of the lake, and is in part followed by the trail to Parker Lake, a typical shallow mud-and-reed lake higher up on the Plateau and now emptying westward, though perhaps originally belonging to this valley. Third, there is the present outlet to the eastward. Fourth, there is a gap to the east-southeast in the direction of Moose Lake, which is followed by the trail to that lake. Moose Lake is another very charming hill-encircled, or, rather, plateau-encircled lake, lying now sixty-one feet higher than Indian Lake, and hence 1673 feet above the sea, and, evidently, the highest lake of any size in the province. The watershed between these two lakes, however, is but little (only a few feet) above Moose Lake, and it seems not improbable that Moose Lake emptied in immediately pre-glacial times through this gap into the Indian Lake valley, in which case the outlet of Moose Lake through Rocky Brook will be found to be post-glacial. However this may be, these two lakes appear to me to occupy parts of a single ancient valley which headed on the plateau not far from Parker Lake and ran southeast across both of these lakes by way of upper Rocky Brook into Dungarvon waters (a branch south of the parts shown on the map), and it is possible this may be the true morphological head of the latter river. While all observed facts, together with the analogy of the river directions in this region, would make this the original direction of flow of these waters, it is evident that it has long been modified, and that in times long pre-glacial, Indian Lake, and perhaps (as above noted) Moose Lake also, flowed by the present course to the Crooked Deadwater.

The present stream from Indian Lake to Crooked Deadwater flows with much fall (262 feet) eastwardly and northeastwardly through a somewhat narrow, winding, drift-bottomed and obviously pre-glacial valley some four miles, when it suddenly turns north to flow into the Crooked Deadwater. Just at the turn it

falls over schistose ledges in a bed that is obviously post-glacial.* Its pre-glacial course I was not able to trace, but the topography of the region suggests either one of two directions: first it may have flowed northward across the present head of the Crooked Deadwater in a more or less direct line to the present outlet near County Line Mountain; or, second, it may have flowed more to the eastward through the chain of small ponds and lakes into Renous Lake. Whether or not the latter was its immediately pre-glacial course, there can be little doubt that at some comparatively-recent period it flowed in this direction, and that there is a single continuous valley all the way from Indian Lake to Renous Lake, homologous in origin with the parallel valley to the northward, later to be mentioned.

2. *The Crooked Deadwater.*—This part of the river is very expressively named, for throughout its extent of over three miles it is a typical deadwater, winding about in a flat basin amidst typical flat spruce bog. It is not a continuation of the Indian Lake Stream, for the latter is a branch of it, but it heads in a small, clear sluggish stream coming, as Mr. Braithwaite tells me, from a little pond to the eastward, and it ends at the dam near County Line Mountain, where the rapid water begins. In places it is narrowed and made shoal by boulder trains across its course, and in one prominent place, "The Jaws," it is narrowed from its usual thirty to fifty yards down to some ten yards by the presence of a striking horseback which the stream has cut directly across. The horseback has a direction northwest and southeast, and can be traced some distance southwesterly. It is obviously the presence of this horseback, thrown directly across a flat basin, which has given the upper part of the Crooked Deadwater its anomalous northwesterly direction; it formed a dam to the waters above it, and these fell over, and cut into, it at its lowest point, which happened to be at the present Jaws.**

From the many windings of the Deadwater one gains fine views of the surrounding hills, especially of the grandly-forested

* The ledges of this place yielded the only rock I was able to find in the Crooked Deadwater region. It is a schist with veins of granite.

**Edward Jack, in his MSS. earlier mentioned, states that this was formerly a great crossing place for lynxes, which were trapped here in large numbers.

County Line Mountain, rising abruptly some 700 feet above the water (and hence 2045 above the sea), and of the great central plateau to the westward, with its clear-cut edge well-nigh as level as the ridge of a roof. Four great gaps, however, appear in the encircling hills. There is one to the northwest, occupied apparently by the stream heading up near Milnagek or Island Lake, and there is another towards the southeast in the direction of the Dungarvon. I have no question that we are here concerned with a single ancient valley, the morphological head of this part of the Dungarvon, cut by an ancient river, which, rising on the plateau near Fox Lake, originally flowed across the present Crooked Deadwater into the Dungarvon. This connection must, however, have been ancient, since the present outlet to the eastward seems of considerable antiquity, and long pre-glacial. Noting the direction of the valley towards Milnagek Lake, the question arises whether the latter also may not have been included in this ancient valley. But all evidence tends to show that such was not the case, and that the watershed between these waters and Milnagek is extremely ancient. Indeed, so far as our present river systems are concerned, this central plateau is the primitive or original watershed of the province. From it the rivers have, from the earliest times, radiated southeasterly and northwesterly, but, in this region, they have never crossed it. As shown in earlier notes (Nos. 39, 55, 56), it is an irregular, often very sharply bounded, plateau, 1700 or 1800 to 1900 feet above the sea, and locally higher, on which occur many shallow ponds, and numerous rivulets, the interlocked sources of the rivers flowing in both directions.

Two streams enter the Crooked Deadwater on the northwest side at the Jaws, one on each side of the horseback. The larger of these rises far off to the northwest, even to within two miles of the Gulquac. I was not able to trace it myself (the sketch on the map being given me by Mr. Braithwaite), but either it or the smaller stream near it appears to occupy in part a pronounced break or valley extending off to the westward, which seems to represent the westerly continuation of the valley emptying these waters easterly into Big Lake.

The Crooked Deadwater region is a famous hunting ground, replete with moose and other big game.

3. *The River from Crooked Deadwater to Big (Tuadook) Lake.*—This part of the river occupies a valley cut deeply, some 400 or 500 feet, into the plateau, but fairly broad and moderately mature. It has much fall, over 200 feet in about five miles, and is almost continuously rapid, flowing usually, if not entirely, over drift. It is obviously long pre-glacial in origin, and as above noted, it is a part of a valley extending off to the westward. It seems plain that this valley is homologous in origin with the parallel valley to the southward of it, that extending from Indian Lake to Renous Lake. But the question as to their mode of origin is one of the most puzzling in all the range of New Brunswick physiography, and I sought in vain during my two visits, in 1901 and 1904, to find some clue to its solution. Since these two rivers cut directly across at right angles to the general original river-trend of this region, which is plainly northwest-southeast, and since these valleys are obviously newer than the more ancient series, I can only surmise that they owe their origin to some local causes, whether softer rocks, fault lines, ancient glacial phenomena, or other, is still to be determined. We appear to have a similar problem in certain other parts of the province, namely, in the part of the Nepisiguit between Indian Falls and Grand Falls, and in that part of the Main Southwest Miramichi between the North Branch and Fall Brook.

Thus, although much is still doubtful about the origin of this exceptional river, enough is evident to make it reasonably certain that it is a remarkably composite system, consisting of parts of two ancient northwest-southeast valleys, cut across and captured by two later northeast-southwest valleys, the whole modified in some details by glacial action.

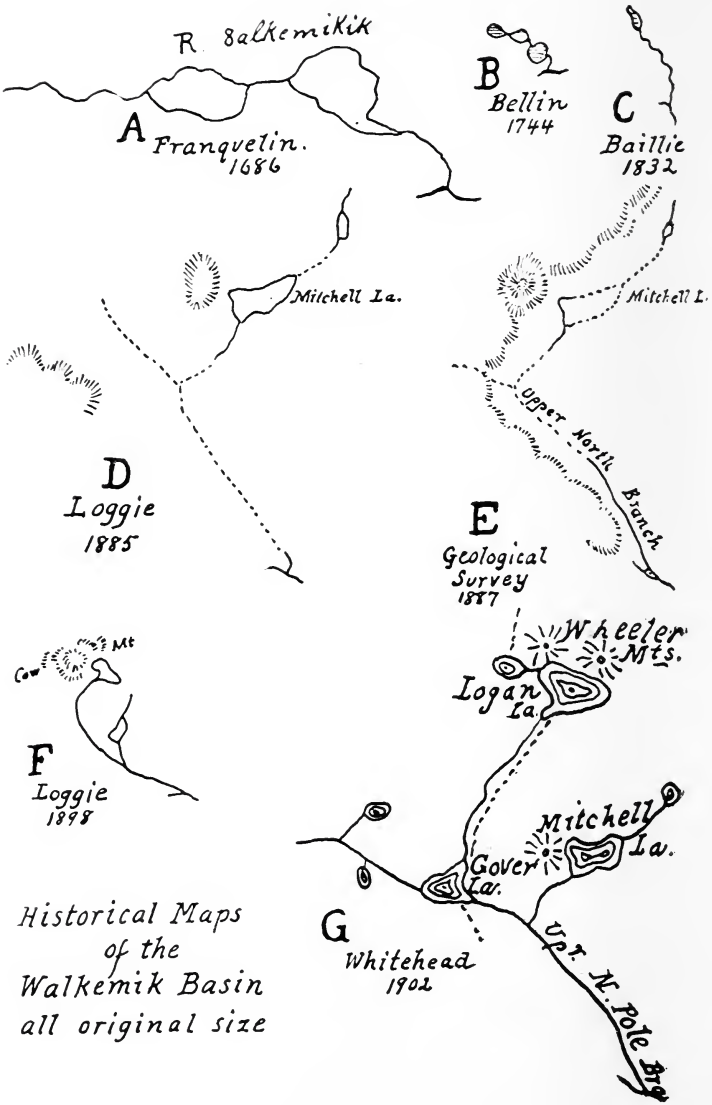
87.—On the Physiographic Characteristics of the Walkemik Basin (Upper North Branch of the Little Southwest Miramichi).

Read December 6, 1904.

The Little Southwest Miramichi River, rising as a small mountain stream on the central plateau, is rapidly enlarged by the confluence of several great branches, of which two are of especial importance,—the Southwest or Tuadook Branch, considered in the preceding note, and the Upper North or Walkemik Branch here to be described. The large basin of this branch, including several fine lakes, lies in the very heart of the New Brunswick Highlands, and, because of its remoteness and difficulty of access, has been hitherto little visited, scantily surveyed, hardly at all mentioned in print, and wholly unstudied by any scientific men. In this region, thus so attractive, I spent somewhat over three weeks in July and August last (1904) in company with my friend, Professor A. H. Pierce, studying the natural phenomena of the country, and mapping by plane-table and traverse its lakes, streams and hills.* Our results are presented upon the accompanying map and in the observations which follow.

We trace first the development of our knowledge of the basin. Its waters appear first and unmistakeably, upon the remarkable Franquelin-DeMeulles map of 1686, as shown by the accompanying copy (Historical maps, A), and it bears the name Salkemikik (or, as we would spell it, Oualkemikik), without doubt its Micmac Indian name. Since some concise name for this branch is needed, as an alternative for its present very cumbersome designation (viz., "Upper North Branch of the Little Southwest Miramichi,") I have adopted this appropriate name in the sim-

* We portaged from Portage Lake, Tobique, without guides or other aid, by way of Hind Lake and the other lakes and ponds of Adder Lake Stream to Upper Graham Plains, and thence to Gover Lake, where we established our base camp. We did not know of the new portage road from Portage Lake to Gover Lake until too late to make use of it. Afterwards we descended the Upper North Branch, studied briefly the Crooked Deadwater and Indian Lake region, and came out by the Renous.



Historical Maps of the Walkemik Basin all original size

plified form of Walkemik (pronounced Wal-kem-ik'), which may be applied both to the branch and to its group of lakes. The Franquelin-DeMeulles representation is followed, though not accurately, by Bellin of 1744 (Map, B), and other French maps, but the first modern map to show it is Baillie's of 1832 (Map, C), which lays it down, of course from reports, as an insignificant branch. The mouth of the branch is located, without name, on Berton's MSS. plan of the Little Southwest of 1838, but it makes no other appearance until 1884, all of the published as well as MSS. maps made in the meantime being an absolute blank in this region, although the name Upper North Branch is applied by Wilkinson, 1859, to the present North Pole Branch. In 1884 the very first survey in any part of the basin was made: in that year R. H. Lyle ran timber lines (noted on the accompanying large map) which crossed its waters in several places and intersected Mitchell Lake, which he sketched and named. His plan (the original is in the Crown Land Office) was followed by Loggie in 1885 (Map, D), and by the later Geological Survey map of 1887 (Map, E), which latter also adds a few fanciful and erroneous hachures. No further advance was made until 1896, when W. B. Hoyt ran timber lines, as noted on the large map, locating and sketching Dunn (or Logan) Lake and other parts of the system, and his plan is the original of the Crown Land Office map of 1898 (Map, F). In 1900 Hoyt ran other lines, and in 1903 W. Malone ran yet others, one of which located and allowed of a sketch of Gover Lake, and all of which are shown on the large map. The map of the Adder Lake Stream basin of 1902, made by Mr. Furbish and myself (these notes, No. 63), located the headwaters of two of the Walkemik branches, including the remarkable Patchel Brook. The Sportsmen's map by Whitehead of 1902 (Map, G), and the very small-scale map by Hough in *Forest and Stream* for November 8, 1902, are in part from the above sources and in part sketched. Thus down to this summer, while the principal lakes and streams had been located in certain points, none of them had been actually surveyed, and the accompanying larger map is accordingly the first to be made from actual survey of these waters. The lakes have

been mapped by plane-table, the mountains by triangulation, and the streams by traverses, and the whole has been adjusted to the timber-line surveys of the region (as shown on the plans of the Crown Land Office), while the contiguous waters have been added from various accessible sources. All streams that are shown by continuous lines have been surveyed, while those in broken lines have only been observed or are inferred.

Of published references to the basin, I have been able to find but four. None of our earlier book-writing sportsmen visited it, nor is there any reference to it in any of the geological reports, or in other scientific literature, excepting my own brief references in Note 63 of this series, and my description of the remarkable Patchel Brook and surroundings in Note 64. There is an account of a hunting trip to Gover Lake and Upper Graham Plain by Frederic Irland in *Forest and Stream* for February, 1902, and there is some mention of the region by E. Hough, who passed through it on a winter trip from the Nepisiguit, in the same journal for November 1, 1902. Other than these, no published references to the region appear to exist. It was first lumbered for pine in the early seventies by John McDougal, and some of the old pine hauling roads can still be seen and are used as trails. The first lumbering for spruce, however, began last winter (1903-1904), when M. C. Craig, of Perth, cut a portage road from Portage Lake to Gover Lake, built a camp at Gover Lake, and cut much good lumber in the vicinity. The basin abounds in big game, and is being gradually opened up to sportsmen by Mr. Henry Braithwaite, who first hunted here in 1884, and who has since opened trails and built camps as shown on the large map.*

* We may here note the origin of the place-nomenclature on this map. *Mitchell Lake* was named by Lyle in 1884 (as he once wrote me), in honor of the Surveyor General then in office, Hon. James Mitchell, and he named also *Dark Lake* and *Moccasin Lake*, both descriptive names, the latter of its shape. *Dunn Lake* was named by Hoyt in 1896 in honor of the Surveyor General of that time, Hon. John Dunn, and he also named *Cave Brook*, descriptively. Most of the other names were given by Mr. Braithwaite, as he informs me; some are evidently descriptive, such as *Caribou Brook, Sable Mountain, Pot-hole Brook, Thunder Mountain, Birch Lake, Portage Brook, Skunk Lake*, and, presumably, *Devils Lake*. Others are for sportsmen he has guided there, as *Graham Plains* and *Lake, Garrett Lakes, Wheeler Mountains*, or for lumbermen, as *MacDougal Lakes* and *Reeds*

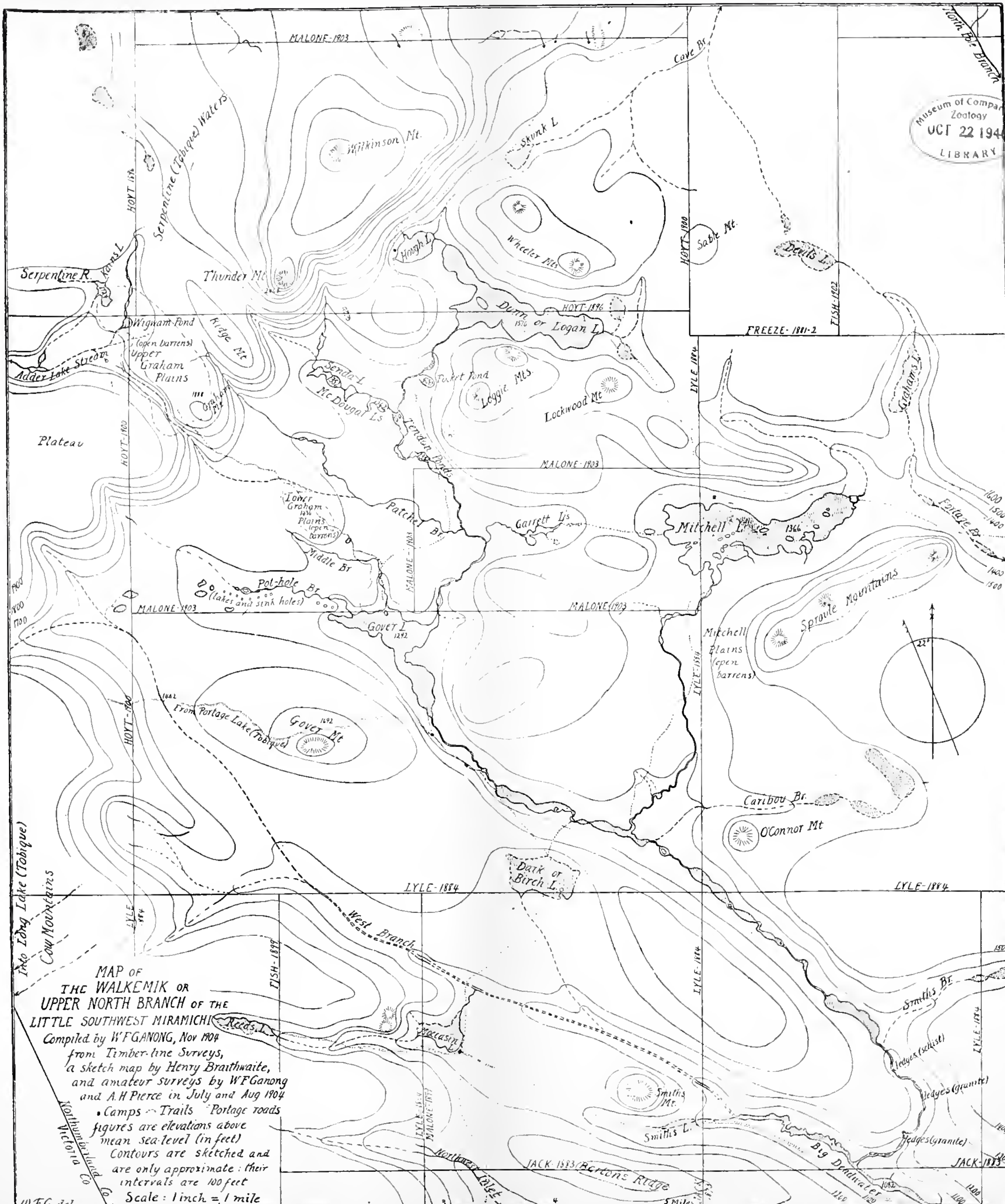
The mind of man is so constructed that it is prone to imagine things rare and choice in places remote and hard to reach, and so we looked forward hopefully to finding something especially worthy of note in these distant parts. But in fact nothing remarkable was met with, though many facts of minor interest, here set down, did result from our journey. Indeed it would not be difficult to predict the character of the region from an inspection of its geographical and geological position, for, lying as it does in the central crystalline belt, which is predominently granite, it displays all the distinctive characters to be expected in such a position—the boulder-strewn irregular surface, with much inferior spruce-heath forest, the obstructed drainage with its many shallow lakes and ponds, the dark waters with their abundant bog and muddy bottoms. It is a typical grainitic region, though more attractive than such places usually are because of its fine hill views and the great abundance of its animal life.

The Walkemik basin is hollowed out in a remarkable manner from the great central plateau of the province. This plateau, much dissected to the southward, is still almost intact upon the west and north. On the northwest it has an apparent elevation of some 1900 feet above the sea, and 500 or 600 above the basin, down to which it slopes with much abruptness. Its edge is here emargined by the sources of some of the streams, but apparently

Lake, while *Logan Lake*, *Gover Lake* and *Patchel Brook* were for men employed by him at those places, and *Smiths Lake* for an old hunter. The names on Serpentine waters, *Wigwam Pond* and *Kains Lake* and *Ridge Mountain* were given by Mr. Furbish and myself in 1902 (Note 63), and we named *Bertons Ridge* and the *Big Deadwater* in 1901 (Note 55). This year Mr. Pierce and I have given new names to previously unnamed places; following the suggestion given by the presence of the names of two surveyor generals, we have tried to honor the names of some of the principal men who have been connected with the administration of the Crown Lands of the province, and have named *Loggie Mountains, Wilkinson Mountain, Lockwood Mountain, O'Connor Mountain* and *Sproule Mountains*, as noted later in this paper. We have also named *Middle Brook* and *Pocket Pond* descriptively, and *Tendon Ponds*, in recollection of an accident one of us had there. *Senda Lake* we have given for a friend of ours. We have also ventured to transfer the name *Hough* (for the sportsman-writer earlier mentioned) from an apparent application to the ridge likely to be confused with Wilkinson Mountain to the little lake previously unnamed. *Cow Mountains* (wrongly applied by Hoyt in his plan to Thunder Mountain) is said by E. Jack, in a MSS. lecture his of 1883 (mentioned in the preceding note) to be a lumberman's name, probably in allusion to Cow Moose, but I suspect it is an alteration or corruption of "County Line Mountains."

it is nowhere cut across. As it swings around on the north of the basin its margin has almost the abruptness of an escarpment, and in the angle is it partially cut across by Patchel Brook, as I have described in an earlier note (No. 64). Farther east it rises abruptly into the greater height of Thunder Mountain, 2468 feet above the sea, and one of the conspicuous mountains of the province. It extends thence northeasterly seemingly as a partially-separated ridge, which rises northward into a still unnamed higher mountain, which must considerably exceed 2500 feet in elevation, which I propose should be called *Wilkinson Mountain* in honor of the well-known provincial geographer, John Wilkinson.* Eastward of this, as seen from the southward, the country appears to fall off somewhat, but it undoubtedly continues eastward as a plateau, approaching 2000 feet above the sea, until it meets the plateau country about the South Branch of Nepisiguit, as already described in these notes (No. 77). From the Thunder-Wilkinson group a very elevated country, including the high summits of Nalaisk, Edward, Winslow, Gordon, Head and Saga mook extends to Nictor Lake, forming, without question, the highest mass of land in the province. So much for the great central plateau which is continuous. But off to the southward are many fragments of it, detached by erosion. One of the most prominent and important of these lies south of Dunn (Logan) Lake, including two elevated, with some lower, summits. These are still unnamed but I would propose they be called the *Loggie Mountains* in honor of the present capable and courteous chief draughtsman of the Crown Land Office, the principal summits being known as the North and South Loggie Mountains. Off to the eastward of these lies a somewhat isolated mountain which might well be called *Lockwood Mountain,* from an early surveyor-general and cartographer of the province, Anthony Lockwood.

* This summit is not visible from anywhere in the immediate vicinity, but it can be seen from several places at a distance. Thus I believe it is visible from the hills south of Mitchell Lake; I have also recorded it in my notes relating to the hills visible from Nalaisk Mountain on the Serpentine. But the best view of it by far is obtained from near the southern end of Holmes Lake, where Thunder and Wilkinson can both be seen with great clearness, Wilkinson rising markedly above the other. Its location on the map is only an approximation, but it is not, I think, far from its true position.



Another detached part of the plateau is the elevated ridge, with three recognizable summits, just southeast of Mitchell Lake, and I would propose for this the name *Sproule Mountains,* for the first surveyor general of the province, one whose services deserve the grateful remembrance of our people. Another but smaller fragment is the conical mountain just east of the junction of Mitchell Lake outlet with the main stream, and for this I would suggest the name *O'Connor Mountain,* for Mr. Loggie's predecessor in the Crown Land Office. Another detached part of the plateau occurs in a remarkable unnamed ridge to the eastward of Portage Brook, and there are yet others to the southward, of all degrees of prominence.

The source of the Walkemik Branch is the little stream falling from the plateau into Hough Lake, which is really an extension of Dunn Lake and separated from it only by flat bog. Dunn (or Logan) Lake is, of all the considerable lakes of the province, the most remote and difficult of access, the most unspoiled (for it has never been lumbered even for pine), and almost the finest in its hill scenery,* being second in this respect only to Nictor, and perhaps Upsalquitch. It lies part way up the slope from basin to plateau (1576 feet above the sea), has rock-bound shores all around, except for some bog and marsh at its upper end and a sand beach at its easterly end. The huge granitic boulders of its shores support only a sparse spruce-heath forest. It is apparently deep, and empties from one side by a post-glacial outlet over a huge moraine. The surrounding splendidly forested hills are broken only in three places, to the northeast from Hough Lake where a valley exists, to the west, where the present outlet lies, and to the southeast where a low valley extends away, occupied in part by a small stream. In line with this is another brook (as Mr. Braithwaite has shown on his sketch map), emptying into Mitchell Lake, and beyond in the same line is Portage Brook, emptying into the North Pole Branch. I have no doubt that the pre-glacial outlet of Dunn Lake was

* I believe this is the lake called by the Micmac Indians *Wel-a-teg-e-ok,* or "Lake surrounded by hills," a name applied by them to some lake on this branch, as I am informed by Mr. Wm. McInnes, of the Geological Survey of Canada.

along these valleys sortheasterly into the North Pole Branch, of which, perhaps, this lake forms the morphological head.

The outlet of Dunn Lake forms a very pretty torrent over the boulders for a quarter of a mile or more, when it becomes a rough bouldery stream which empties into a series of long boulder-bordered deadwaters or ponds, the Tendon Ponds, lying in a flat basin. The uppermost of these receives also the outlet of a series of very pretty clear-water little lakes (MacDougal Lakes, of which the uppermost, Senda Lake, is especially attractive), extending close up under Thunder Mountain, and fed by mountain streams from its slope. Below the deadwaters the stream flows with little fall, largely over a gravelly and sandy bed, down to Gover Lake, receiving the outlet of the pretty Garrett Lakes and the important Patchel Brook. This brook is formed by the confluence of two large branches, one coming down between Thunder and Ridge Mountains, forming a mountain torrent which has cut deeply into the mountain rocks, and another which rises on the Upper Graham Plains and has cut the very remarkable deep gorge which I have described in an earlier note (No. 64). There is no doubt, I think, that the latter branch is the true morphological head of the Walkemik Stream, and that its pre-glacial predecessor extended across Lower Graham Plains, through Gover Lake and along the present Walkemik valley to near its mouth, forming one of the primitive northwest-southeast series of rivers radiating from the Central Highlands. Both of the branches of Patchel Brook leave the mountain gorges abruptly and cross a heavily-wooded boulder-strewn plain in very irregular courses difficult to follow. Gover Lake, 1292 feet above the sea, the drainage centre of the basin, is an irregular shallow lake, with bog and boulder margin, and muddy bottom. In addition to the main Walkemik stream it receives three brooks. The first is a small, clear spring-brook from the east. The second, Middle Brook, runs along the southwest margin of the Lower Graham Plains. The third is Pot-hole Brook, which rises apparently on the margin of the plateau, and in its course to Gover Lake flows beside, and in some part through, the most extensive and finely-developed series of glacial sink-holes that I have seen anywhere

in New Brunswick. They are of all sizes and depths, from a few yards in diameter and depth up to considerable basins; some are wooded in the bottom, others are open meadow, others are bare rocks, showing evidence that they are lakes for a part of the year, while others are permanent and pretty little lakes. No doubt they are much more numerous than the dozen or more which we saw and whose general positions are shown on the map. This part of the basin appears to contain a series of parallel northwest and southeast moraines extending out from the western plateau, whose directions determine the courses of the brooks, which turn around their eastern ends into Gover Lake. The entire region exhibits glacial phenomena in great perfection, including the irregular moraines of Upper Graham Plains and the glacial gorge of Patchel Brook, earlier described (Notes 63, 64), the remarkable drumlin hills and islands of Mitchell Lake presently to be noticed, and the parallel moraines, the sink holes and other phenomena of this basin.

The main stream below Gover Lake flows southeast in a valley between a high and finely curved ridge (Gover Mountain) on the west and a lower ridge on the east, and, falling a few feet over boulders, with a possible granite ledge in one place, enters the first of a long series of lake-like deadwaters separated by short abrupt boulder rips. These deadwaters have the bouldery and boggy shores, irregular depths, and other characteristics of true glacial lakes, which indeed they are, of the simplest type. Into the second of these enters the outlet of Mitchell Lake.

Mitchell Lake, 1366 feet above the sea, is another very attractive lake of marked individuality. It is notably irregular in outline, with many islands and peninsulas, with abrupt low hills near it and loftier ridges and hills in the background. It exhibits one especially interesting feature, in which respect it surpasses all other New Brunswick lakes, namely, the islands, peninsulas and the abrupt rounded hills of the shores are all beautifully rounded glacial knolls of the drumlin type. Further, the distinctness and attractiveness of these knolls are greatly enhanced by the fact that they are in considerable part bare of forest, and covered only with a carpet of heaths, allowing their contours to

appear as plainly as if they were bare. The lack of forest is the result of former intense forest fires, which not only cleared a part of the south shore of the lake, but produced the extensive open dry barrens (Mitchell Plains) extending off a long distance to the southward. The surrounding hills show three breaks. First there is a low valley extending eastward and connecting with that of Portage Brook, flowing into the North Pole Branch.* This may be the route of the pre-glacial outlet of the lake valley, in which case it would have formed a branch of the pre-glacial stream which apparently emptied the Dunn Lake valley into the North Pole Branch. This introduces the question as to the origin of the east-and-west valley of the lake itself, but this I cannot explain, though the fact that it lies in part in a northeast-southwest line which includes Dark and Moccasin Lakes** suggests a possible origin homologous with that of the Upper Tuadook and Upper Renous-Indian Stream valleys considered in the preceding note. The second break is on the northwest, though it is not well marked. It may, perhaps, indicate an early connection with Dunn Lake in this direction, though such appears unlikely. There is some evidence also of a valley directly westward, and it may be that the drumlin hills of Mitchell Lake represent the finer glacial debris washed by this route from the Gover Lake Basin, in which all the glacial material is very coarse. The third break is to the southwest, followed by the present outlet. The entire country crossed by this stream is flat and open, evidently an extension of the Gover Lake Basin. The stream flows with but moderate fall over drift,—in its upper course over boulders and in its lower course partly over gravel,—but I was unable to find anywhere along it any clear evidence as to whether

---

* I have not yet been able to visit the North Pole Branch, but Mr. Braithwaite's description of it as, for the most part, a fine canoe stream, would indicate that it occupies a very ancient valley. The maps show a great bend in the river just below where Portage Brook enters it; it is very likely this bend represents a post-glacial course, while the pre-glacial course is directly across the bend, a subject I hope later to be able to study, especially as its head waters also offer some curious problems.

** Dark (Birch) and Moccasin Lakes are both attractive (especially the latter) forest encircled lakes. Reeds Lake, much more elevated, is apparently shallow and with low shores, but is said to contain large trout.

its course is here certainly pre- or post-glacial, though the former seems much the more probable. Its present course cannot, however, be very ancient, since it runs directly across the prevailing northwest and southeast drainage characteristic of this region, though possibly it may run in a part of an old northeast-southwest valley as already noted. On the other hand there is evidence that a small part at least of its course falls in an ancient valley of the northwest-southeast series. An inspection of the map will show that the chain of McDougal Lakes, the Garrett Lakes, the small brook emptying into the Mitchell Lake outlet a portion of that outlet,* and one of the Caribou Lakes all lie in a line, which line, as the Crown Land plans show, points directly to the head of Indian Brook. I think it is possible we have here another of these ancient parallel northwest-southeast valleys, the third in the Walkemik system.

Below the Mitchell Lake outlet the river flows through three or four deadwaters similar to those above, with the usual boulddery rips between, then by a rough boulder-strewn stream, often with high rocky valley walls on one side or the other and with much drop, into the lowermost (and one of the largest) deadwaters on the river. Below this it becomes an extremely rough stream, one of the roughest in the province, falling heavily amongst huge boulders between steep banks of coarse glacial drift. It soon swings out of the prevailing southeasterly direction, and turns to the southwest, falling still more in a yet rougher channel, not only over boulders, but over schist and granite ledges crossing its entire bed. This part of the river below the bend is obviously post-glacial, flowing apparently in a trench 25 to 50 feet deep cut into level glacial deposits. Although I was not able to trace the pre-glacial course of this part of the Walkemik valley, I have no

* My survey of this stream made it swing more to the east in its middle portion, indeed carrying it across the position of Lyle's timber line; but as that line shows no crossing streams, I have adjusted it to the position on the map. I had a somewhat similar experience in my survey of Mitchell Lake. I made it much longer than represented on the map, but as Lyle's original plan of 1884 shows an apparently chained line, making the lake 1 1-4 miles in length along its axis from his north line, I have shortened my survey to fit these dimensions. It interests me to find, however, that a former letter of his to me gives the length of the lake as 1 3-4 miles.

doubt it will be found continuing the line of the deadwaters across to the Little Southwest. Finally the river enters the valley of the Little Southwest, becomes abruptly more gentle in its character, and joins that river in a huge deadwater.

It is of interest to note now the relations of the waters of this basin with others adjacent. On the northeast runs the North Pole Branch, whose head swings around to approach Dunn Lake on the plateau northeast of that lake, where their relations are still to be worked out. On the northwest come the sources of the Serpentine (Tobique), and in one place, at the head of Patchel Brook, these two systems are separated only by a slight rise of ground a few yards across (Note 63). On the west the Little Southwest itself runs parallel with the Walkemik. I was not able to follow the Little Southwest to its source, as I desired, but one branch heads in a notch on the plateau which can be clearly seen from the eastern end of Gover Lake, while, as Mr. Braithwaite tells me, the main stream swings to the westward and heads in two little lakes near the County line. The intersection of timber lines and the Portage Lake portage road with this river shows that its general course must be about as sketched on the map, though its course is still wholly unsurveyed. Obviously it is another of the parallel valleys of the primitive northwest-southeast series.

In general, therefore, the physiographic history of the Walkemik basin seems to be plain. It is a composite of two or three ancient northwest-southeast valleys which have been thrown together partly by ancient cross erosion and partly by glacial changes. It still remains a question how the Gover Lake basin here became so extensively eroded, even the abundance of streams hardly explaining its depth and extent, much less the extreme sharpness of the transition from it to the plateau. It is perhaps homologous in age and origin with the great Silurian plateau north of the Highlands. Further study may show that softer rocks occurred here, even though no traces of them were noted by us.

The geology of the Walkemik basin, not having been studied at all heretofore, naturally excited our interest. But the entire

country is so heavily buried in drift and covered by forest that extremely few rock exposures were seen. On Patchel Brook granite and felsite both appear (Note 63), while on Upper Graham Plains there are considerable ledges of schist. The upper valley of the eastern branch of Patchel Brook has cut deeply into schists, and the stream at the head of the MacDougal Lakes has cut into granite. No other exposures were found, except a doubtful ledge of granite below Gover Lake, until the lower course of the river was reached, when ledges of schist and granite were passed, as noted on the map. The distribution of rocks shown by these, with some other, facts will be considered in the next note.

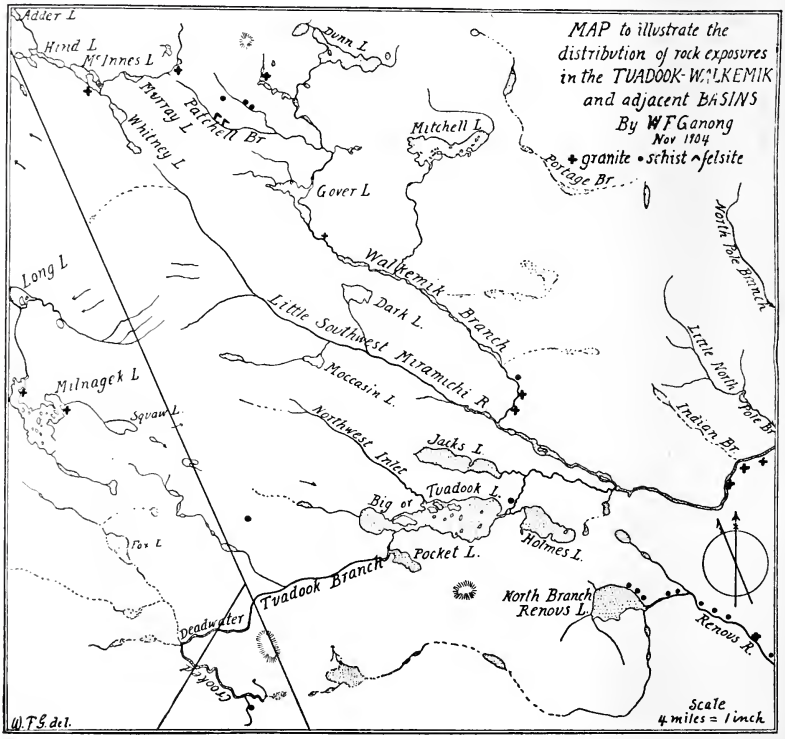
The vegetation of the region presents no features of especial interest. It is all heavily forested, with the exception of three great open areas, the Upper Graham Plains, Lower Graham Plains, and the Mitchell Plains, all of which have been opened by early fires, and now bear the plants of open dry barrens. In places, especially along the river below the Mitchell Lake outlet, these barrens are growing up to forest, the two characteristic trees being the Princes Pine (P. Banksiana) and the American Larch (L. Americana). The forest on the ridges is the usual mixed growth of the typical New Brunswick forest type, including some good pine and spruce, while on the lower levels and around the lakes and deadwaters it is chiefly of the worthless black spruce-heath-hypnum type, characteristic everywhere of granite boulder districts.

The region is extremely rich in big game, especially in moose, caribou and deer. Beaver are also abundant, and are building new dams and other extensive work at several points, notably at the inlet of Hough Lake, and at the inlet of the eastern end of Dunn Lake. Probably in no part of New Brunswick are the large animals so abundant and so little disturbed.

88.—On Geological Boundaries in the Tuadook-Walkemik Region.

Read December 6, 1904.

The geological boundaries laid down on our geological maps are, in much of the Central Highland region, necessarily largely conjectural. These parts have been little visited, in some large areas not at all, by geologists, and so completely is that



country drift-buried and forest-covered that ledge-exposures are very hard to find. During three visits to the area shown on the accompanying map, I have noticed ledge rock in the places indicated by the symbols. These facts will necessitate a considerable change in the boundaries represented on the published maps, but

unfortunately the data are not enough to allow new boundaries to be established with any certainty. A comparison of the accompanying with the published geological maps, both upon one scale, will not only show how much re-arrangement will be necessary, but incidentally will illustrate how greatly our knowledge of the topography of that region has advanced since the geological maps were published. Probably the granites and schists will be found to be intermingled in a very complicated manner. The granites are undoubtedly, as our geologists agree, intrusive, and the schists are the result of the action of the granites upon the sedimentary rocks into which they were intruded.

The original data for the location of the boundaries on the geological map may be found in the reports of Hind and of Ells, the only professional geologists who have been within this area,* while the additional data for the accompanying map are in the preceding notes of this series at the pages noted below. Hind, in 1864, crossed from Long Lake to Big Lake, visited its outlet and returned to Long Lake. Ells, in 1880, ascended the Little Southwest Miramichi to about the mouth of the Walkemik or Upper North Branch (as he tells me in a letter) and returned by the same route.

GRANITES. On the Little Southwest, near Indian Brook, by Ells, in 1880 (Report, 1879-80, D, 34). I have myself seen these ledges which contain inclusions of schist. Near McInnes Lake and at Wigwam Pond in Note 63, page 67. On Milnagek Lake, Note 56, page 470. Above Senda Lake, below Gover Lake, and on lower course of Walkemik, in Note 87, page 341. On Renous, Note 85, page 316.

SCHISTS. At the outlet of Tuadook Lake by Hind in 1864 (Report, 1865, page 153). On Upper Graham Plains, Note 64, page 75. Northeast of the Crooked Deadwater, Note 55, page 465. On the Renous Lake and River, Note 85, page 314, 316. On stream near Crooked Deadwater, Note 86, page 326. On branch of Patchel Brook and lower course of Walkemik Branch, Note 87, page 341.

My note on Patchel Brook (Note 64, pages 73, 75) speaks of both felsites and granites forming the walls of the gorge of that stream, but I am uncertain as to their extent and mutual relations.

* Edward Jack, an amateur geologist, was in this vicinity in 1873, and, apparently, earlier, and made some observations, finding, however, no ledges within the area of our map. Charles Robb concluded erroneously from from Mr. Jack's notes that all this area was occupied by granite. (Report of the Geological Survey, 1870-72, page 251).

ARTICLE II.

THE PHYSIOGRAPHY OF GRAND LAKE,

By W. S. Butler.

Read 7th February, 1905.

(ABSTRACT)

Grand Lake is the largest sheet of fresh water in New Brunswick, and is part of a group of lakes on the eastern side of the valley of the St. John, in the flat region where it is bordered by extensive intervals or alluvial flats. It is connected with the other lakes by a thoroughfare or narrow creek-like passage, and connected with the St. John river by a narrow, tortuous passage called the "Jemseg." The lake is about twenty-five miles long, and from three to five miles wide, and has some long bays extending to the north-eastward. Salmon river, the principal affluent, enters the lake close to its upper end and with several important branches, conveys to it a large volume of water. The river next in size that enters the lake is Newcastle river, on which are important coal mines. Douglas Harbor, on the north-west side of the lake, formerly called the "Keyhole" is a remarkable indentation; it has high banks around it, but no stream entering it. Long point, on the same side of the lake is dangerous to navigation, because from it runs out a long bar, just under water, and so concealed from the navigator. The lake is comparatively shallow, especially in its upper part, between Bear island (concerning which the writer sent a communication to the society some years ago) and the head of the lake. There are extensive farming lands around this lake, especially along its south-eastern and western shores, with rolling lands and fertile fields. The northern shores of the lake are flatter and lower, and the lands there have supplied much lumber for market, at present the soft wood used for lumber is mostly cut away, but much hardwood remains. Formerly large vessels were built around Grand lake, but now the construction of vessels is confined to wood-boats and schooners. In the spring of the year there are excellent fisheries for gaspereau and shad in Grand lake and the lakes connected with it. Large numbers of wild fowl are found in its marshes and afford much sport in the autumn.

ARTICLE III.

ON AN EARTHENWARE POT OF THE STONE AGE FOUND AT MAQUAPIT LAKE.

By G. F. Matthew and S. W. Kain.

Read Dec. 6, 1904.

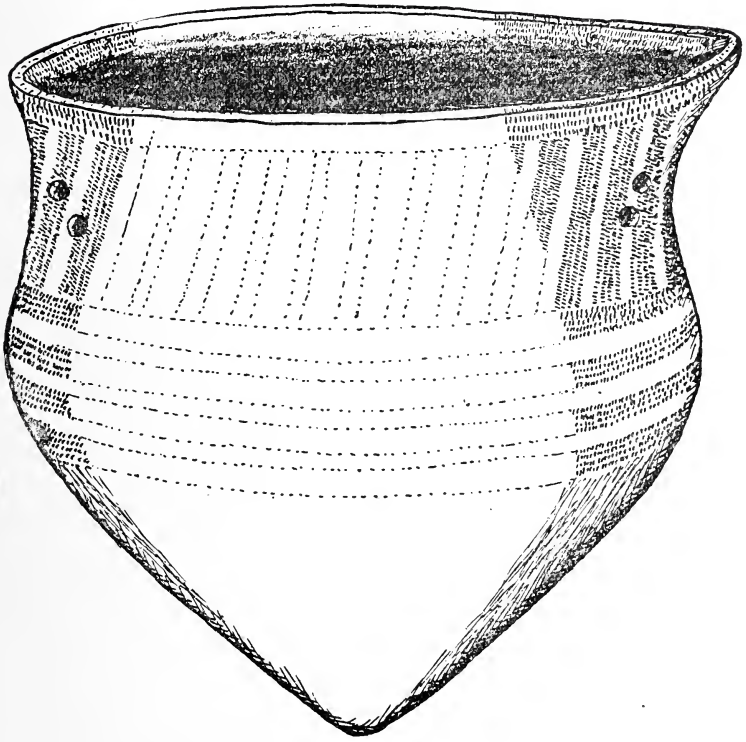


Fig. 1.— RESTORATION OF EARTHEN POT — ⅓ ORIGINAL SIZE.

In the autumn of this year the Society received from Mr. Duncan London portions of an ancient stone pot, which was obtained from him by correspondence with one of the authors of this paper.

This donation is of unusual interest, as the remains of the pot are sufficiently complete to enable us to reconstruct a typical piece of the pottery used by the people of the Stone Age who inhabited the valley of the St. John river before the advent of Europeans.

Heretofore we have had only small fragments of pots, etc., which may have belonged, as regards the several finds, to one vessel, or to many; and so doubt and uncertainty existed as to the size and form of the vessels to which these fragments belonged.

With Mr. London's fragments of a single pot, we are able to reconstruct the vessel from the bottom up to the lip, and observe the pattern which the ancient potter traced on the surface of the vessel, and judge of the amount of artistic skill displayed in its ornamentation.

Further, with this pot as a standard, we can study to advantage the numerous pieces of ancient pottery of the Stone Age in the Society's possession, and to note any difference that may exist in form and ornament between it and others from the same district, and from other parts of the province. From these comparisons we hope to form some opinion of the possibility of these earthenware fragments belonging to successive inhabitants of this region, or to different tribes inhabiting parts of the province, or adjacent regions. Where a people have left no written records, we are thrown back upon such methods as these, for obtaining a knowledge of their domestic habits, and stage of advancement in the arts of civilization; which is of more importance to humanity than a record of their wars and conquests.

Since the visit of our Society to French Lake in 1893, when we held a summer camp there, and made a study of the natural features and archæology of the district,* Mr. London, who lives near there, has taken a great interest in the remains left by the Stone Age people, and has been in frequent correspondence with one of the authors of this paper. More than once he has shown his liberality by giving to our museum articles of this nature which he has secured around French and Maquapit Lakes.

The remains of this pot were found by Mr. London in the

* N. H. S. Bulletin No. XII, p. 84.

edge of Maquapit Lake, at a time in the summer when the waters of the lake were unusually low, and so exposed portions of the flats on the S. W. shore of that lake which usually are under water. Along this side of the lake are remains of an abandoned portion of the thoroughfare from French Lake, now partly silted up. This thoroughfare now goes directly out into Maquapit Lake, west of the old deserted channel. The subsidence of the earth's crust in this part of the valley of the St. John river would have allowed this to occur, by the depression of the portion of the intervale which once protected this abandoned channel from the surf of the lakes.

It is quite possible that the subsidence of this area by bringing the spot where the pot was found, beneath the ordinary lake level at the present day, may have been the means of preserving it from the destruction by frost which has overtaken other vessels that have been exposed to its action, when lost in the water or abandoned at higher levels along the lake shores, and thoroughfares.

The form of the pot donated by Mr. London is not without special significance. Heretofore, from the fragments preserved we have thought the bottoms of pots of people of the Stone Age in this region were round; such a form would have a special advantage where the vessel was not used to set on a flat surface, but to be held in a bed in the ashes, or the loose earthen floor of a hut bottom. But in Mr. London's pot there is a departure from this ideal, in that the form of the bottom is that of a rounded cone; this conical shape would have an advantage, where the bottom of the pot was set in the ashes of the fire; it would rise the body of the pot higher than if the bottom were round, and so bringing its sides more completely under the action of the fire.

That the pot was not raised entirely above the fire, as the ordinary iron pot now in use is, seems clear from the fact that the surface coating of clay at and near the bottom, is not burned off, as it is higher up on the slope of the pot.

The outward slope of the pot rises to about the middle, whence it curves gradually inward, so that the upper third of the pot has a smaller diameter than the middle; and above this constricted

portion it slopes outward again to the lip. This curving form is not only pleasing to the eye, but protects the upper part, where the ware is thinner, from the fierce action of the fire.

We had observed this curving slope in fragments of aboriginal pottery previously collected, and in the first field camp which the Society held, viz., the one at Bocabec (1883),* an implement of bone was collected which puzzled the members who worked at the shell heaps of the Stone Age that are found there, as to its use or purpose. The object was sent to Sir Daniel Wilson, then the chief Canadian expert in archæology, who stated that this tool was believed to have been used in forming the curve, which is found below the rim in these ancient culinary vessels.

The material of which this pot was made appears to have been ordinary fine river sand mixed with clay. Where the force of the fire in subsequent use has been strong enough to change the color of the pot, the iron in the clay has been sufficient to give the ware a brown tint. Elsewhere it remains of a gray color, showing that in the original firing it was not subject to intense heat, such as is used in the manufacture of modern pottery; it is, therefore, at present tender and easily broken. Also for this reason it is not easy to attach broken fragments that evidently belong together, and the reconstruction of a pot becomes difficult.

With such tender ware it was necessary to make up in thickness what is lacking in cohesive strength, and so the bottom of the pot was made quite thick. At the apex (in the bottom of the pot) it is 1½ inches thick; at three inches from the bottom it is ¾ of an inch thick, and at six inches up it is ½ an inch thick; a little above this it is ⅜; and from this to the lip varies from ⅜ to ¼ of an inch in thickness. Thus the greater thickness of the pot is from the widest part down to the apex, increasing gradually, while the upper half of the pot is comparatively uniform in thickness.

While the outside of the pot (leaving out the pattern on the surface) was quite smooth, the inside shows marks of the potter's hand. These are impressions of the ends of the fingers drawn around the pot to form it. These impressions are not quite

*N. H. S. Bulletin No. III, p. 7.

regular, as we would expect them to be, if a potter's wheel had been used in forming the pot; but in some places the finger streaks are deeper, and in others less marked.

The outer surface of the pot, where not worn or cut by the fire, is remarkably smooth, much more so than the inside. It evidently had a luting of fine mud or clay spread over the whole outer surface, and upon this sensitive coating the pattern was laid. How the very smooth surface was given to this luting of clay we can only conjecture; but we may surmise that a brush of fine fur would serve as a tool for this purpose.

For about 3½ inches from the apex the surface of the pot is perfectly smooth; this is the part that would be buried in the ashes when the pot was in use.

The pattern (which we may call rush pattern) on the lower part of the pot, above the smooth surfaces, consists of faintly impressed longitudinal grooves, radiating from the bottom up the slope of the vessel. We conjecture that this pattern may have been impressed in the following way: To support the pot at a level, where the potter could work at it conveniently and without detriment to the smooth surface, the vessel may have been held in a hoop, supported at the sides on stakes; if this hoop had a lining of rushes held in place at the top by another hoop (making a double hoop), and these rushes were tied together at the bottom, they would form a bag or cavity in which the pot could be placed preparatory to using the tool by which the chief pattern made on the surface of the pot was given. The weight of the pot itself was sufficient to cause the faint longitudinal grooves which we find near its lower part. This part of the pot was about three inches wide.

Above the Rush pattern we come to the part where the potter applied herself seriously to the decoration of the surface. From here up to the lip of the pot, we find the ornamentation made with one and the same tool, and a similar tool has been used in the decoration of the other fragments of pottery of the Stone Age found in New Brunswick.* The pattern on this pot is such a one as might have been made by a row of four or five projections

*See Bulletin Nat. Hist. Soc. of N. B. No. III, p. 17.

similar to the small teeth.* A modern artizan would have set such tools in a small wheel to facilitate rapidity of work, but we have found no proof that such a device was used on the aboriginal pottery of New Brunswick. If the tool were a chisel-ended one with teeth, the resulting ornament does credit to the infinite patience of the potter who decorated the surface of this pot, for only a steady hand and great care could have made the separate indents so uniform as they are seen to be. On the other hand, the several rows of pattern are by no means exactly spaced from each other, as some are even twice as far apart as others.

FIG. 2.—DECORATION ON THE POT.—NATURAL SIZE

The pattern made by the tool above indicated consists of a central depressed furrow, with faint tooth-like impressions or dots; on one side of this (the right hand) † they are more distinctly like a pair of tooth marks, with a shallow line between the two teeth; or the other (the left) there are similar toothed impressions, but the division of the two teeth is less marked. There are thus two little teeth on one side of the median depression, and a single long tooth impression (or one obscurely divided in two) on the other. When well preserved, the median groove is also seen to have faint tooth-like impressions in the bottom. The

*See Bulletin Nat. His. Soc. of N. B. No. 111, p. 17.

† In this figure the pattern is reversed.

whole width of this tooth pattern is about half of an inch, and bands thus made run over the surface of the pot.

In the laying on of the pattern for a space of about three inches around the bilge of the pot there are four horizontal rows of these bands (See Fig. 1), and in some places they are nearly obliterated, being worn off by the fierce action of the fire; but it can be seen that the tool which made this pattern even pressed through the clay coating and indented the sandy bottom of the ware, so that both the ware itself and the fine luting that covered it must have been in a plastic condition when the tool was applied.

Above the bilge, where the sides of the pot are concave, for a space of about three inches in width, the surface is marked by bands of pattern, which in place of being horizontal, as those below, are diagonal; these extend nearly to the lip of the pot. (See Fig. 1). Here the pattern is in better preservation, having escaped somewhat the intensity of the fire. These bands of pattern start from the uppermost of the four horizontal bands.

Finally there is a horizontal row of tooth-like impressions around the brim below its edge. These have been made by a different tool from that which made the diagonal pattern below; they show three or four more deeply indented teeth, but are intended to carry out a similar design. In this row there are about eight or nine imprints in the space of an inch, but in the main pattern twice that number. The upper edge of the pot has a row of two teeth all around, as there is not room to show the full pattern. But inside the brim is a row of three or four tooth pattern intended to carry the same ornamentation over the rim.

The transverse diameter of this pot was nearly one foot, and the height of the pot somewhat less. The mouth of the pot is not perfectly round, for a deviation from the circular outline of the edge is caused by a short lip where the edge is pushed or drawn out for convenience in pouring out the contents of the vessel. (See Fig. 1). The spout is a short, broad one, but resembles those we have seen on some modern pitchers. That the projecting lip has been used for this

purpose is clear from the blackened outer surface of the pot below this spout, showing where the drippings of the pottage has been charred by subsequent use of the pot on the fire.

And indeed we found evidence here, as the explorers at Bocabec had at an earlier date, that the cook did not exercise much care in cleansing the inside of the pot after use, as this in places bore evidence in a charred crust that no trouble was taken to clean the inside of the vessel.

One peculiar feature that marks this pot is the presence of holes bored through the ware from the outside, and quite fresh in appearance, as though not worn from use. These holes are from an eighth to a quarter of an inch in diameter, and are in pairs in the hollow or curved part of the pot, about an inch and a half, below the brim. There are two pairs, one on each side of the spout, and there is another pair in the back part of the pot, but exactly where does not appear from the fragments preserved; possibly there may have been another pair of paired holes at the back to correspond to those near the spout. These paired holes are not in a horizontal position, but in each pair one is considerably below the other.

Similar paired holes have been found in aboriginal pottery found in Ontario, and Mr. David Boyle has suggested that they were made to fasten two pieces of pottery together, *i. e.*, to repair a break. But this cannot be the case with the holes in the pot from Maquapit Lake, for in it there are no breaks between the holes. It has been thought that these holes were for strings or sinews by which the pot could be suspended or lifted, and Mr. Boyle has suggested that these strings could be protected from the fire by a covering of clay plaster on the outside of the pot; but in the Maquapit pot we find no trace of such material having been used over these holes as a shield from the fire.

What makes the purpose and use of these holes all the more difficult to understand, is that a single hole somewhat larger than the others was bored at a point which is even below the fullest part of the bilge of the pot, where, unless plugged, it would have drained off the principal part of the contents of the pot. It would seem possible that this pot, after it had served its purpose

as a cooking vessel, may have been used for the storage of small valuables of a family of the Stone Age people, and that the perforations were for strings with which to suspend the vessel in some out-of-the-way corner of the hut. Or it may be that these people were migratory in their habits, like the present aborigines, and buried their valuables when moving to a new camping ground. (See paragraph in Mr. London's letter relative to the depths at which pottery fragments were found).

We append here copies of the letters received from Mr. London and Mr. Boyle relative to this vessel:

LAKEVILLE CORNER, Sunbury Co.
November 14th, 1904.

DEAR MR. KAIN:

I accept with much gratitude the hearty vote of thanks tendered me by the Natural History Society, and only wish that I could render better assistance in the good work that is being done. I am always encouraged by the attention which you and Dr. Matthew give to specimens that I send you.

On Monday, August 8th, 1904, I was prospecting for Indian relics at Ring's Island, S. W. side of Maquapit Lake, and soon discovered on the point of the ridge, about two or three rods from the bank of the thoroughfare, a large lump of mud of a little lighter color than the mud-flat, and as I had found two other objects like it this year, and two last year, in the same place, I knew that I would find pottery fragments under it, and I secured what was left of the largest and thickest pot I have ever seen, and have just sent you the same. All the other fragments I got there this year and last I did not keep separate. There were not enough pieces together of any other dish to indicate how large it was. All that are not yet uncovered are probably more or less broken. When the water is summer-low the ridge is about six feet out. The pot I sent you had been about one foot under ground. Of the other four, one was at the surface of the ridge. The depth of the rest under ground had been six, twenty-four, and thirty inches, respectively.

I am sending you a sketch of Maquapit Lake, showing the above-mentioned place.

Yours sincerely,
DUNCAN LONDON.

P. S.— Those pots were from ten to twenty-five feet apart. You can make what use you please of this note.

TORONTO, November 16th, 1904.

SAMUEL W. KAIN, ESQ., Custom House,
St. John, N. B.

DEAR SIR:

In reply to your letter of the 14th inst., in which you refer to the fact that certain portions of the old Indian pot found in New Brunswick are perforated and look as if rimmed, or countersunk from the outside, I remember very distinctly the conversation you and I had on this subject in our museum, and I remember equally well telling you that, as far as I knew, I was the first to offer, what I regard, as being the only explanation that satisfies the conditions, so far as such holes are concerned. You say that Dr. Matthew offers an objection respecting my theory, asking, "What material could have been used to do the fastening which would stand fire?" This is an easily answered question. In the first place, I do not think pots of this kind were ever placed *over* the fire. They were placed *beside* the fire, and heated stones from the fire were placed in the pots. But even where we may suppose the pots to have been placed on the fire, you know as well as I do, that on account of the rounded bottoms of all our Canadian pottery, the vessels were first steadied in a hollow in the ground, around which, we have reason to believe, the fire was sometimes placed. In such a case, if the perforations are found in the bottom, any binding material would be safe there from the fire. If used on the sides, they would be safe when plastered over with clay, and in any event, there is little doubt that clay *was* plastered over the cracks that the holes were made to bind together. Of course not being able to see the holes for myself, or to knowtheir exact position in the pot, I am unable to say how far the conditions will square with my theory. I have, however, little doubt that it was for the purpose I have mentioned these holes were made. If, as Dr. Matthew thinks, such holes were made for the purpose of tipping the pot, or, as still others think, for the purpose of having something to use as a handle or bail, it occurs to me that holes for such purposes would have been made by the potter when she was modelling the vessel.

Can you not send me a drawing of that pot, even if it be only a rough sketch? From what you say about holes being rimmed from the outside, this rimming or countersinking is proof that the holes were made after the pot was finished. Are these holes on each side of a fracture?

Yours respectfully,
DAVID BOYLE.

ARTICLE IV.

SUPPLEMENTARY LIST OF THE LEPIDOPTERA OF NEW BRUNSWICK.

By William McIntosh.

In Bulletins Nos. XVII, XVIII and XIX, introductory lists of the Lepidoptera of New Brunswick are given. These lists enumerate some 53 species of butterflies and 232 moths. The moths include only the super-families Sphingoidæ, Saturnoidæ and part of the Bombycoidæ of Dyar's catalogue.

The following list is presented as a supplement to those already published. The species enumerated belonging to the families represented in the lists found in the Bulletins named above.

FAMILY NYMPHALIDÆ.

Polygonia satyrus, Edw. This is considered a western species, but our specimens have been examined by Dr. Fletcher and pronounced genuine satyrus. Rare; only a few specimens have been taken.

FAMILY AGAPETIDÆ.

Enodia portlandia, Fab. Two specimens of this rare butterfly were taken during the past summer about twenty-two miles above Fredericton by Stanley Jewett.

FAMILY LYCÆNIDÆ.

Thecla acadica, Edw. Evidently rare, taken at Scotch Lake, Queens Co., by William H. Moore, and at Nerepis, Kings Co., by the writer.

FAMILY HESPERIIDÆ.

Amblyscirtes samoset, Scud. A few specimens taken in July. May be fairly abundant, but owing to its quick flight, small size, and dark color, is not easily noticed.

FAMILY SPHINGIDÆ.

Phlegethontius cingulata, Fab. Occasionally abundant late in the summer.
Ceratomia amyntor, Geyer. Not a common species.
Lapara bombycoides, Walk. Not common, June.

FAMILY SATURNIIDÆ.

Automeris io, Fab. Not uncommon in Western New Brunswick, but we have no record of its occurrence near St. John.

FAMILY ARCTIIDÆ.

Eubaphe aurantica, var. rubicundaria, Hbn. Rare.
Eubaphe aurantica, var. quinaria, Grt. July, not abundant.
Arctia caia, Linn. This moth is taken in Western New Brunswick. We have no record of its occurrence near St. John.
Halisidota caryæ, Harr. Taken in York and Carleton Counties.

FAMILY NOCTUIDÆ.

Panthea furcilla, Pack. Rare, July 15 to 31.
Apatela funeralis, Grt. Two specimens in July.
A. grisea, Wlk. Rare, late in June and July.
A. brumosa, Gn. One specimen, May 31.
A. hæsitata, Grt. One specimen, August 12.
A. sperata, Grt. Rare, July 2 to 5.
A. noctivaga, Grt. One specimen, June 15.
A. distans, Grt. Not common.
A. lanceolaria, Grt. Recorded from Chatham.
Arsilonche albovenosa, Goeze. Not common, June, July and August.
Dipthera fallax, H. S. Occurs in August.
Hadena mactata, Gn. Two specimens.
H. ducta, Grt. One specimen.
H. lignicolor, Gn. Rare.
Feralia jocosa, Gn. Not common, taken last of May.
Pyrophila pyramidoides, Gn. One or two records from Central New Brunswick.
Oncocnemis artifasciata, Morr. Not common in August and September.
Eueretagrotis attenta, Grt. Common July 22 to August 17.
Semiophora elimata, Gn. Common in July.
Pachnobia fishii, Grt. Occasionally very abundant in May.
Noctua oblata, Morr. A few specimens in July.
Carneades detersa, Walk. This species appeared in the list published in Bulletin XVIII as Carneades quadridentata, on the authority of the late Dr. Strecker. Prof. John B. Smith, upon examining a series of specimens from this locality, found it to be Walker's Charæas detersa, our specimens being larger and much darker than the American specimens accounting for Dr. Strecker's mistake.
Mamestra grandis, Bdv. Reported from Chatham.
M. rosea, Harv. Several taken in June.

M. rugosa, Morr. One specimen, July 9.
Orthodes crenulata, Butler. A common species.
Xylina tepida, Grt. Taken in some numbers in April.
Litholomia napæa, Morr. A common species in April and May.
Calocampa cineritia, Grt. Not common, June.
Achatodes zeae, Harr. One or two specimens only.
Papaipema purpurifascia, G. & R. Rare.
P. rutila, Gn. Not common.
Tapinostola variana, Morr. One specimen, July 14.
Euchalcia venusta, Wlk. One specimen. August 7.
Eosphoropteryx thyatirodes, Gn. Two specimens taken in August.
Autographa rubidus, Ottol. Dr. Ottolengui described this species in 1902 from New Brunswick and Manitoba specimens.
A. alias, Ottol. A very common moth.
A. vaccinii, Hy. Edw. Common.
A. variana, Ottol. Described by Dr. Ottolengui from a species taken by the writer. New Brunswick is the only known habitat for this species.
Erastria carneola, Gn. One specimen, July 15.
Euclidia cuspidea, Hbn. Rare, June.
Syneda alleni, Grt. Not uncommon in June and July.
Zale horrida, Hbn. One specimen.
Thysania zenobia, Cram. This South American moth was taken near St. John in 1902. This being the first record of its occurrence in Canada.
Epizeuxis lubricalis, Geyer. Common.
Palthis angulalis, Hbn. Very common.
Lomanaltes eductalis, Wlk. Common.
Bomolocha baltimoralis, Gn. Also abundant.

FAMILY NOTODONTIDÆ.

Melalopha apicalis, Walk. Several taken.
Melalopha albosigma, Fitch. Not common, June.
Gluphisia septentrionalis, Walk. Not common, June.

FAMILY LIPARIDÆ.

Euproctis chrysorrhœa Linn. One specimen taken. This was the first Canadian record of the brown tail moth. The writer has not been able to visit the locality of its capture since to see if additional specimens could be found.

FAMILY LASIOCAMPIDÆ.

Tolype velleda, Stoll. Two specimens taken at McAdam Junction.

ADDITIONS TO THE PLANTS OF NEW BRUNSWICK.

By G. U. Hay, Chairman Botanical Committee.

During the past two seasons about forty species and varieties of flowering plants new to New Brunswick have been reported, while additional new localities have been found for a number that have been hitherto considered rare.

In the latter part of June last, Mr. M. L. Fernald, of the Gray Herbarium, Cambridge, Mass., spent a day in St. John, part of which was devoted to an examination of plants on the Ballast Wharf. In the afternoon of the same day, with two members of our Botanical Committee, some hours were spent in Rockwood Park investigating the plants. In both places the investigation proved of considerable interest, and a few new varieties were added to our list of introduced plants.

A week later I had the great pleasure of meeting with the Josselyn Botanical Society of Maine at Fort Kent. Nearly a week was spent in examining the flora of the meadows and forests on both sides of the St. John river in that vicinity. Several plants new to New Brunswick were found, which are recorded in the list following, and a few are recorded separately, which were found on the Maine side of the boundary. These are to be looked for in New Brunswick, where their occurrence is probable. Mr. Fernald's exact knowledge of the plants of that region proved of the greatest service to the other botanists of the party, and especially to the New Brunswick representative. Indeed, the members of the Josselyn Club were all very generous in extending their investigations into this province, and both sides of the river came in for a fair share of attention, a kind of pleasant and unselfish reciprocity which might be more widely imitated in the relations between the two countries.

The botanists of the Atlantic Provinces of Canada — New Brunswick, Nova Scotia, Prince Edward Island, and Eastern Quebec — might well form a society like the Josselyn Botanical

Society of Maine to investigate more fully the flora of these provinces, which has so much in common and at the same time such marked differences. A society like this, spending a week or more every season, alternately inland and near the seashore, would do much in the interests of botanical research for these provinces.

The presence of the members of the Royal Society and its branch—the Botanical Club of Canada—in this city in June last was another occurrence of interest. The members of the club enjoyed an outing in the Park, and other points, and the presence of Dr. Jas. Fletcher, Dr. A. H. MacKay and others contributed to the success of the meeting.

Some New and Rare Plants.

The following embrace the discoveries of the past two years. The names of those plants printed in full face type are recorded for the first time in New Brunswick.

16 Ranunculus sceleratus, L. Dalhousie. *Fernald.*

41 Barbarea vulgaris, R. Br. Ballast Wharf, St. John. *Fernald* and *Hay.*

49*a* **Sisymbrium altissimum,** L. On railway track near Ingleside. A newly imported weed. *Dr. Jas. Fletcher* and *G. U. Hay.*

50 Erysimum cheiranthoides, L. On railway track near Ingleside. *Hay.*

58*a* **Lepidium apetalum**, Willd. Ballast, St. John. *Fernald.*

68*a* **Viola septentrionalis,** Greene. Woods, St. John. *Fernald.*

105*a* **Hypericum boreale,** Bicknell. Bathurst. *Fernald.*

179*a* **Pyrus sitchensis,** Piper (=P. sambucifolia of eastern authors) In Rockwood Park, St. John. *Fernald* and *Brittain.*

180 Potentilla simplex (=Protentilla canadensis, L., var. simplex, Torr. and Gray. On grassy bank near Ballast Wharf, St. John. *Fernald* and *Hay.*

244*a* **Osmorrhiza divaricata,** Nutt. St. Francis, Madawaska Co. *C. H. Knowlton.*

280*b* **Galium Claytoni,** Michx. Bathurst. *Fernald.*

280*c* **G. labradoricum,** Wiegand. St. John. *Fernald.*

280*d* **G. palustre,** L. Bathurst. *Fernald.*

310*b* Aster longifolius, Lam. Ingleside. *Hay.*

316*a* **A. subulatus,** Michx. Salt Marsh, Bathurst *Fernald.*

323*a* **Antennaria canadensis,** Greene. Bathurst. *Fernald.*

323*b* **A. neodioica,** Greene. Bathurst. *Fernald.*

343*a* **Matricaria discoidea,** D.C. Ballast Wharf, St. John. *Fernald* and *Hay.*

343*b* **M. inodora,** L. St. John and Bathurst. *Fernald.*

354*a* **Senecio sylvaticus,** L. St. John. *Fernald.*

355*b* **S. Robbinsii,** Oakes. Along railway track near Harvey Station. *Fernald.*

366*a* **Hieracium floribundum,** Wimm. & Grab. St. John. *Fernald.*

367*a* Leontodon autumnalis, L., var. **pratensis,** *Koch.* Near Ballast Wharf, St. John. *Fernald.*

368*a* Taraxacum officinale, Weber, var. **palustre,** Blytt. St. John. *Fernald* and *Hay.*

392 Vaccinium caespitosum, Mich. Dry grounds. St. Francis, Madawaska County. *Hay.*

399 Epigaea repens, L. In fruit (rarely found). Fort Kent. *Fernald.*

413 Monotropa hypopitys, L. In moss of fir woods. Ingleside. *Hay.*

422*a* Glaux maritima, L., var. **obtusifolia,** Fernald. Bathurst, *Fernald.*

461. Limosella aquatica, L., var tenuifolia, Hoffm. Bathurst. *Fernald.*

466*a* Veronica serpyllifolia, L., var. **borealis,** Laestadius. Thickets on banks. St. John River. Clair, Madawaska County. *Members Joss. Bot. Soc.*

527*a* **Polygonum exsertum,** Small. Salt marsh, Bathurst. *Fernald.*

541*a* **Rumex Acetosa,** L. Fills some fields between St. John and Coldbrook. *Fernald.*

567*a* **Betula glandulosa,** Michx. On the big plateaus along the South. Branch Nepisiguit. *W. F. Ganong.*

582*a* Salix glaucophylla, Bebb. Gravelly shores of Upper St. John. St. Francis. *Members Joss. Bot. Soc.*

582*b* Salix lucida, Muhl., var. **intonsa,** Fernald. Along Upper St. John River St. Francis. *Members Joss. Bot. Soc.*

584*a* S. **alba,** L , var. **vitellina,** Koch. Rockwood Park, St. John. *Fernald* and *Hay.*

600 Picea nigra, Link. The slender ragged-topped spruce of our northern swamps. *Fide Fernald.*

620 Pogonia ophioglossoides, Nutt. St. Francis. *Members Joss. Bot Soc.*

622*a* **Habenaria virescens,** Spreng. Low wet places along the Northwest Branch Oromocto river. *Ganong* and *Hay.*

623 H. bracteata, R. Br. (=H. viridis, R. Br., var. bracteata, Reichenbach). Wet meadows and woods. Oromocto and St. Francis. *Hay.*

630 H. lacera, R. Br. Moist thickets and meadows. Ingleside. *Hay.*

632 H. fimbriata, R. Br. Moist thickets. Ingleside. Second station reported in New Brunswick. A handsome plant with large lilac-purple flowers. *Hay.*

637*a* **Iris setosa,** Pallas, var. **canadensis**, Foster. Abundant on beaches and headlands of the Bay Chaleur. *Fernald.*

638*a* **Sisyrinchium angustifolium,** Mill. On grassy bank near Ballast Wharf, St. John. *Fernald* and *Hay.*

672*a* **Juncus alpinus,** Vill. Bathurst. *Fernald.*

677*a* Luzula campestris, D.C., var. **frigida,** Buchenan. On grassy banks near Ballast Wharf, St. John. *Fernald* and *Hay.*

732 Scirpus rufus, Schrad. Bathurst. *Fernald.*

753*b* Carex canescens, L., var. **disjuncta,** Fernald. Bog in Rockwood Park, St. John. *Fernald* and *Brittain.*

786*a* C. umbellata, Schk., var. **brevirostra.** Boott. Alluvial thicket, banks of the St. John, at Clair, Madawaska County. *Fernald* and *Collins.*

817*a* **C. glareosa,** Wahl. In brackish places, clefts. Dalhousie, Restigouche County. *M. L. Fernald.*

817*b* **C. albicans,** Willd. In alluvial thicket on banks of St. John, at Clair, Madawaska Co. *Fernald* and *Collins.*

829*a* **Panicum boreale,** Nash. Alluvial thicket, banks of the St. John, at Clair, Madawaska Co. *Fernald* and *Hay.*

833 Hierochloe borealis, Roem and Schultes. . Clair, Madawaska County. *Hay.*

864 Poa pratensis, L. Waste grounds. St. John. *Fernald* and *Hay.*

864*a* P. pratensis, L., var. **domestica,** Laestadius. Waste grounds, St. John. *Fernald* and *Hay.*

864*b* **P. glauca,** Vahl. In alluvial soil, banks St. John river, Clair, Madawaska Co. *Members Joss. Bot. Soc.*

876*a* Glyceria borealis, F. W. Batchelder. Banks of St. John, at Clair, Madawaska County. *Fernald* and *Hay.* Second station reported in New Brunswick.

892*a* Equisetum arvense, L., var. **campestre,** Milde. Gravelly shores of the St. John, at St. Francis. *Members Joss. Bot. Soc.*

The following plants found by Mr. M. L. Fernald on the borders of New Brunswick may be looked for within the province: *Poa alpina,* L., on rocks, Metapedia side of Restigouche; *Osmorrhiza obtusa,* Fernald (a cascade mountain plant) found on the Restigouche at the mouth of the Metapedia, should occur on the New Brunswick side; *Cnicus discolor,* Gray, a large plant, 4-6 feet high, leaves white underneath, at Van Buren and on Aroostook river, Maine; *Listera auriculata,* Wiegande, *Carex Crawfordii,* Fernald, *Carex Raeana,* Boott (very rare), *Lycopodium sitchense,* Rupr., found at or near Fort Kent, Maine.

Additions to New Brunswick Fungi.

The following additions have been made to the list of New Brunswick larger fungi. They have all been collected at Ingleside, except where mention to the contrary is made. The same plan has been adopted as in previous lists of subjecting all critical species to the notice of a specialist. Dr. W. G. Farlow, of Cambridge, Mass., Professor G. F. Atkinson, of Ithaca, N. Y., and Professor C. H. Peck, of Albany, N. Y., have kindly examined and identified many of the plants found in the list following :

Amanita spreta Pk. Ground in open places. Poisonous.

A. rubescens Pers. Edge of woods.

Lepiota naucina Fr. Growing in conservatory of H. E. Gould, Sussex.

L. carcharius Fr. In open places.

Armillaria imperialis Fr., var. americana Farlow. A fine specimen, growing under evergreens.

A. imperialis Fr., var. grisea Farlow. "This is the specimen noted as *A. imperialis* (?) Pk., in Bulletin No. 21. Found in a few places in New Brunswick and Maine. Distinguished from A. ponderosa by the double ring. The American specimens do not differ from the European species, except in the paler color of the pileus. A similar variation in color is found in other species of this genus, and the New Brunswick fungus may be called A. imperialis Fr., var. grisea Farlow."—W. G. F.

Clitocybe laccata Scop., var. striatula Pk. In mixed woods and open places.

Collybia longipes Bull. Deeply rooted among decaying deciduous leaves.

C. fusipes Bull. On decayed wood.

C. radicata Rehl. Among decayed leaves in deciduous woods.

Mycena leaiana Atkinson. On rotting leaves.

Lactarius torminosus Fr. Low woods. Acrid white juice. Said to be poisonous.

L. resimus? Fr. Common in the woods about Ingleside.

L. uvidus Fr. In woods. The milky juice white, turning as also the flesh to a beautiful lilac.

Russula punctata Gillet. In grassy places.

R. rubra Fr. In mixed woods.

Cantharellus infundibuliformis Fr. In mossy damp woods.

C. rosellus Pk. In the moss of thick evergreen woods. A pretty plant.

Flammula sapinea Fr. Growing on dead coniferous wood.

Cortinarius purpurascens Fr. In mixed woods.

C. albo-violaceus Pers. In open woods.

C. asper Pk. In woods and clearings.

C. lilacinus Pk. Low mossy grounds in woods.
C. castaneus Bull. On the ground in spruce woods.
C. ochroleucus (Schaeff) Fr. On the ground among decaying leaves.
C. sanguineus Fr. Under and upon moss-grown decayed logs. Whole plant a dark blood-red color.
Paxillus strigosus Pk. In mixed woods.
Gomphidius glutinosus (Schaeff) Fr. On borders of evergreen woods. An interesting co-partnership was noted,—the base of the stem of this plant united to that of a boletus.
Lentinus cochleatus Fr. Found on stumps.
Boletus albus Pk. In evergreen woods.
B. edulis Bull., var. clavipes Pk. Everywhere in mixed woods.
B. vermiculosus Pk. In woods. The plant changes suddenly to a beautiful blue when wounded.
B. ornatipes Pk. Woods and open places.
B. serotinus Frost. Shaded grassy places. Flesh white, changing to a bluish color when wounded.
B. subtomentosus L. In woods.
Boletinus porosus (Berk) Pk. Damp grounds in woods and open places.
B. pictus Pk. In the moss of woods and swamps.
Polyporus varius Fr. On stumps.
P. circinatus Fr. Somewhat rare. A fine specimen, with duplicate strata of pilei, found growing on the roots of an upturned fir tree.
P. leucophaeus Mont. Growing on dead trunks.
P. fomentarius Fr. A small form found on oaks.
Poria tomentocincta B. & Ray. On dead wood.
Daedala unicolor Fr. On stumps, especially birch.
Merulius tremellosus Schrad. On decayed trees. Rare.
Hydnum ochraceum Pers. On dead branches.
Hydnum albonigrum Pk. In evergreen woods.
Sistotrema confluens Pers. Rare. On the ground and on stumps.
Radulum Bennettii B. & C. *Fide* G. F. A. On dead trunks.
Phlebia merismoides Fr. On stumps and branches. Rare.
Craterellus clavatus Fr. On the ground in the moss of swamps.
C. cornucopioides Pk. In woods. Not common.
Geoglossum glutinosum Pers. On the ground among grass, etc.
Peziza scutellata. On decayed wood.
Xylaria polymorpha. On dead trees.

Plants previously reported,	233
Additions named above,	53
Total,	286

OBSERVATION OF PLANTS, 1904.

By G. U. Hay.

April 30.—A very severe winter with abundance of snow and steady cold weather. Sleighing good up to the end of March. April has been cold, with hard frosts and frequent light falls of snow up to the 20th. On the 19th there was a heavy snow storm, with strong wind from the northeast, and drifts. This was followed by a few days of mild weather and a warm rain on the 26th. During late April and early May the weather was fine and cold, with light frosts at night. April 27th: Coltsfoot (tussilago farfara) in bloom at St. Stephen (J. V.); May 1st, in bloom at St. John; April 27th: Ribes fetidum in leaf under cliffs in Rockwood Park and alder catkins discharging pollen.

Wild Garden, Ingleside.

May 4.—Plants in bloom: Hepatica, mayflower, red maple, and a few of the dog-tooth violet. Catkins of the trembling poplar, alder, and birches shedding pollen freely. Frost out of the ground in the clearings, but patches of ice and snow remain in the woods.

May 10.—White violets and strawberry plants beginning to bloom.

May 18.— Plants in bloom: Pappoose root (caulophyllum thalictroides), amelanchier, bluets, dandelion, marsh marigold, trillium grandiflorum (not native, but has bloomed regularly since it was transplanted from Ontario ten years since), trillium erythrocarpum, lonicera ciliata, alnus viridus, rhodora (a few), ribes fetidum, uvularia sessilifolia, anemone nemorosa, white and blue violets in great abundance, mayflowers in shaded places. Trees in leaf: Betula papyraceae, amelanchier canadensis, pyrus americana, acer spicatum. Coming into leaf: Elm, horse-chestnut, red maple, trembling poplar, red cherry, sugar maple, mountain maple.

Fine growing weather for the past week, with plenty of rain

and warm weather, hastening the vegetation, but the rain retarding farming operations.

May 25.— Weather cool at nights, with occasional light frosts, but the days warm, with showers alternating with sunshine. Purple trillium, red-berried elder, red-ozier dogwood, blueberry plants, trientalis americana, bog-bean and striped maple in blossom. Amelanchier everywhere in full bloom, its white blossoms in contrast with the vivid green of the new foliage. At no other season do our northern woodlands present a fairer picture than at this time. The deciduous trees are all in leaf, except the red oak, red ash, acacia and sumach. The white silky wool of the opening leaves of the large-toothed poplar give still another tint to the many tinted foliage of spring.

May 28.—The fallen petals of amelanchier begin to whiten the ground in the neighborhood of these trees. The white petals of the red cherry are fully expanded, keeping up the brightness of the woods for a week longer. The petals of the white trillium are beginning to fall. In bloom: The twisted-stalk (streptopus roseus), clintonia, crataegus, with the Siberian crab-apple and Persian pea of the gardens. Nearly all the ferns have unrolled their fronds.

June 10.—A few ripe strawberries found in sunny spots. In bloom: Iris versicolor, ledum latifolium, potentilla canadensis, cypripedium acaule.

June 12.—Weather cool. Light frosts on the night of 11th and 12th. Thermometer 40° F. at 6 a. m. on the morning of the 13th.

August 31.—Quite severe frosts in many places last night. The evenings have a decided chill. There are abundant rains at intervals. All through the summer there was very little continued hot weather.

October 13.—A cold wet autumn followed a cool summer, and the harvesters' work was greatly interfered with. On the night of October 7th the ice that had formed on a shaded wood road was visible at four o'clock in the afternoon of the following day.

November and early December had many warm days and clear crisp nights, reminding one of our usual October weather.

APPENDIX.

SUMMARY OF THE PRESIDENT'S ADDRESS.

On a previous occasion I made a reference to the great necessity which exists for the construction in St. John of some suitable building for the care and proper display of the various objects which are in the possession of this Society. We own a valuable museum, composed largely of specimens of the organic substances of our own Province; we have many articles of interest which have been gathered in foreign countries, gifts from thoughtful friends; we have an excellent library of useful books, chiefly of a scientific kind; and this library, while it is constantly growing in size, is scarcely available to the scientific student because of the small space into which it is crowded, and the consequent difficulty of classifying, or, rather, arranging it for the student's use. Although the ownership of all these is in the Natural History Society of New Brunswick, I may safely say that that Society has no narrow feeling of ownership. So far as it can, it opens its treasures to all who may desire to use them, in a truly scientific spirit, and it feels that it is merely a trustee for the public, managing property so that it may be conserved for the great purpose for which it was gathered, the diffusion of knowledge. We owe the city government acknowledgment of the fact that it gives us free of charge the premises which we occupy, but I am quite sure that it can be properly said we strive to make return by the use which is made of the property, by the broad spirit with which we open our doors to allow of the examination of the objects which are in our possession, by the efforts which we make to spread the bounds of knowledge by our lectures, and particularly by the special efforts which are made by some of our members to teach the young and to unroll before them the pages of knowledge upon which are written great truths concerning the life of the world. We have now in St.

John a public library building erected by the munificence of a philanthropic man who never saw our city, and who is animated solely by a desire to do good to the human race. The requirement which he makes of us, as citizens of this city, is that we shall year by year spend a specified sum in carrying out the purposes for which he provides the building. Into that contract we have entered cheerfully, and I have little doubt that its terms will be observed faithfully. But the public library building ought to be supplemented by such a building as I have suggested—as others have suggested before me—for the Natural History Society. A modest brick structure, built upon a simple plan, sufficiently large to contain our museum and our library, and to allow something for their expansion, would not cost a great deal of money. There ought to be ten citizens of St. John willing, as there are surely many more than that number able, to give us a thousand dollars each with which to commence the work. With that sum in hand the road would be easy enough. I do not look with great favor upon the constant calls which are made upon the civic treasury to help this or that particular institution, but if we had a good sum in hand, if we showed willingness upon our own part to make a fair pecuniary effort for this undertaking, we may say to the city fathers, "We occupy by your grace premises which would bring you in an annual rental, if they were put upon the market, of so much money; in all human probability, and as long as we do fairly such work as we are doing now, you will continue us in the occupancy of these premises; but it might be quite as well for you, financially, to capitalize the value of the rental and give it to us. You will help a useful civic and public institution by doing so, and you will be recouped the outlay by the revenue which will accrue from the rooms which we now hold." But I feel that no such proposition can be made until at least we have in sight a good deal more money that we have now for the purpose. In some way we must make a commencement towards the accumulation of money for the purpose if we desire our work to continue successfully.

Surely it is work that ought to continue. When I read in the papers or hear of discussions as to whether this particular subject

or the other should be taught in the public schools, or should form part of our college curriculum, I often feel, as no doubt you often feel, how much is not taught that ought to be taught. We cling to old systems of education with tenacity and sincerity. The youth of the country are compelled to go through courses of study from which they learn really little of the life that is about them, of the world in which they live, or, what is of more important still, of themselves. A man who became a great philosopher, and whose opinions and thoughts have had considerable influence upon the modern world, struggled from a Scottish village school to a famous university in his native country, but soon left it, as he discovered that it had little or nothing to teach him of the things which he wanted to know. In the past century, indeed in the past half century, real knowledge of the material world has accumulated so fast that it has gone far ahead of all our school books and of our school teaching, and we have scarcely noted the fact in our methods of education. The plants which grow around us, the trees which shelter us, or which adorn our parks, the insect world so full of strange life and often containing dangerous foes, the birds whose attractive forms are so agreeable to the eye and whose music is so grateful to the ear, the soil which produces for us articles of food, the stones from which we construct our houses are things of which we know too little, of which we teach the young scarcely anything, or of the mystery which lies in and beyond them, unless some enthusiastic student of any of these, who may be a school teacher, brings them within the reach of the pupil in a furtive and doubtful way. And so to most of us when our school days are over, as to Peter Bell in Wordsworth's poem, "the yellow primrose is but a yellow primrose, and nothing more." We are unconscious of the mystery of its life, of its far-off origin in the world of matter, of its relation to the law of substance, of the fact that it is constructed of the same material as that of which we are constructed, and that it lives not simply for us, but in obedience to universal law with a life such as it is that is all its own. I remember that when I was a boy at school, filled with a desire to know something about everything, I was told that everything which was on this earth was made for man's use, and that we should be very grate-

ful for the provision and the care which had thus stored up so much for us that was useful and good. This kind of instruction seemed to render unnecessary any detailed information as to the objects themselves, and therefore it was a duty to master all the more quickly the mystery of the multiplication table. The same kind of instruction is probably given yet to many young people. It is not very long since I heard a preacher of some eminence—in another city, of course—descant in his sermon upon the Divine wisdom which had stored up in the womb of earth the coal which is now the source of so much useful power that it might be ready for man when man was ready to use it. Perhaps the remark was not an unreasonable one from a theological point of view, and it sounded well. The scientific man, however, could probably maintain without much difficulty that the coal would be where it is if man had never come upon the earth to make use of it. The observation recalled to my mind the remark made by John Tyndall in one of his lectures thirty years ago. He was explaining to his audience the sources of motive power, and drawing comparisons between those substances whose atoms are still in action and those whose atoms have already closed in chemical union and are therefore dead. He named a number of these, and then said: "In this way we might go over nearly the whole of the material of the earth's crust, and satisfy ourselves that though they were sources of power in ages past, and long before any creature appeared on the earth capable of turning their power to account, they are sources of power no longer. And here," he said, "we might halt for a moment to remark on that tendency, so prevalent in the world, to regard everything as made for human use. Those who entertain this notion, hold, I think, an overweening opinion of their own importance in the system of nature. Flowers bloomed before men saw them, and the quantity of power wasted before man could utilize it is all but infinite compared with what now remains. We are truly heirs of all the ages; but as honest men it behooves us to learn the extent of our inheritance, and as brave ones not to whimper if it should prove less than we had supposed."

The complaint—if you will call it a complaint—which I have made regarding what we teach the young in comparison with

what we should teach them is not a new one. It was again Tyndall, who, after pointing out that in our earliest youth almost all of our enjoyments are physical, and that the confectioner's shop occupies in our ideas the foreground of human happiness, remarks that there grows up in our minds, as thought ripens, the desire to penetrate into the character and causes of the phenomena presented to our observation, but we do not gratify this desire. An instance which he gives is typical: "A few days ago," he wrote, "a master of arts, who is still a young man, and, therefore, the recipient of a modern education, stated to me, that until he had reached the age of twenty years he had never been taught anything whatever regarding natural phenomena or natural law." Twelve years of his life previously had been spent exclusively among the ancients. Now valuable as the ancient learning may be, it is surely not wise "to sacrifice the hopes and aspirations of the Present out of deference to the Past." A man who has occupied a notable position in the affairs of our country once said within my hearing, a Canadian, be it remembered, that he was seven years old before he knew there was such a language as the English, and that he was twenty before he learned a word of it. I refer to this as showing limitations which may be placed consciously or unconsciously upon the instruction which is given the young, and upon the ease with which the avenues to real knowledge may be closed by custom, by prejudice, or perhaps by some paternal idea that we may know too much. Against such an idea as this the existence of our Natural History Society is a constant protest. Although it is thirty years since Tyndall uttered his complaint, the cause is not yet removed. In that notable work, written only four or five years ago, in which Hæckel endeavours to solve "The Riddle of the Universe," he complains that the knowledge of modern science is not applied in the great concerns of life, in the courts of justice, in the field of politics, in the work of government, and he justifies his complaint by the observation that we can only arrive at a correct knowledge of the structure of the social body, the state, through a scientific knowledge of the structure and life of the individuals who compose it, and the cells of which they are in turn composed. The first step in the direction which he would take is to reform the schools.

"Our education of the young," he declares, "is no more in harmony with modern scientific progress than our legal and political world." Physical science, which is so much more important than all other sciences, and which, properly understood, really embraces all the so-called moral sciences, is still regarded as a mere accessory in our schools, if not treated as the Cinderella of the curriculum. Most of our teachers still give the most prominent place to that dead learning which has come down from the cloistral schools of the middle ages. In the front rank we have grammatical gymnastics and an immense waste of time over a "thorough knowledge" of classics and of the history of foreign nations. Ethics, the most important object of practical philosophy, is entirely neglected. The valuable teaching of modern cosmology and anthropology, of biology and evolution, is most inadequately imparted, if not entirely unknown, in our higher schools, while the memory is burdened with a mass of philological and historical facts which are utterly useless, either from the point of view of theoretical education or for the practical purposes of life; and he adds that the antiquated arrangements of the universities are as little in harmony with our scientific knowledge as the curriculum of the primary and secondary schools. It can be said, at least for this distinguished professor of the University of Jena, that he does not fear to express his opinions.

The President then proceeded to the consideration of the special theme which he discussed during the evening, viz., the relation of ordinary animal life, in its consciousness, to the life of man.

He inquired into the possibility of there being among insects and birds and animals a certain amount of race or family knowledge in addition to the mere experiences of indviduals. He expressed the belief that there was something more than mere instinct in the knowledge a butterfly—the ordinary cabbage butterfly—displayed in placing its eggs upon the cabbage plant. As a grub it had fed upon that plant; did it carry through its existence in the chrysalis form and into the prefect insect remembrance of its food when a mere grub? Was there a form of reasoning in its mind when, unable to find a cabbage, it sought some other

plant, rejecting many until it found one with food qualities resembling those of the cabbage? To seek to secure the propagation of its species might be properly attributed to what we called instinct, but the provision it made for the care of its children seemed to have in it something of reason. The mason wasp provided for its young by enclosing in the cell in which it laid its eggs, a spider or spiders which it paralyzed, so that when the egg hatched the young grub would have its food. The insect apparently had accurate knowledge how to paralyze the spider without killing it, and a fair knowledge of the quantity of food for each grub. It seemed to have race knowledge as well as individual knowledge and skill. The great philosopher, Descartes, taught that consciousness and thought are the prerogative of man alone, and there is a pretty general acceptance of his idea. He regarded the animal world — men excepted—as mere machines, whose acts were purely mechanical, and therefore uninfluenced in any way by thought. Yet bee-keepers will tell us that currents of information at times appear to run through a bee-hive, and the swarming of the bees seems to be a thoroughly planned scheme. Experiments made by Lubbock with ants showed that they possessed centres of intelligence in their congregations. These were low forms of creation, and they did not appear to apprehend man as a special factor in creation. But higher animals did. The swarming of birds was a kind of tribal movement, somewhat after the nature of the movements of the early Indians, who in the early days followed their food; but the bird took note of man, and its effort to deceive him as to the location of its nest or the hiding place of its young was a reasoned appeal to the consciousness of man, for the bird not only undertook to deceive him, but, evidently, assumed that it was possible to deceive him. Taking a still higher class of animals, the dog, for example, we could easily find in many of these, if we examined carefully, not only race feeling, but individuality in a marked degree. A good and seemingly honest dog living in the country will carefully guard his master's sheep, but at night will travel miles to a place where he knows of another flock, will murder a number of them and return to his home by early morning as meek-looking and as honest-appearing as though "'twere nothing he had done by

night." Of course it is easy to say that he has killed the sheep because of an instinct which has come to him through a remote ancestry. But think of what he has done. He has not only killed some sheep, but he has ingeniously planned to deceive his master and everybody else as to any connection of his with the crime, and he poses as an honest, well-behaved dog, deserving of confidence. His plans and his conduct show not only consciousness, but a sense of moral responsibility which he immorally violates. He reasons out the way of committing a crime, the possibility of detection, and the best plan of avoiding suspicion. In these and in other instances to which he referred, the President found evidence that reason existed in the animal world, and which justified the acceptance of the belief that the same principle of reason ran through all living things. He was inclined to this view. The difference was in degree. This led him to a statement of Hæckel's theory of the universe which he explained at some length, and with many illustrations and quotations from that writer's works, in support of his theory of the unity of nature and the law of substance. This theory eliminated entirely the idea of a Creator directing the affairs of the world, and referred all created things to a sensation, a force, a tendency, and out of this grew up not only all organisms, but also all the consciousness which existed in the animal world, a process of evolution producing the highest forms of intelligence, as well as the bodies through which this intelligence, consciousness and intellectual force was expressed. One of the quotations was as follows:

"The remarkable expansion of our knowledge of nature, and the discovery of countless beautiful forms of life, which it includes, have awakened quite a new æsthetic sense in our generation, and thus given a new tone to painting and sculpture. Numerous scientific voyages and expeditions for the exploration of unknown lands and seas, partly in earlier centuries, but more especially in the nineteenth, have brought to light an undreamed abundance of new organic forms. The number of new species of animals and plants soon became enormous, and among them (especially among the lower groups that had been neglected before) there were thousands of forms of great beauty and interest, affording an entirely new inspiration for painting, sculpture,

architecture, and technical art. In this respect a new world was revealed by the great advance of microscopic research in the second half of the century, and especially by the discovery of the marvellous inhabitants of the deep sea, which were first brought to light by the famous exploration of the Challenger (1872-1876). Thousands of graceful radiolaria and thalamophora, of pretty medusæ and corals, of extraordinary molluscs, and crabs, suddenly introduced us to a wealth of hidden organisms beyond all anticipation, the peculiar beauty and divinity of which far transcend all the creations of the human imagination. In the fifty large volumes of the account of the Challenger expedition, a vast number of these beautiful forms are delineated on three thousand plates; and there are millions of other lovely organisms described in other great works that are included in the fast-growing literature of zoology and botany of the last ten years. . . . . A man needs only to keep his eyes open and his mind disciplined. Surrounding nature offers us everywhere a marvellous wealth of lovely and interesting objects of all kinds. In every bit of moss and blade of grass, in every beetle and butterfly we find, when we examine it carefully, beauties which are usually overlooked. Above all, when we examine it carefully with a powerful glass, or, better still, with a good microscope, we find everywhere in nature a new world of inexhaustible charms.

"But the nineteenth century has not only opened our eyes to the æsthetic enjoyment of the microscopic world; it has shown us the beauty of the greatest objects in nature. Even at its commencement it was the fashion to regard the mountains as magnificent, but forbidding, and the sea as sublime, but dreaded. At its close the majority of educated people—especially they who dwell in the great cities—are delighted to enjoy the glories of the Alps and the crystal splendor of the glacier world for a fortnight every year, or to drink in the majesty of the ocean and the lovely scenery of its coasts. All these sources of the keenest enjoyment of nature have only recently been revealed to us in all their splendor, and the remarkable progress we have made in facility and rapidity of conveyance have given even the less wealthy an opportunity of approaching them. All this progress in the esthetic enjoyment of nature—and proportionately, in the

scientific understanding of nature—implies an equal advance in higher mental development, and consequently in the direction of our monistic religion."

The President remarked that while it was not impossible to conceive matter progressing from one stage to another until it is arranged in subtle and highly nervous form, it seems to be almost impossible to conceive of its inert masses becoming endowed with the capacity, through an evolving process, to think, to hope, to aspire, to imagine itself in fellowship with the Almighty and to plan for its continuance in some form for an immortal, a never-ending existence.

In fact while we might argue that there is practically no difference, except in degree, between the consciousness of the animal creation and the consciousness of man in all matters where experience exists; while it might be mentioned that at some time in the evolutionary process consciousness emerged—even though we are unable to say from what or whence it emerged—we are bound to take note of the imaginative capacity, which is not in any way based upon our human experiences, of those prodigous projections of the intellect into conceptions of a future of which we have no experiences or sensations, of those marvellous flights of fancy in which man displays his own creative faculty independent entirely of and beyond the ordinary concerns of the life in which he exists. The scientific man, by close observation, by patient investigation, is able to unravel some of the secrets of nature, to grasp the physical facts connected with the life of our world and applying his generalization of the past to his observation of the present create anew the earth. In this he is only —effective as is the work, and correctly as it may be done—giving the results of recorded observations and determined facts, but when the human intellect, invading the realms of fancy, creates new worlds, conceives new conditions of life which are outside and beyond all human experience, and independent of any actual knowledge, it passes beyond the limitations of matter in any of its forms, and, it seemed to him, "threw doubt, very great doubt, upon the theory that all consciousness is but a quality of highly organized matter. Perhaps, too, it would not be improper here to say that it is no easy task which the extreme evolutionist has

undertaken when he attempts to explain the moral sense by the operation of an evolutionary law. * * * * At this point I leave my subject, for I have no desire whatever to enter the metaphysical labyrinth which opens before me. I can only say that as investigators of natural history, our plain duty is to endeavor to ascertain, as far as possible, the exact truth as regards every known thing, to examine, to investigate, to compare; and yet to formulate no theories which we cannot establish by facts which are within our reach; to shrink from no examination which we may fairly make, to shirk no investigation of matter in whatever form it may present itself for fear of some result which will destroy a cherished theory, ever remembering that we are seeking not merely to wrest some secret from nature's well guarded store, but that we are seeking after truth; not alone for the satisfaction which we will undoubtedly derive from the attainment of knowledge, but for the good which must accrue to mankind as a knowledge of the universe is diffused; and as we master the fact that the sum of human happiness will be enlarged if we apply that knowledge honestly, justly and fairly to all the concerns of life. This, at least, is a work which we ought to be able to perform, and yet it may demand of us the most difficult of human sacrifices, the sacrifice of self!"

FORTY-THIRD ANNUAL REPORT

OF THE

COUNCIL OF THE NATURAL HISTORY SOCIETY

OF

NEW BRUNSWICK.

The Council of the Natural History Society of New Brunswick submits the following report for the year ending December 31st, 1904:

Membership.

During the year the membership has been increased by the admission of ten ordinary, twenty-one associate and two junior members, making a total of 195.

The following shows the numbers, classes and total enrolled membership:

Honorary,	4
Life,	6
Corresponding,	24
Ordinary,	59
Associate,	98
Junior,	4
Total,	195

Treasurer's Report.

Income—

Balance from 1902-3,	$577 64	
Interest on investments,	135 16	
Bulletins sold,	2 45	
Government grant,	200 00	
Membership fees,	145 00	
Dividend Botsford estate,	10 00	
Donations,	1 50	
		$1,071 75

Expenditures—

Maintenance of Museum,	$286 50	
Library books and binding,	8 75	
Printing and distributing Bulletin XXII,	267 31	
Sundries,	267 26	
Balance,	241 93	
		$1,071 75

Of the above balance, $33.00 is held in trust for the Ladies' Association, and $40.00 for botanical work, as set forth in last year's report.

The Society owns, besides a $1,500.00 mortgage (protected by insurance), $1,000,00 special deposit in the Bank of Nova Scotia.

It seems in order to again call attention to the Building Fund, which consists only of the donation of $10.00 in 1897, and the interest that amount has earned. The collections are insured for $2,500.00.

A. Gordon Leavitt,
Treasurer.

Library.

The books in the library have been re-arranged. A catalogue in manuscript has been prepared, a number of pamphlets bound, and others are ready to be sent to the binder. The assistant curator has taken charge of the work this year. There is urgent need of an active library committee to complete the work of cataloguing the books.

Publications.

Bulletin XXII has been published during the year, containing articles on natural science by various members of the Society, and fully as large and as well illustrated as any previous Bulletin. Several of the papers of more general interest read before the Society were published in the daily press.

Lectures.

Eleven regular meetings, including the annual meeting, and one special meeting, were held during the year.

The following are the dates of the meetings and the titles of papers read:

1904.

January 5.—(*a*) Describing Indian remains found on opening Indian graves in the vicinity of Tracadie, by Dr. A. C. Smith.

(*b*) Describing the location of certain beds of fossil mussel shells, by Mr. J. P. Clayton.

(*c*) The Physiography of the Northwest Miramichi, by Professor W. F. Ganong.

(*d*) Ornithology—Past and Present, by A. Gordon Leavitt.

January 19.—Annual Meeting. Reports received. President's address. Election of Officers.

February 2.—(*a*) Weeds and their Persistence, by Mr. J. Vroom.

(*b*) Certain Natural History Curiosities said to occur in New Brunswick, by Professor W. F. Ganong.

March 1.—(*a*) House Flies and their Relations, by Mr. Wm. McIntosh.

(*b*) New Brunswick Animals and Animal Romancers, by Professor W. F. Ganong.

April 5.—(*a*) On the Physical Aspect of the Cambrian System in Eastern Canada, by Dr. G. F. Matthew.

(*b*) The Earthquake of March 21st, 1904, by Mr. S. W. Kain. Also a communication on the same subject from Mr. W. B. Hoyt.

(*c*) A canoe trip on the Northwest Oromocto Lakes, and down the Northwest Branch in company with Professor W. F. Ganong during the summer of 1903, by Dr. G. U. Hay.

May 3.—(*a*) The Commercial Value of Birds, by Mr. J. W. Banks.

(*b*) Notes on New Brunswick Birds, by Mr. W. H. Moore.

May 12.—A special meeting for the purpose of taking into account the providing of hospitality for the delegates of the Royal Society of Canada.

June 7.—Burr-Balls of Little Kedron Lake, by Professor W. F. Ganong.

October 4.—Mushrooms and Toad-stools — How to know them, by Dr. G. U. Hay.

November 1.—(*a*) The Human Telephone, by Professor L. W. Bailey.

(*b*) A Measure of the Rate of Recession of the Coastline of New Brunswick. New Aneroid Measurements in New Brunswick. The Physiographic Characteristics of the Renous River, by Professor W. F. Ganong.

December 6.—(*a*) An Earthenware Pot of the Stone Age, by Dr. G. F. Matthew and Mr. S. W. Kain.

(*b*) Synopses read, of papers prepared by Professor W. F. Ganong.

An elementary course of lectures was given during January, February and March in the Society's rooms at 8 o'clock on the Tuesday evenings not occupied by the regular meetings. These lectures were for members, for children in the schools, and others interested in the natural sciences.

The following were the dates and the titles of papers read:

Dr. G. F. Matthew gave two lectures: January 12—How hills and valleys are made (with special reference to those in our own vicinity). January 26—Why sea shells are found on the mountains.

Mr. Wm. McIntosh gave four lectures: February 7—Things seen on a day's ramble. February 16—A general view of insects. February 23—Butterflies and moths. A view of Mr. McIntosh's fine collection. March 8—Things seen on the seashore.

Mr. A. Gordon Leavitt gave one lecture, March 15, on Bees, Wasps and their allies.

March 22.—An evening with the microscope, by members of the Microscopical Section.

March 29.—View of collections in the Museum under the direction of Dr. G. U. Hay and Mr. A. G. Leavitt.

To pupils of Grades VII and VIII of the public schools prizes were offered for the best written series of notes on the lectures. The children showed great interest in the lectures, and several essays were submitted. The first prize was awarded to D. W. Hodsdon, and the second to Colin G. Leavitt.

Library and Museum.

The library and museum have been opened to visitors three afternoons of each week — Tuesday, Thursday and Saturday. The assistant curator, Miss Florence A. Hoyt, has been in charge.

The number of visitors during the year has been 105 adults and 402 children.

Changes have been made in two rooms of the museum—adding to the cases, renovating the specimens, and displaying them to greater advantage.

The new show case in the reptiles and fish room adds much to the appearance of this part of the museum.

Archaeology.

During the past year Mr. Duncan London, of Lakeville Corner, Queens County, one of our corresponding members, has found a number of interesting relics of the Stone Age. In August, 1904, he was fortunate enough to discover a large number of pottery fragments, representing one earthen vessel. This find has proved of very great interest, and Dr. G. F. Matthew

and Mr. S. W. Kain prepared and presented an interesting paper, published in this Bulletin, describing the piece of pottery. From this specimen we are able to form an excellent idea of the size of earthen vessels used by the men of the Stone Age, and the method of the decoration practised.

Geology.

There is not much to record of geological discovery in New Brunswick. Members of the Society have been at work in the northern part of the province. Professor Bailey has discovered confirmation of the reference of the slates of the Teteagouche river to the Ordovician system, in the presence of certain graptolites. He also reports the presence of valuable iron deposits there. By means of a magnetic instrument, a valuable iron ore lode has been located at New River, in Charlotte County. Small veins only had been known in this district before.

Professor Ganong has been pursuing his explorations in the north of the province, and is giving the result in the series of articles he is publishing in this Bulletin.

Botany.

(See special articles, pp. 358–365.)

General.

The Royal Society of Canada met in St. John during the week beginning June 20th, on the occasion of the Tercentenary of Champlain's discovery of the St. John harbor. Our Society undertook, with the Historical and Loyalist Societies, the duty of entertaining the members, which was done, it is believed, to the satisfaction of the members of that society and to the credit of the city. The President of this Society and the Council took a prominent part in the entertainment of the guests, and the ladies of the Ladies' Association, in conjunction with lady representatives of the Historical and Loyalists' Societies, gave a drive through Rockwood Park and a picnic at Duck Cove, which were greatly enjoyed by the visitors.

The reception given by Senator and Mrs. J. V. Ellis was a very pleasant function, affording many citizens an opportunity

to meet the members of the Royal Society. A morning outing on the harbor, arranged by Senator Ellis, and a luncheon by His Worship Mayor White, were other social events greatly enjoyed by citizens and their guests.

The Ladies' Association has co-operated in the work of the Society. The Council especially expresses its appreciation of the work done for the entertainment of the Royal Society. The report of the Ladies' Association is appended hereto.

The curator, Miss Hoyt, has attended to her duties during the year to the satisfaction of the Council. Our grateful acknowledgments are due to the press of the city for free publication of notices and reports of meeting, and to those who have read papers before the Society.

REPORT OF THE LADIES' ASSOCIATION OF THE NATURAL HISTORY SOCIETY.

The work of the associate members has gone on as usual during the past year. The number of members has increased largely, being now nearly one hundred, and the interest in the work of the Society has grown in even greater measure.

The Thursday afternoon lecture course for 1903-4 was exceptionally good, and very well attended. Of special value and interest were the lectures to the children. The school children attended in large numbers. Invitations were sent to the teachers of certain schools to select a number from their classes who would be interested in the subject for each date respectively, and invite them to the lecture. So many came that the rooms were overcrowded, and the regular members of the Society could not even find standing room. We felt the need of more commodious rooms.

We were delighted to welcome to our course of lectures Miss Ganong, of Rothesay, who gave two lectures, one on the Mollusca and one on the Singing Birds. After the second lecture Miss Ganong made an appointment to meet the young pupils in Rockwood Park at seven o'clock of a Saturday morning to give them a practical lesson in distinguishing birds by their song. To her surprise no less than fifty came out to the Park to make acquaintance with the birds in their native haunts.

In the beginning of the summer the Ladies' Association united with the ladies of the Historical and Loyalist Societies in arranging for a picnic and drive to Duck Cove in given honor of the Royal Society of Canada, which was holding its annual meeting at St. John on the occasion of the Tercentenary of Champlain's discovery of the river St. John. The weather proved disagreeable, but apart from this the entertainment was a success in every way.

A programme of lectures for this winter has been arranged, and is being carried out. It began with a conversazione, which

was successfully conducted by the Associate members. Two lectures of the course have already been given. They were well attended, notwithstanding the stormy weather.

The Association has buisied itself in procuring donations to the library and museum, and is pleased to report continued interest in the latter. The museum is open to the public on three afternoons in the week—Tuesday, Thursday and Saturday. Many school children come, and some teachers regularly bring classes and give them object lessons in Natural History.

There is every prospect that the current season will prove not less useful and interesting to the members than former ones, and I would express the hope that the year will not pass without some steps being taken toward the better housing of the museum and library, which should be a source of pride and a centre of interest to the citizens of St. John.

K. M. MATTHEW,
President of the Ladies' Association of the N. H. S. of New Brunswick.

St. John, N. B., January 19, 1905.

DONATIONS TO THE MUSEUM, 1904.

DATE.	DONOR'S NAME AND DESCRIPTION OF GIFTS.
January...	A. C. Smith. Steel axe, cod hook, fish harpoon, iron scrapers. Mr. Clayton. Specimen of mussel shells. Geoffrey Stead. Crude petroleum.
February..	J. London. Specimens stone net sinkers of the Indian period.
March.....	Miss Emma Disbrow. Snake skin, found on Judge Cushing's grave at Greenbush, U. S. A.
June.....	Col. A. Markham. A matrix, in which opals are found.
October ...	Mr. Geo. Batson. Model of a Viking ship. A. C. Smith. An Indian relic. Miss Hunt. Arrow heads. Rev. W. C. Gaynor and Dr. G. U. Hay, Specimens of fungi.
November	G. M. Duncan, M. D. Specimens of couch-grass. Master W. Jones. The dry part of tamarind, nut galls, and portion petrified stump of red wood tree. Duncan London. Earthen pot of the stone age.
December	Mrs. C. E. Huestis. Specimen of fossil oyster.

DONATIONS TO THE LIBRARY, 1904.

Donor's Name.	Residence.	Works.
Academy of Natural Science	Philadelphia	Proceedings
Academie Imperiale des Sciences	St. Petersburg.	Bulletins
American Entomological Society	Philadelphia	Circulars
American Museum of Natural History	New York	Bulletins
Australian Museum	Sydney, N. S. W.	Reports
Amherst College	Amherst, Mass	Reports
Archaeological Society	Ontario	Reports
Boston Society of Natural History	Boston	Bulletins
Boston Free Public Library	Boston	Reports
Buffalo Society of Natural Science	Buffalo	Bulletins
Bureau of Ethnology	Washington	Transactions
California Academy of Science	San Francisco	Proceedings
Cincinnati Society of Natural History	Cincinnati	Bulletins
Colorado Scientific Society	Denver	Transactions
Connecticut Academy of Science and Art	New Haven	Bulletins
Cornell University Library	Ithaca, N. Y.	Report
Comite Geologique	St Petersburg	Report
Canadian Institute	Toronto	Transactions
Davenport Academy of Natural Science	Davenport	Proceedings
Director Royal Gardens	Kew, G. B.	Bulletins
Department of Inland Revenue	Ottawa	Report
Entomological Society	London, Ont	Journal
Feuille des Jeunes Naturalistes	Paris	Journal
Field Naturalist Club	Ottawa	Transactions
Gray Herbarium	Cambridge, Mass	Bulletin
Geological Survey	Perth, W. A.	Report
Geological Society	London	Report
Geological Survey	Ottawa	Report
Historical and Scientific Society of Manitoba	Winnipeg	Bulletin
Indiana Geological Survey	Indianapolis	Report
Iowa Geological Survey	DesMoines	Report
John Hopkins University	Baltimore	Circular
Linnæan Society	New South Wales	Report
Liverpool Biological Society	Liverpool	Proceedings
Lloyd's Museum	Cincinnati	Report
Manchester Geological Society	Manchester	Proceedings
Minnesota Academy of Natural Science	Minneapolis	Bulletin
Minister of Mines	Sydney, N. S. W.	Report
Missouri Botanical Gardens	St. Louis	Proceedings
Maryland Geological Survey	Baltimore	Report
National Museum Library	Washington	Proceedings
Natural Science Association	New Brighton	Bulletin
New York Academy of Science	New York	Journal
New York Public Library	New York	Bulletin
Ottawa Literary and Scientific Society	Ottawa	Bulletin
Philadelphia Museum	Philadelphia	Report
Public Museum	Milwaukee	Report
Queens Quarterly	Kingston	Report
Rochester Academy of Science	Rochester	Proceedings
Royal Academy of Science	Stockholm	Proceedings
Royal Colonial Institute	London	Journal
Royal Geographical Society	London	Proceedings
Royal Society of Canada	Ottawa.	Proceedings
Smithsonian Institution	Washington	Proceedings
South Dakota School of Mines	Rapid City	Report
Texas Academy of Science	Austin	Report
University of Toronto	Toronto	Proceedings
University of California	California	Report
U. S. Coast and Geodetic Survey	Washington	Bulletin
U. S. Fish Commission	Washington	Report
U. S. Commission of Agriculture	Washington	Circular
U. S. Geological Survey	Washington	Report
Wilson Bulletin	Oberlin, Ohio	Bulletin
Wisconsin Natural History Society	Milwaukee	Proceedings

OFFICERS AND COMMITTEES OF THE NATURAL HISTORY SOCIETY FOR 1905.

Patron.

His Honour the Lieutenant Governor, Hon. J. B. Snowball, LL. D.

Council.

President—Hon. J. V. Ellis.
Vice-Presidents—G. F. Matthew, G. U. Hay.
Treasurer—A. Gordon Leavitt.
Secretary—W. L. McDiarmid.
Librarian—W. L. Ellis.
Curators—S. W. Kain, Wm. McIntosh, J. W. Banks.
Additional Members of Council—H. G. Addy, J. Roy Campbell, James A. Estey.

Ladies' Association Branch.

President—Mrs. G. F. Matthew.
Vice-Presidents—Mrs. G. U. Hay, Mrs. H. G. Addy.
Secretary-Treasurer—Miss Edith McBeath.

Standing Committees.

Archaeology—S. W. Kain, A. C. Smith, M. D., Miss A. D. Jack.
Botany—G. U. Hay, W. F. Ganong, John Brittain, James Vroom.
Entomology—William McIntosh, A. G. Leavitt.
Finance—A. G. Leavitt, J. Roy Campbell, W. F. Hatheway.
Geology—G. F. Matthew, L. W. Bailey, Geoffrey Stead.
Lectures—G. U. Hay, H. G. Addy, G. F. Matthew, J. A. Estey.
Library—W. L. Ellis, Wm. McIntosh, Mrs. G. U. Hay, Mrs. W. F. Hatheway, Miss McBeath.
Microscopes—W. L. Ellis, G. G. Melvin, W. H. Mowatt.
Ornithology—A. G. Leavitt, Wm. White, J. W. Banks, Mrs. G. U. Hay.
Press—G. U. Hay, A. G. Leavitt, Wm. McIntosh, W. L. McDiarmid.
Publications—G. F. Matthew, S. W. Kain, G. U. Hay, A. G. Leavitt, W. L. McDiarmid.
Rooms—H. G. Addy, Mrs. G. F. Matthew, Mrs. G. U. Hay.

LIST OF MEMBERS.

Patron.

The Lieutenant Governor, Hon. Jabez Bunting Snowball, LL. D.

Honorary Members.

Bailey, Professor Loring W., Ph. D.....University of New Brunswick.
Ganong, Professor W. F., Ph. D.....Smith College, Northampton, Mass.
Laflamme, Mgr. J. C. K.....Laval University, Quebec.
Marr, Professor John E.....St. John's College, Cambridge, G. B.

Life Members.

Chamberlain, M. .....Boston, Mass.
Hay, G. U., D. Sc.....St. John, N. B.
Hegan, Jas. B.....Charlottetown, P. E. I.
Matthew, Geo. F., D. Sc.....St. John, N. B.
Matthew, Robt.....Cienfuegos, Cuba.
Kain, S. W.....St. John, N. B.

Corresponding Members.

Baxter, Dr. John.....Chatham, N. B.
Brittain, John .....Fredericton, N. B.
Butler, W. S.....Butler's, Queens Co., N. S.
Chalmers, Robert .....Ottawa, Ont.
Cox, Philip, Ph. D.....Chatham, N. B.
Duncan, G. M., M. D.....Bathurst, N. B.
Duff, Professor A. W., Ph. D.....Worcester, Mass.
Forer, Henry..... Liege, Belgium.
Fowler, Rev. Professor James, A. M.....Kingston, Ont.
Gilmour, Dr.....Quaco, N. B.
Gesner, G. W.....New York.
Kirkland, R. J., LL. D.....Grand Rapids, Mich.
London, Duncan.....Lakeville Corner, N. B.
MacKay, Dr. A. H., LL. D.....Halifax, N. B.
McLaughlin, D. J. W.....Grand Manan, N. B.
Matthew, Rev. C. R.....Kingsville, Ont.
Moser, John.....Butternut Ridge, N. B.
Perkins, Henry F., Ph. D.....Hartland, N. B.
Smith, A. C., M. D.....Tracadie, N. B.
Stead, Geoffrey.....Chatham, N. B.
Trueman, C. J.....St. Andrews.
Vroom, James.....St. Stephen.
Walker, Byron E.....Toronto, Ont.
Wilson, W. J.....Ottawa, Ont.

Ordinary Members.

Addy, Geo. H.
Barnhill, Geo. E.
Burditt, W. F.
Banks, J. W.
Belyea, J. Fred.
Beveridge, James
Campbell, J. Roy
Clarke, C. P.
Caritte, Ray
Ellis, Hon. J. V., LL. D.
Ellis, W. L., M. D.
Estey, James A.
Fairweather, G. Ernest
Fisher, W. S.
Fotheringham, Rev. T. F.
Frink, J. H., V. S.
Gilmour, A. B.
Hubbard, W. W.
Hall, Percy G.
Hall, Gilbert M.
Hatheway, W. F.
Howe, John D.
Hannington, T. B.
Inches, R. P., M. D.
Jones, Fred. Caverhill
Jones, R. Keltie
Kingdon, Right Reverend D.
Leavitt, A. Gordon
Lord, J. Simpson
Markham, Alfred
Melvin, Geo. G., M. D.
Mowatt, W. H.
Mowatt, James
Murdock, Wm., C. E.
Morrison, W. S., M. D.
Murray, Geo.
McIntosh, W.
McDiarmid, W. L.
Phillips, Wm.
Reynolds, James
Rowe, Chas. F. B.
Scammel, J. H., M. D.
Scammel, J. R., C. E.
Seeley, Alfred
Shewan, E. T. P., C. E.
Skinner, Hon. C. N.
Starr, F. P.
Stothart, Thomas
Simms, T. S.
Scott, Walter
Thompson, Enoch
Vroom, Wm. E.
Walker, James, M. D.
Wetmore, H. C., D. D. S.
Wilson, J. E.
White, W. W., M. D.
White, Wm.

Associate Members.

Adam, Miss Helen
Alward, Mrs. Silas
Anderson, Miss Mary
Abbot, Mrs. E. N.
Addy, Mrs. H. G.
Bullock, Mrs. T. H.
Bustin, Miss Anna
Barker, Miss Helen
Barker, Miss Emma
Bartlett, Miss Katharine R.
Bourne, Mrs. T. O.
Bent, Miss
McBeath, Miss Edith
McKean, Mrs. Geo.
Morrow, Miss May I.
Murphy, Miss Grace
Murray, Mrs. Geo.
McIntosh, Mrs. J. R.
Nannary, Miss Mary
Nixon, Mrs. G. H.
Olive, Miss Katherine
Purves, Miss Louise
Pidgeon, Miss Emily G.
Price, Mrs. G. P.

ASSOCIATE MEMBERS.—*Continued.*

Caritte, Mrs. deB.
Cotter, Miss K. A. M.
Calhoun, Mrs. J. R.
DeForest, Mrs. H. W.
Dawson, Miss J. C.
Domville, Miss Gabel
Ellis, Mrs. J. V.
Fiske, Mrs. Emma
Fisher, Mrs. G. S.
Fairweather, Mrs. G. Ernest
Gerow, Mrs. G. W.
Gibson, Miss Maude
Gorham, Mrs. F. C.
Hamilton, Mrs. Geo. A.
Hamilton, Miss Alice
Hatheway, Mrs. W. F.
Hea, Miss Annie M.
Hay, Mrs. G. U.
Holman, Mrs. W. F.
Holman, Mrs. A. L.
Hunt, Miss L. Ariana
Homer, Miss E. B.
Hoyt, Miss M. E.
Hanington, Miss G. F.
Inches, P. R.
Jack, Miss A. D.
Johnson, Miss Annie E.
Kerr, Mrs. M. A.
Landry, Mrs. I. J. D.
Lawrence, Mrs. J. M.
Lawlor, Miss K. E.
Leavitt, Mrs. R. T.
Longmaid, Miss S.
Lee, Mrs. T. Carleton
Leavitt, Miss G. W.
Lowe, Mrs. Chas.
Matthew, Mrs. Geo. F.
Matthew, Mrs. R.
Prichard, Miss Helen
Rankin, Mrs. Thos. A.
Rising, Miss A.
Roberts, Mrs. Harry
Robertson, Mrs. J. F.
Robinson Miss Eleanor
Robb, Miss A. D.
Rowan, Miss Jean
Robson, Mrs. W. L.
Salter, Miss Laura
Sharp, Miss M. C.
Sheffield, Mrs. Morton
Schofield, Mrs. J. K.
Smith, Miss M. Barry
Starr, Mrs. R. P.
Stetson, Mrs. F.
Stockton, Mrs. A. A.
Sutherland, Miss J. K.
Stead, Miss Frances M.
Simms, Mrs. T. S.
Shanklin, Miss Annie J.
Smith, Mrs. Morton
Seeley, Mrs. J.
Smith, Mrs. Geo.
Thompson, Mrs. Mary
Turner, Miss Katie E.
Titus, Mrs. F. R.
Taylor, Mrs. E. R.
Wade, Mrs. John
Wardroper, Mrs. H. E.
Warner, Mrs. James
Whitney, Mrs. Jas.
Wright, Miss
Wetmore, Mrs. H. C.

ST. JOHN OBSERVATORY.

METEOROLOGICAL SERVICE OF CANADA.

Latitude 45.17 N. Longitude 66.4 W.

MONTHS	BAROMETER			THERMOMETER			*Cloudiness:* 0 = Clear 10 = Wholly Clouded	*Precipitation:* Rain & Melted Snow	Thunder Storms	Fogs
	Mean	Highest	Lowest	Mean	Max.	Min.				
January ...	30.04	30.75	29.22	14.8	42.2	—14.7	5	4.36	0	3
February ..	29.99	30.62	28.97	14.9	44.2	—14.	5	3.07	0	0
March.....	30.03	30.99	29.35	28.7	46.3	—1.3	5	5.27	1	2
April.....	29.97	30.57	29.45	38.4	63.2	17	6	4.47	0	6
May... ...	30.00	30.32	29.58	51.9	72.5	33	6	2.81	1	4
June.....	30.03	30.47	29.52	56.2	79.2	41	6	1.75	0	7
July.	29.98	30.23	29.53	61.6	81.	50.3	7	3.47	1	18
August....	30.03	30.40	29.70	60.6	76.4	46.4	6	6.50	1	8
September.	30.07	30.56	29.14	54.2	68.5	34.5	5	4.44	0	6
October....	30.02	30.52	29.01	46.7	65.	27	6	4.08	1	3
November .	29.83	30.41	28.64	34.	49.9	12.5	7	2.40	0	1
December..	29.93	30.52	29.18	16.5	46.2	— 6.8	5	1.60	0	1

The mean height of barometer for year was 29.993. The highest reading was 30.990, on 5th March, and the lowest 28.637, on 14th November. The mean temperature for year was 39.9, being 2 degrees colder than average. Maximum temperature 81, on 9th July; minimum, —14.7, 2nd of January. The total precipitation, 44.22 inches, was 1.86 inches less than average. First frost occurred on 9th September; last frost 2nd of May.

D. LEAVITT HUTCHINSON,
Director St. John Observatory.

WIND DIRECTION AND VELOCITY.

Months	N.		N. E.		E.		S. E.		S.		S. W.		W.		N. W.			
	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours Calm	Total Miles
January...	148	1272	120	1213	28	395	19	378	4	89	16	302	93	1282	214	3059	102	7,990
February..	215	2465	108	1190	9	71	8	173	16	386	37	704	79	1497	214	3838	10	10,324
March.....	96	1194	48	247	69	660	48	721	61	625	102	1605	38	369	227	4216	55	9,637
April.....	120	329	38	871	82	1473	41	566	100	527	112	881	68	381	25	1410	134	6,438
May	83	1078	46	508	140	1697	57	714	185	1736	140	1910	38	339	26	362	29	8,344
June.....	87	1035	56	709	46	336	68	531	228	1821	134	1484	4	7	48	590	49	6,513
July	40	580	17	107	26	216	30	256	373	2634	132	1803	16	86	56	622	54	6,304
August....	120	1529	11	81	24	135	17	201	283	2060	150	2012	24	266	14	232	101	6,516
September.	67	559	16	90	32	352	30	473	140	1508	214	3183	126	1592	39	457	56	8,214
October....	81	1166	74	761	34	189	28	558	42	449	210	3745	96	994	138	2013	41	9,875
November..	114	966	145	2262	7	76	4	37	13	116	84	1402	31	203	244	3433	78	8,495
December..	133	986	107	1131	10	141	10	225	17	382	28	596	25	275	342	4545	72	8,281

NOTICE.

The Bulletins of the Society contain the following articles, among others:

	Price
Bulletin VI.—Relics of the Stone Age in New Brunswick, by Loring W. Bailey; Marine Mollusca of New Brunswick, by W. F. Ganong, ...	$ 0 50
Bulletin VII.—Historical Sketch of the Natural History Society, by LeB. Botsford; Echinodermata of New Brunswick, by W. F. Ganong, ...	50
Bulletin VIII.—Economic Mollusca of New Brunswick, by W. F. Ganong, ...	50
Bulletin IX.—Sketch of Prof. C. F. Hartt; Archæozoon Acadiense—Laurentian Sponges, by Geo. F. Matthew, ...	40
Bulletin X.—Discoveries at a Village of the Stone Age at Bocabec, N. B.; Fossiliferous Horizons of the Cambrian Rocks at St. John, N. B., by Geo. F. Matthew, ...	40
Bulletin XI.—The Climate of Acadia in the Earliest times, by Geo. F. Matthew; Observations on some New Brunswick Fishes, by Philip Cox, ...	40
Bulletin XII.—An Outline of Phytobiology, by W. F. Ganong; Crystalline Rocks near St. John, by W. D. Matthew; Outlets of the St. John River, by G. F. Matthew, ...	50
Bulletin XIII.—An Cutline of Phytobiology, by W. F. Ganong, Ichthyology of New Brunswick, by Dr. Cox; Volcanic Rocks of Maritime Provinces, by W. D. Matthew, ...	50
Bulletin XIV.—Sketch of Dr. Gesner; Flora of the Restigouche, by G. U. Hay; Remarkable Sounds in the Bay of Fundy, by W. F. Ganong; Two Shrews new to New Brunswick, by Dr. P. Cox, ...	50
Bulletin XV.—Abraham Gesner, a review of his scientific work; An extinct Palæozoic insect, G. F. Matthew; Intrusive Rocks near St. John, W. D. Matthew; Tidal Phenomena of St. John, A. W. Duff, ...	50
Bulletin XVI.—Life of Dr. James Robb, L. W. Bailey; Earthquakes in New Brunswick, S. W. Kain; List of Mosses, J. Moser; Recent Discoveries in the St. John Group, G. F. Matthew; Natural History and Physiography of New Brunswick, W. F. Ganong. (This is continued in the four next Bulletins).	50
Bulletin XVII.—Marsh and Lake region, Chignecto Bay, G. J. Trueman; "Dip" of Magnetic Needle in N. B., A. W. Duff; Notes on a Wild Garden, G. U. Hay; Butterflies of New Brunswick (List), Wm. McIntosh; A new Cambrian trilobite, G. F. Matthew. (Papers on Cambrian palæontology by the same author in the three following Bulletins); Artesian and Fissure Wells in New Brunswick, G. F. Matthew and S. W. Kain; A Wilderness Journey, G. U. Hay	50
Bulletin XVIII.—Noctuidæ and Butterflies of New Brunswick, Wm. McIntosh, ...	50
Bulletin XIX.—Notes on the Archæology of New Brunswick, S. W. Kain; Some Relics of the French Period in New Brunswick, S. W. Kain and C. F. B. Rowe; List of New Brunswick Fungi, G. U. Hay, ...	5
Bulletin XX.—The South Tobique Lakes, G. U. Hay, ...	50
Vol. I.—(Bulletin I - V). Bound and Indexed, ...	5 00
(Only a few copies of this volume on hand.)	
Vols. I - IV.—(Bulletins I - XX). Bound and Indexed (price of set), ...	13 00