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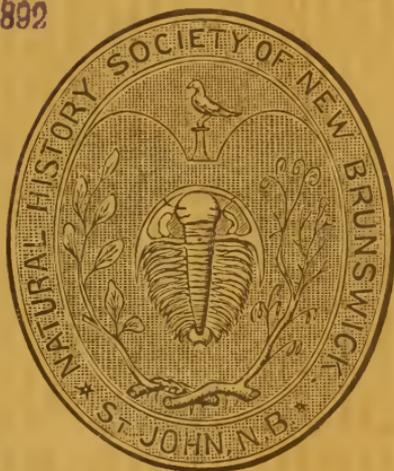
NATURAL HISTORY SOCIETY

OF

NEW BRUNSWICK.

No. X.

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BULLETIN No. X.

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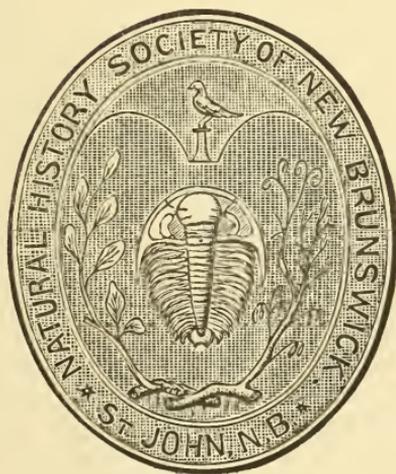
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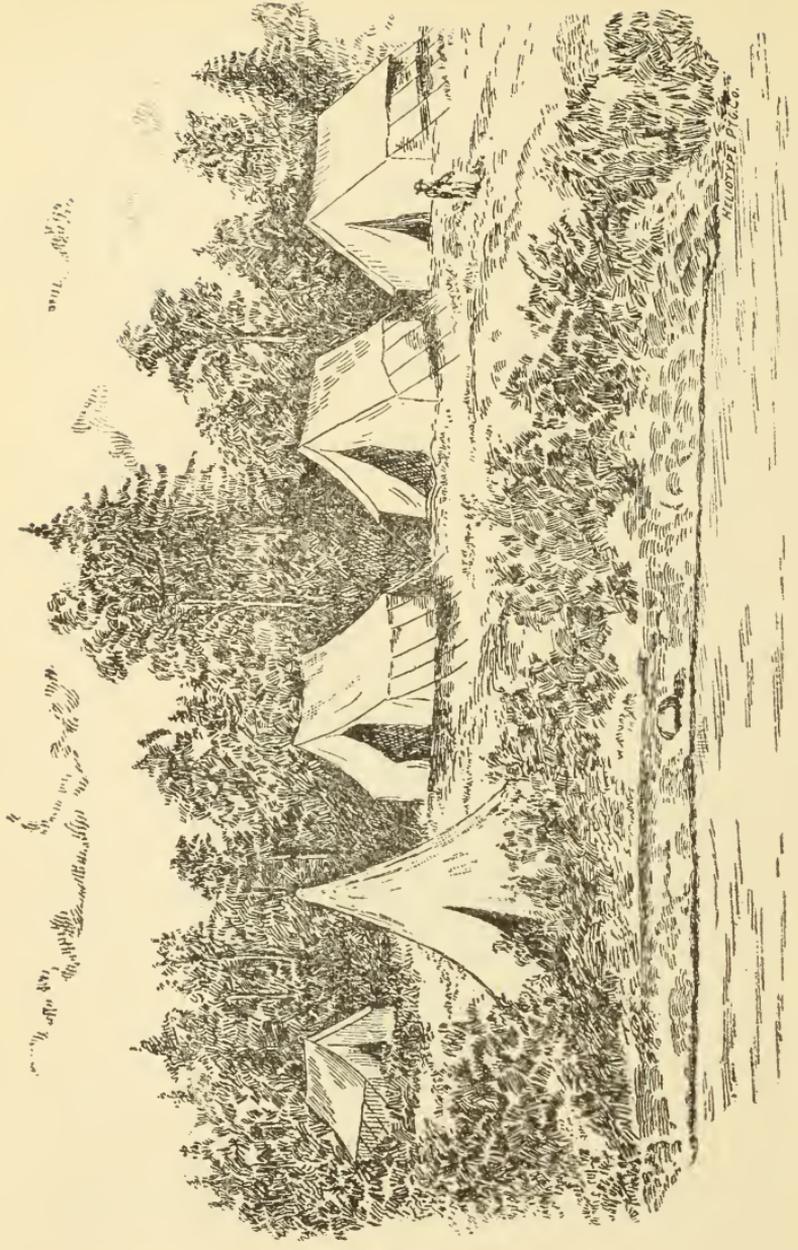
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WILSON'S PITCH

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Bulletin of the Natural History Society of New Brunswick.

REPRINTS FROM BULLETIN NO. III.

[For several years past Bulletin III. (1884) has been out of print, and the Society has been unable to satisfy the applications made for it. These applications have been mostly for the purpose of obtaining Mr. Matthew's article on the Village of the Stone Age at Bocabec. The Council of the Society has therefore resolved to reproduce this article, and also a list of the mammals of New Brunswick by M. Chamberlain, which appeared in the same Bulletin.

No further work has been done on the collections made at Bocabec, except on the implements of stone, bone, etc. The article on these, referred to by Dr. Bailey in Bulletin VI., is in course of preparation, and will appear in the next number of the Bulletin.

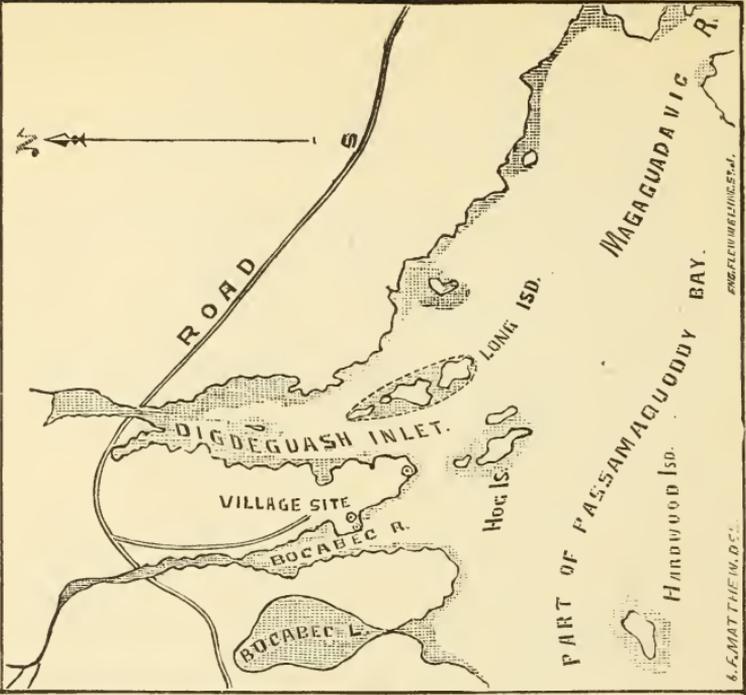
In addition to these there is a collection of the bones of the mammals used for food by the Stone Age people of Bocabec, which have not yet been studied, as well as a few objects of other kinds.

In the years that have elapsed since the exploration was made at Bocabec, death has been busy among us, and, among others, has shorn from our membership one who has been an active promoter of the Society's work since its organization, Dr. George A. Hamilton (at that time a leading physician in St. John) and who, with his family, was one of the camping party at Bocabec.*

The article on Bocabec appears here without alteration or addition, except some slight changes and corrections of error in the typography, suggested by the author. The frontispiece, however, is an addition to the original article, and is from a water-color view of the camping ground made by Miss B. Whitney. The view is from a point in front of the beach at the site of the village, and shows the flat on which the village was situated and the wooded ridge behind it.]

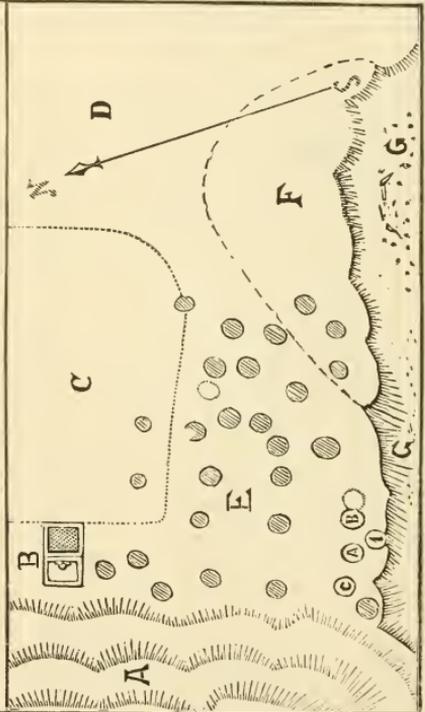
* The party consisted of Dr. and Mrs. Hamilton, Arthur M. Hamilton, Frances Hamilton, George U. Hay and Mrs. Hay, Joseph Pritchard and Mrs. Pritchard, Geo. A. Whitney and Miss Bessie Whitney, Geo. F. Matthew and W. D. Matthew, all of St. John; and Messrs. W. F. Ganong (now a professor in Harvard) and J. Vroom, both of St. Stephen; and Jas. E. Wetmore, of Grand Lake.

VICINITY OF BOCABEC.
SCALE 2 MILES TO AN INCH.

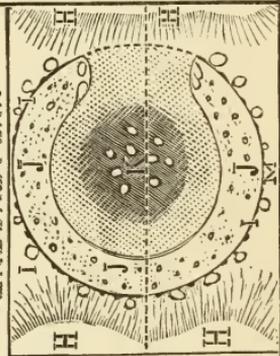


6. F. MATTHEW, D.E.S.

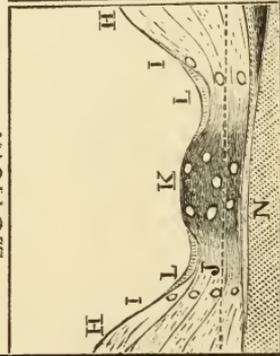
VILLAGE SITE AT BOCABEC.
SCALE 80 FEET TO AN INCH.



HUT BOTTOM "A"
GROUND PLAN



SECTION.



ARTICLE I.

(Article II. of Bulletin III.)

DISCOVERIES AT A VILLAGE OF THE STONE AGE AT BOCABEC, N. B.

BY G. F. MATTHEW, M. A., F. R. S. C.

(Read 5th February, 1884.)

A number of the members of this Society combined to form a summer encampment in Charlotte County for the purpose of studying, during a short vacation, the Botany, Zoology and Archæology of the above locality. As the work in the last-named branch of study was entrusted to me, it becomes my duty this evening to tell you of the result of our investigation in the kitchen-middens at Bocabec.

First, however, I may mention that our party left St. John by the Grand Southern Railway on 6th August last, and were joined at our destination by other members of the Society from St. Stephen and from Queen's County.

To the Manager of the Grand Southern Railway we owe our thanks for carrying the party at reduced fare, and for transporting our outfit free of charge; and to George F. Hibbard, Esq., and Mr. Alexander Boyd, for much kindness and attention during our stay in St. George and at Bocabec.

DESCRIPTION OF THE VILLAGE SITE AND ITS SURROUNDINGS.

The spot chosen for investigation was a group of kitchen-middens or shell heaps which mark the site of an abandoned village of the Stone Age at a place called Phil's Beach, near the mouth of the Bocabec River. The site was well chosen, for the advantages of the place are manifold to a people who depended for existence on hunting and fishing. A clay flat, (C, D, E, F,)* flanked on the west by a long projecting hill of felsite rock, running parallel to the course of the Bocabec River, was the spot chosen for the principal settlement. On

* The letters refer to the woodcut "Village Site of Bocabec," on opposite page.

the east a similar ridge separates the flat from Digdeguash Inlet. To the north of this clay flat, where there is now an open field, the standing forest broke off the keen winds of winter ; and to the south was the sea-beach, where drift wood in abundance was thrown up, and where boats or canoes could be kept, secure from the rising and falling tide.

The tide rises from twenty to twenty-five feet at this place; and as the lower half of the beach is stony, it is probable that the savages who dwelt there obtained their principal supplies of shell-fish at some other point. A sandy beach, and therefore one more suitable for clams, exists on the river about half a mile further up than Phil's Beach; and extensive sand-flats abounding with these bivalves are found around the shores of Hog Island, off the mouth of the Bocabec River. These sands, below the surface, are black with accumulated organic matter, resulting from the decay of marine animals (clams, etc.) and would be valuable as a fertilizer of the clay fields found in the valleys along these shores. Sea-fish and marine animals no doubt abounded then, as now, along the whole of this river. Herring and other fish are now taken in great quantities in the weirs at the mouth of the Bocabec.

The position of the aboriginal settlement at Phil's Beach was also very advantageous for hunting. The inhabitants of the village could float up with the tide three miles, to the head of navigation, whence they had a five mile range for hunting beaver and larger game on the branches of the Bocabec River; or by going out of the river and passing into Digdeguash Inlet, a still more extensive woodland tract was open to them. From the mouth of the Bocabec they could also cross Passamaquoddy Bay in various directions in search of seals and sea-birds.

The position of this village was well chosen for defence. Its inhabitants appear to have had an outpost at the point on the eastern side of the entrance to the Bocabec River, whence a view could be had of all canoes approaching from the Digdeguash or Magaguadavic River, or the more open part of the Passamaquoddy Bay. Another section of the settlement occupied a small beach on the Bocabec River a little further

up than Phil's Beach, and thus guarded the northern approach to the village.

To the east of Phil's Beach a spring of cool water flows over a low cliff into the sea, and would have given an unfailing supply of this necessary liquid to the inhabitants of the village. In the swale (D) to the east of the village site, now cleared but then probably wooded, a further supply of water was available.

Such was the general relation of the village of Phil's Beach to the surrounding country. A few words may be added as to the arrangement of the dwellings of which it was composed. On first surveying the ground, it was observed that the north side of the village site (C) was comparatively smooth, having been under cultivation since the arrival of the English, and no inequalities remained that would indicate where the dwellings of the ancient inhabitants had been. On this smooth ground we pitched our tents, and found it admirably adapted for our purpose, being well drained by the layers of shells beneath. Fully one-half of the site of the village, however, including the part on which the shells of the kitchen-midden were heaped together in the greatest quantities (C), had never been disturbed by the plow. Here the ground was covered with a growth of the Cow Parsnip (*Heracleum lanatum*), intermingled with other coarse weeds and grasses. This herbage extended to the extreme limits of the village site except, on the north, where the land had been brought under the plow. In the western part of the shell covered area, where the heaps of shells were most conspicuous, the presence of numerous saucer-shaped depressions indicated the positions of the huts of the aboriginal settlement. Over the greater portion of this uneven area no order or arrangement into regular streets could be observed. But near the sea beach, on the southern side of the village site, there was an approach to regularity in the position of the hut bottoms. The front row of huts (A, B, C, etc.) appears to have been the favourite section for dwellings. Not only were the foundations of the huts more closely set in this row, but the refuse heaps both before and behind them are larger than elsewhere. The huts of this row are very closely

set, with alley-ways between, in some cases only four feet wide; but the spaces between the huts further back are greater. Such at least was the arrangement of the huts in the later years during which this community existed. Not only were the huts more scattered in the rear part of the village, but anything like a systematic arrangement in rows entirely disappears after passing the third row from the front of the village.

Of the depressions marking the hut bottoms of the front row, which as I have said, were more closely placed than those further back, one was much longer and deeper than the rest. This, at first sight, gave the impression of a long communal dwelling, and here we determined to begin our exploration. In digging a trench through a part of this depression we struck an ancient fire-place, which was made the centre of exploration for several feet around. It was found that at this point the deposit in the hut bottom was about two feet deep, but its fire-place rested on an older kitchen-midden, or refuse-heap beneath.

HUT BOTTOM NO. 1.—ITS ANTIQUITY.

The hut bottom of which the first named fire-place is the centre is distinguished on the plan as hut bottom A. The older shell-heap beneath (marked No. 1) differs in several respects from that of hut bottom A; there was much less charcoal mingled with the shells, and fish-bones were more plentiful. When also we had traced this lower kitchen-midden in different directions beneath and beyond hut bottom A, we found stone chips or flakes, which had been struck off in the manufacture of weapons, differing in kind from any that were met with at the higher levels. The weapons found in the lower kitchen-midden were also larger, coarser, and of a different form from those exhumed from the hut bottom and waste heaps of A. Fragments of bone harpoons were more plentiful at the lower horizon, the pieces of bone more fragile, and the stone chips more abundantly coated with carbonate of lime than at the higher levels. There were also differences in the patterns of the pottery found in the two deposits. The ornamentation of the fragments of pottery found in this lower kitchen-midden

was made with a pointed instrument having a smooth round point, but that of all the pottery obtained from the higher levels was impressed with a tool having a square or angular point,—all seemed to point to a want of continuity in the arts and habits of the men of the older kitchen-midden, and those who made the shell-heaps and occupied the hut bottom of A; and it seems possible that the former belonged to a different tribe or race from the latter.

I am the more confirmed in this impression that there was an older and independent occupation of this camping ground, from the discovery near the edge of the bank overlooking the sea beach, in and beneath the oldest kitchen-midden, of an ancient fire-place, so situated that it must have belonged to a hut whose foundation has been partly swept away by the sea; and which was therefore erected and occupied when the bank extended further out than it does now, and also further out than when the inhabitants of hut bottom A lived there. This older fire-place is marked on the plan as hut bottom No. 1. It was planted on a fresh layer of gravel apparently spread over the original land surface by a storm or by the surf when the land was lower than it is now, as the gravel fills up the inequalities between the stones which are scattered over the clay flat. There was but a film of vegetable mould between this gravel and the clay, from which it may be inferred that hut bottom No. 1 marks a very early occupation of the site. The clay upon which the layer of gravel was spread, is the Leda or Champlain clay of geologists ("N" in section of hut bottom), and it does not seem likely that a very long time elapsed, after this portion of the land was raised above the sea, before it was occupied by man.

The foot-hold thus obtained at the sea-side by the dwellers of hut-bottom No. 1 seems to have been precarious, and when their successors came they placed their camps further back, and found a permanent site, safe from the encroachments of the sea.

HUT BOTTOM A—ITS FORM AND THE HABITS OF ITS OCCUPANTS.

As I have already remarked, the site of hut bottom A and its associated dwellings had on the surface the appearance of a communal dwelling, which was eight feet in breadth by thirty long. As our explorations progressed it was found that this oblong depression did not mark the foundations of a single hut but of several placed close together in a row. The exact form and size of the typical hut was disclosed by a layer of clean beach gravel, which we met with about fifteen inches from the surface (J). This layer formed a ring around the fireplace, at a distance of from two to three feet from its centre, and was bordered all around by the shells of a kitchen-midden (H). The ring of gravel was about three inches thick in its deepest part, and was continuous except on the south side, where a break about four feet long marks the position of the door. Here the ends of the gravelly layer were upheld or bounded by a few large stones.

This gravelly stratum was found to form the boundary of a hut bottom, less than one-third of the length of the whole depression occupied by the row of hut bottoms; the hut bottom had a diameter of eight feet. Around the margin of this foundation there were imbedded stones (I) of various sizes that appear to have been used as supports or wedges for poles of which the frame work of the hut was composed. No remains of these poles or of any wood work was discovered which could be referred to the time when this village site was occupied by an aboriginal people.

There are two peculiarities in the foundation of this hut which would lead to the inference that the hut was conical. The first is the relation of the kitchen-midden to the gravel of the sleeping-bench. In making a trench through this hut bottom, and others adjoining, sections of several layers of gravel marking such sleeping-benches were passed through at various depths in the deposit; and in all, the outer edge of the gravel of the sleeping-bench was found to be overlapped by the shells of the kitchen-midden, as though the shells had fallen in upon the gravel after the decay of the poles which had supported the walls of the hut. This overlapping of the

shells might, however, have been caused by the heap of shells outside the hut growing more rapidly than the *debris* accumulated within it; and then on the decay of the walls of the hut these shells would fall in on the gravel of the sleeping bench. A second feature in the appearance of this foundation, which seemed to indicate a conical form to the dwelling, was the width between the ends of the gravelly layer of the sleeping-bench of hut bottom A. If this space corresponds to the width of the doorway it would be quite out of proportion to the size of such a dwelling, unless the doorway was rapidly narrowed above by the convergence of the poles supporting the sides of the hut.

The careless habits of the old Neolithic people who dwelt on the shores of the Bocabec were quite noticeable, and certainly were favorable to the spread of disease among them. I have said that they underlaid their sleeping banks with gravel, and in this practice they shewed their appreciation of the comfort of a dry bed. This couch they no doubt made softer by covering it with boughs, and warmer by the added luxury of fur-skins. Nevertheless, in some respects they were exceedingly slovenly. The ashes and charcoal of their fire-places (K) gradually accumulated to such an extent that to level up the sides of their huts they brought in gravel and threw it on the trampled clam shells and other fragments of their feasts that were scattered over the floor. They were too slothful to clean out the smaller fragments of bone, etc., and so it happened that in the course of time the stones around their fire-places, which were used to support the firewood and the pots, were gradually buried up, and fresh stones had to be brought in to raise the wood above the embers and to support the cooking vessels. If the occupants of a hut were careless enough to break a pot, it was more than probable that the fragments would be allowed to lie on the floor and be trampled under foot, until buried out of sight among the *debris* scattered around the fire-place. The bones left after dinner received much the same treatment. When the flesh was eaten off the leg-bones, they were broken up for the marrow they contained, and, with the smaller bones, were left scattered around on the floor, or perhaps the

larger fragments would be flung carelessly out of the door and left to fester in the sun. Occasionally a fit of house-cleaning would seize upon the occupants of one of these huts and the fragments lying within on the floor would be scraped together and shovelled out at the door to mingle with the heaps of shells and broken bones without. The evidence of these actions on the part of the inhabitants of hut A is found in the frequently alternating layers of charcoal mingled with broken bones, of pottery clay and other refuse from the hut, which are found in the kitchen-midden before the door (H). These occur with considerable regularity and frequency, in alternation with layers of clam shells which form the bulk of the shell heap. Owing to these occasional house-cleanings, and the vast quantities of clam shells thrown down around these dwellings, the kjokken-modding increased much more rapidly than the deposits within the huts; and although fresh material was frequently brought in to level up the interior of the huts, the boughs and perishable matter within gradually decayed away and the floors sank down, so that now the depth of the deposit within the site of the huts is only about half as great as that of the shell heaps without.

The fire-place (K) of this hut was found to have been kept in the same spot from the time the hut was first built, almost until the settlement was abandoned. Such, however, was not the case with an adjoining hut bottom (B), which was gradually shifted to the east, so that at the close of the occupancy of this village site it was about two feet from its original position. A similar want of permanency in the position of the individual hut was found to exist in other hut bottoms. The huts, therefore, must have been re-built from time to time, and perhaps were deserted for a part of the year.

There seems, however, to have been sufficient permanency to these hut bottoms to warrant the assumption made in a preceding page, that each saucer-shaped depression in the kitchen middens of this village marks the site of a hut.

From the present aspect of the surface of the kitchen-middens at this village site, a rough approximation to the population of Bocabec River during this latter part of the

Stone Age may be obtained. In that part of the higher portion of the main village site which still remains undisturbed by the plow, there are depressions marking the position of about thirty hut-bottoms. Allowing four individuals to each hut, there would be in this part of the village a population of about 120. But behind this part of the village, which has been ploughed over, there is an area of about equal extent covered by shells; and an additional tract of about the same size, more or less covered by kitchen-middens, lies to the east of the higher part of the village site. At times, on the basis above given, a population of 300 may therefore have lived at the main village at Bocabec. But it is probable that half this number would be nearer the ordinary population of the place.

It appears to have been the practice of the women who dwelt in hut A, to stow away their needles, pins, and other articles of use or adornment at the back of the hut, and here they would occasionally slip down and be lost between the couch and the poles and stones of the outer wall. Several of the bone implements taken from this hut bottom were found in such places.

MANUFACTURE OF POTTERY.

One of the occupations of the women living at Bocabec was the manufacture of pottery. On the western side of hut bottom A was a pottery-yard, or place of deposit, where the occupants of this hut kept a supply of clay for the manufacture of pots and earthen vessels. These people had ready to their hand, in the flat of land which they had chosen as a site for their village, a good tough clay, well suited for making pottery, when mixed with a due proportion of sand. Nevertheless, they do not appear in any case to have used it, but took the mud of the sea-shore, near low-tide mark, for the manufacture of their ware. Such I infer to have been the case, for in the course of our excavations we came across patches of pottery clay in various spots, and at several levels in the hut bottoms A, B, and C, and kitchen-middens adjoining them, and in all cases the material thus used was beach-mud, mingled with numerous shells of mussel and clam. In

preparing this mud for use, these women of the Stone Age picked out the coarser stones and gravel and many of the shells before moulding and baking their pots. But in consequence of the imperfections of the material used as the basis of their pottery, and the very imperfect firing to which the ware was subjected, it was exceedingly fragile. The coarseness of the clay used in the manufacture, as well as these defects in the material, and the imperfect baking, compelled these potters to make their ware quite thick, in order to obtain the necessary strength. Their vessels were seldom less than three-eighths of an inch thick in any part, except near the rim, and the bottoms were usually about half an inch thick. As I have already remarked, the women appear to have been slovenly in their housekeeping, and as an added instance of this trait I may mention that the charred remains of their pottage still clings to the fragments of their vessels. In the fine charcoal and ashes around the fire-place of hut bottom A were found numbers of parched peas or vetches and of a round seed of the size of those of the radish, as well as grains apparently of some kind of grass. The peas were about the size and appearance of Beach Peas (*Lathyrus maritimus*, Big.), a plant which now grows plentifully at high-water mark on the beach in front of the village site.

But while animadverting upon the carelessness these people in some respects, it is only just to give them credit for a considerable amount of rude taste in the ornamentation of their pottery. Upon the fragments found at the three hut bottoms we examined there are no less than ten distinct designs or patterns impressed upon the surface of the ware. Some of them are quite ornamental. A favorite style of ornamentation consisted of continuous parallel lines made with pointed tools ; but a more elegant pattern was a chevron, consisting of rows of short diagonal lines impressed in this manner. We did not meet with any of the tools by means of which these patterns were impressed upon the pottery. A small implement with a square point seems to have been in common use, and another is indicated with several teeth by which certain rows of scolloped indentations were made.

The lips of several of the vessels were ornamented with diagonal rows of indentations apparently made by an implement having three teeth.

Some of the patterns indicate a different process of manufacture from the last: these show the print of a coarse woven fabric on the outside of the vessel, and sometimes also within. On some fragments this pattern has the appearance of a fine basket work, and may have been used to preserve the form of the vessel, as well as to ornament the surface. On other pieces of the terra cotta the pattern very closely resembles that left on bread by the coarse osnaburg used by bakers to cover their dough. Fragments of another pot were found which bore the impression of flattened bunches of grass or rushes.

One pattern of the class first referred to, consisting of square, incised dots, is precisely like the marking on some fragments of pottery which I met with about fourteen years ago at Oak Bay, on the western border of Charlotte County. A fragment of pottery found at Bocabec bears the imprint of a leaf of the fir tree (*Abies Americana*) that had been incorporated with the clay of the vessel before baking. It is not probable that this little leaf was in the clay when taken from the mud-flat of the Bocabec River, for being light, such a leaf would have floated on the water and been stranded near high tide mark. We can imagine that it may have fallen from a neighboring tree, or have stuck to the clay when it was thrown down beside the hut. Here we may fancy the crouching potter unconsciously kneading it in as she prepared her clay, and gave form and beauty to her work; little thinking that she thus gave permanency to the outlines of a little leaf which perished ages ago; or that she was adding another line to the history of her people.

Some of the patterns on the fragments of pottery from Bocabec are very like those on the sherds obtained by Dr. L. W. Bailey at the thoroughfare of Maquapet Lake; but the designs are not so elaborate; yet, there appears to have been much in common between the men of the river and those of the sea shore, in this art, as well as others.

In the relative culture of the river Stone-men of Acadia and those of its sea coast, we seem to have a parallel to that observed in Denmark by Prof. Steenstrup between the weapons and implements of the men who erected the tumuli and those who left the Kjøkken Mødding in that country, but the differences between the work of the inland people and those of the sea shore in Acadia do not appear to have been of so marked a character as that between the work of the corresponding populations in Denmark. We have as yet, however, but small collections to test this point, but I may mention incidentally that some of the skin scrapers from the St. John River exhibit a high finish, and are equal to the most perfect figured by Evans, as found in the barrows of Britain.

IMPLEMENTS AND WEAPONS OF STONE.

Though their pottery was coarse, the people of Bocabec showed a great degree of proficiency in another art, namely, the manufacture of implements of stone.

This industry we may suppose was in the hands of the men, and some of the implements obtained show that it was brought to great perfection.

If Longfellow was right, this work was carried on by the North American Indians outside of the hut. The poet's graphic description of the arrow-maker of the West, sitting by his hut door and meditating upon the exploits of former days, is well known. I cite it, as I think it will be seen that his habits did not in all respects agree with those of the arrow-maker of the Stone Age in Acadia.

" At the doorway of his wigwam
Sat the ancient Arrow-maker,
In the land of the Dacotahs,
Making arrow-heads of jasper,
Arrow-heads of chalcedony." . . .

Truth, however, compels us to declare that the arrow-maker of Bocabec conducted his operations chiefly within doors. Nor do I suppose that he worked within the hut on account of any special secret in the manufacture, but for other reasons that I will endeavor to explain further on. By far the best work in this line of art at Bocabec was found

within hut bottom A, where the chipping of the lance and arrow-heads was performed beside the fire-place on stones or supports placed near the fire. The flakes resulting from the manufacture of these implements were very plentiful in this part of the hut bottom. Very few flakes were found outside the hut, and these mostly beside stones used for wedging the poles of the frame-work that supported the covering of the hut. In the kitchen-midden, flakes are quite rare. It would, therefore, appear that the arrow and lance-heads were fabricated beside the fire-place, and apparently at times with the help of the fire-light, for the flakes were more abundant at the sides and back of the fire-place than in the front. The lance-heads were flat, and of a long oval pattern; a narrower and thicker point, of which one example was found, was probably a javelin-point; and another that was triangular and barbed at the base, would be regarded as a spear-point. All the weapons of this type that we met with were made of petrosilex or a highly quartzose felsite, and most of the arrow-heads were fabricated from these rocks, but we found a few that were made of quartz and jasper.

The arrow-points were chiefly of three patterns, viz., lozenge-shaped, lanceolate leaf-form and triangular, with lateral notches for securing the point to the shaft. Many of these arrow-points were rudely made, others more highly finished. The workmanship on one of the triangular, notched arrow-points of petrosilex rock could not be surpassed. It was finely serrated on the edges and had a fine tapering point. Another arrow-point of laurel-leaf form made of quartz was also quite symmetrical.

There was a remarkable scarcity of axes and of the larger stone implements at these hut bottoms. Only one well-formed axe was found, and this was in the kitchen-midden under hut bottom B. A very large, ovate, lance-head of quartzite accompanied this axe. In this lower kitchen-midden, which is connected with the hut bottom No. 1 already referred to, there were many flakes of a dark brown petrosilex of coarser grain than the black petrosilex from which many of the weapon-points of the higher kitchen-middens and hut bottoms

were made. Quartzite rock was more largely used in the manufacture of weapons by the inhabitants of hut No. 1 than by the men who subsequently occupied the place.

Some rougher axes and hammer-stones were found. These larger implements for rough work were chiefly made from diorite or quartzite, rocks better suited for standing heavy blows than the more fragile petrosilex and quartz.

Among the objects from Bocabec are a number of skinning knives. Those which showed the most careful chipping were rectangular in outline, like some agate knives found on the St. John River. Several, however, were lunate or oval. The material used in the manufacture of these knives was either quartz or petrosilex, mostly the former. Numbers of stone flakes, chiefly of petrosilex, which had the form of rude knives, were found. Some of these, in their worn edges, gave evidence of having been used for cutting. These flakes are of various forms, some approaching scrapers in appearance, others are simply sharp flakes which do not appear to have been applied to any special use. The skinning-knives were made of quartz and petrosilex, but a large majority of the knife-flakes were formed of the latter rock. Quartzite knife-flakes were comparatively scarce, and came mostly from the shell-heap of hut bottom No. 1.

The most curious stone implement found at Phil's Beach was one obtained by Mr. Alexander Boyd, the proprietor of the place. This implement was unearthed from the kitchen-midden behind hut bottom A by Mr. Boyd, when he was removing shells to spread on his land. It consists of petrosilex rock, and in form resembles a short femur of a large reptile; it is smoothed by rubbing at each end, and may have been used as a slick-stone for softening skins.

Other stone implements of a long oval form, which from their appearance are supposed to have been used as slick-stones, were found at hut bottom A. Here also we met with a long cylindrical stone which had probably been used as a pencil, for small facets have been formed on the end of it by rubbing.

Scrapers in great numbers were found in the hut bottoms

of this village site, but they were as imperfectly made as they were numerous, and none were met with that possessed the artistic finish of the agate scrapers found on the shores and tributaries of the St. John River.

Though thus lacking in elegance, the scrapers found at Phil's Beach, Bocabec, present a variety of forms, and were no doubt intended for various uses. Beside the ordinary scraper, which in form may be compared to a gun-flint with rounded corners, and which was used for dressing skins, there were several kinds that were probably used as carpenters' tools. Some of these had chisel-shaped extremities, and, secured in a handle of bone or horn, would have made very serviceable little chisels. Other gouge-pointed forms would have been useful implements for scraping the insides of hollow bones, such as are found shaped into needles, bodkins, etc. In others the outline of the scraping edge was concave; these would have been suitable for scraping the wooden shafts of arrows or any other rounded surface of wood or bone. It was in hut bottom C that the greatest variety of these implements was found.

As hut bottom A was characterized by the variety and perfection of its stone weapons, so hut bottom C, by the presence of numerous scrapers, gave evidence of the operations of the artificer in wood. Quartz, being a harder stone than petrosilex or felsite, was the favorite material for scraping tools; but many of the scrapers made of this rock were merely rough flakes, to which a fresh edge was given by flaking minute chips from the margin, and the tool thus restored was used again. This habit of the men of Bocabec reminds us of the manner in which window glass is now used by cabinet makers for similar purposes, a fresh edge being obtained by breaking the glass, when the old one has become dulled by use.

By far the greatest number of scrapers were made of quartz; but beside those made of petrosilex (and these were numerous), there were a few of agate, jasper and chalcedony. No veins of agate or chalcedony are known to occur near the Bocabec River, but these minerals could have been pro-

cured at Grand Manan Island to the south, or on the St. John River to the north. Two scrapers made of these varieties of quartz shew a remarkable amount of weathering, as though they had been in use for a long time.

The source of supply for the material from which the greater part of the stone weapons and implements of Bocabec have been fabricated is not far distant from the site of the village. The whole northern and eastern side of Passamaquoddy Bay is bordered by trap rocks and sedimentary rocks which, from the fossils found in the slates at the base of the series, are regarded as Upper Silurian. The lower part of this formation with marine fossils, which in the Reports of the Geological Survey of Canada are described as Division 1, are absent from the outcrops about Bocabec, which expose at the base of the terrain, Division 2. This part of the terrain which, in the most southerly outcrops in Charlotte County, consists of hardened silicious shales, is represented at Bocabec by a fine-grained petrosilex, exposed in Digdeguash Basin, and probably also on Bocabec River. This rock splits with a deep conchoidal fracture, and is capable of being worked like flint or chert into stone weapons. It is this material which the men of Bocabec found most advantageous for the fabrication of lance and arrow-heads.*

In the Third Division (Div. 3) of the Silurian series of rocks, flaggy sandstones are common on the southern margin of Passamaquoddy Bay; but at Bocabec, which is at the head of the same Bay, this number of the series is found to be very compact and fine-grained, coming under the the denomination of quartzite. This rock has been used to some extent by the dwellers of Bocabec for their larger weapons and implements.

A third rock, or rather mineral, quartz, was one of which the men of Bocabec availed themselves to a large extent in the manufacture of stone weapons. As this mineral occurs abundantly in the pebbles of the drift and other surface deposits of the region, it is plentiful on the sea beaches, which

*This rock is sometimes called hornstone; it is not however a hornstone which is a splintery or flint-like variety of quartz, but it is a fine grained, siliceous, sedimentary rock, baked or hardened. It differs from felsite, which develops numerous joints when weathered, and so is unsuitable for flint implements.

abound with stones washed out of these surface deposits, and no special source of supply need be looked for.

From the fact that many of the rocks and minerals used by the community of Bocabec for weapons and implements were found so close to their homes, we have good reason to suppose that there was very little occasion for these men of the Stone Age to seek them elsewhere by barter.

IMPLEMENTS OF BONE AND IVORY.

Bone implements of various kinds were found both in the hut bottoms and in the kitchen-middens, but mostly in a fragmentary condition. The most abundant were bodkins of a rough type. These were made in most cases by pointing split pieces of the leg bones of moose, deer or other large animals. An implement like a bodkin in form, but hollow, and having a slit sawed or cut at the smaller end, was made of the leg bone of a bird. Not knowing the use of this implement, I sent it to Dr. Daniel Wilson, of Toronto, for examination. He thinks "it may be assumed with much probability that it is a modelling-tool, such as the Western Indians still use in the fashioning and ornamenting of their finer pottery."

Several fragments of netting needles, or implements which for their size and form appear to have been available for this use, were found, and one perfect needle of this kind, about eight inches long, was met with. It had one eye about the middle; another broken needle had two perforations. Many fragments of channelled bone implements, which appear to have been pieces of needles and bodkins, were exhumed from the hut bottoms. The harpoons were of the ordinary form, with lanceolate point, and barbed on one side. Only fragments of this kind of implement were obtained.

Among the worked bones which are not, strictly speaking, implements, there was one which was scored on the back, and another that was notched on the edge. Such bones may have been of the nature of tally-sticks; but Dr. J. W. Dawson suggests that objects of this kind, which are also found among the ancient relics in European caverns, may have been used for playing games, small pieces of wood, ivory and bone being

carried about by the Indians of British Columbia at the present day, and used like playing-cards.

Of ivory implements the only ones found were made of the tooth of the beaver. By cutting the point of the incisor of this animal in various ways, chisels, gouges, and other pointed implements were formed. These would be used where the material to be operated upon was not too hard, and such implements were more easily made than the quartz scrapers or tools.

ANIMALS USED FOR FOOD.

In our operations at Bocabec a great many bones and fragments of bones of various animals were unearthed. I have not yet had time or opportunity to have these determined, but it is certain that quite a number of species are represented. The beaver is perhaps the most abundant, for the lower jaw and the femur of this animal were constantly turning up in our excavations. The leg-bones of moose and of deer or cariboo (reindeer) were also of frequent occurrence, but were almost invariably broken to pieces for the marrow. The hare, the fox and the bear were indicated by teeth, jaws and limb-bones. Bones of birds are frequent, and represent those of wading, aquatic, and arboreal habit. A number of bones, which from their spongy texture are supposed to be those of marine animals, were found. Fishes are represented by remains of the cod, herring, sculpin and shark.

But the remains which form by far the greatest mass in the kitchen-middens at Bocabec are those of *shell-fish*. Among these, pre-eminence must be given to the clam (*Mya arenaria*), which makes up perhaps nine-tenths of the bulk of the molluscan refuge.* The horse-mussel (*Modiola modiolus*) and the

* The following paragraph from the *St. Croix Courier* (1892), published at St. Stephen, N. B., is of interest in connection with the great abundance of the shells of this mollusc. "Mrs. Brown [Mrs. W. Wallace Brown, of Calais, Me., whose husband was formerly Indian Agent] has been told by the Passamaquoddies that the shell heaps were left by their forefathers; who, they say, made autumn encampments on the shore, for the purpose of getting a winter supply of clams. They chose a spot from which it was easy to get back to their winter hunting grounds; therefore the shell heaps are usually found near the mouths of navigable streams. The clams were put in an oven, and cooked just enough to be taken out of the shells easily; and were then dried on sticks. This preserved them and made them light and easy to carry. Several households they say used the same oven, which accounts for the great number of shells in one place. The saltness of the clams made them an important article of food; as salt was unknown in its crystalline form." [It is evident however, that the men of the Stone Age did not visit Bocabec solely for the purpose of laying in a store of smoke-dried clams.—G. F. M.]

long-whelk (*Buccinum undatum*) are the most numerous of the other molluscs found in the refuse heaps of this village. After these species may be named the round-whelk (*Lunatia heros*) and the small purple-shell (*Purpura lapillus*.) The rock-periwinkle (*Littorina rudis*) is occasionally found, and so also is the bonnet limpet (*Crepidula fornicata*); but the common European periwinkle (*Littorina litorea*), now so common on this coast, is entirely wanting. Beside these, a single valve of the large scallop (*Pecten tenuistriatus*) was found.

The sea urchin is present, but may have been introduced accidentally by crows, and not have been brought intentionally from the beach by the former residents of Bocabec. Other posthumous or accidental additions to the fauna are the land snails, of which several specimens were found at various levels in the shell heaps. Among the species found here, *Helix alternata*, Say, is by far the most abundant. *Helix albolabris*, Say, was not very common. Several specimens of *Helix hortensis*, Müll., were observed, but this species has probably been introduced since the arrival of the English. A species was found which agrees with Binney's description of *Helix Sayii*, except that the tooth on the parietal partition is nearly obsolete. Among the smaller snails were *Helix monodon*, Rack, *Hyalina arborea*, Say, *Hyalina multidentata*, Binn.

Vanity is a foible quite as prevalent in savage as in civilized communities, and we are not surprised to find indications of it among the dwellers at Bocabec. Among the *reliquæ* of their hut bottoms was a fragment of a stone pendant decorated with crossed lines in the form of a lattice, and two kinds of powder, which appear to have been kept in valves of the common clam. One of these powders is made from galena ore, small veins of which occur on the islands of Digdeguash Inlet, near Bocabec. The powder has a glistening appearance. The other powder, which was formed of pulverized shells of the horse mussel, could have been used as a white paint. These powders would appear to have been a part of their toilet requisites. That such has been the use of the glittering

galena seems highly probable; and Darwin, in his account of the native Fuegians of South America, who subsisted on a diet similar to that of the Stone men of Bocabec, records their appearance as follows: "These poor wretches were stunted in their growth, their hideous faces *bedaubed with white paint*, their skins filthy and greasy, their hair entangled, their voices discordant, their gestures violent, and without dignity."

PERMANENCY AND ANTIQUITY OF THE VILLAGE.

It has been thought that these kitchen-middens around the shores of Passamaquoddy Bay were made by a people who camped along the shore in summer for fishing and hunting, but retreated inland to the shelter of the woods in winter. There are, however, indications that the occupation of the village sites marked by these shell-heaps was more or less continuous.

Among the indications of occupancy at other seasons than the summer, I may refer to the kind of clay used in their pottery, and the places in the village where deposits of this clay were found. In making sections of the three hut bottoms at Bocabec we passed through several layers of pottery clay of small lateral extent, which had evidently been scattered on the floor of the huts. So also in the kitchen-midden in front of hut bottom A, irregular layers of the same kind of clay were traversed. These layers were mingled with the charcoal and refuse that had been cast out from the door of the hut in such a way as to show that all had come from within the hut. I think, therefore, there can be little doubt that the moulding of the pottery was sometimes carried on within the huts. The practice of chipping their flint implements within the hut, to which I have already referred, would also indicate the use of these dwellings during the colder part of the year.

The very fact of these savages using only the mud of the beach in the manufacture of their pottery, seems to show that the work in terra-cotta was carried on mostly in winter, when other and better kinds of clay (for no other kind has been found in the sherds collected at Bocabec) were inaccessible to them.

The position of the encampment also, situated as it was on the edge of an open beach facing the south, and sheltered from the north-west and north-east winds by protecting ridges of land, was well adapted for a winter residence.

With our very imperfect knowledge of the shell-heap folk of Passamaquoddy Bay and of the remains they have left, it would be premature to say how long these kitchen-middens have been lying in their present condition, or when the various village sites marked by accumulation of these remains were abandoned. It may, however, be worth while to mention a few points bearing on the question of their age.

Among all the weapons, implements, and other objects found at Bocabec, not one article has been met with which in any way would lead to the supposition that these people were acquainted with the products of European industry. Mr. W. F. Ganong informed me that at a group of kitchen-middens at Chamcook, near St. Andrews, not far from the spot where De Monts wintered with the first colony of Europeans who attempted a settlement in Acadia, an iron-bound copper kettle had been found. I am not aware of the conditions under which the discovery was made. No trace of any object formed of metal or glass was detected at Bocabec. The stone weapons and implements were made of material occurring on the Bocabec River, or in its neighborhood, or at least not farther off than the St. John River. Two of the scrapers, one of chalcedony and the other of agate, shewed quite a deep weathering and must have been for a long time exposed on the surface of the ground. Nevertheless, the tools of felsite, which are more easily affected by the weather, do not give indications by the condition of their surface of very great antiquity; and the two scrapers of chalcedony and agate may have been the implements of an earlier people found and used by the latter dwellers at Bocabec.

An inference regarding the antiquity of this village site may also be drawn from the covering of vegetable mould which has gathered on the surface of the shell-heaps to a greater or less depth in different places. In the hollows, and especially over the hut bottoms this mould has attained a

considerable depth, in some places as much as a foot or eighteen inches.

But while on the one hand these conditions point to a period anterior to the discovery of America, or at least of the region of Acadia, by the "White Race," as the time when the shores of the Bozabec ceased to be occupied by the people whose remains we have examined; on the other hand, their sojourn on its banks, when compared with the whole length of the Stone Age, was both recent and short.

In the Old World, the Stone Age has been divided into two great periods — the Palaeolithic, or the time when mankind used implements and weapons of chipped stone only, and the later Neolithic, when weapons of ground stone were also employed. The length of time embraced in the earlier of these periods is very great. Since its beginning the river valleys in Western Europe have been very much deepened, and the courses of the rivers in some cases changed. Man, who at first hunted the Siberian elephant, the rhinoceros, the cave bear and other large animals now extinct, used at first large and roughly made axes of chipped stone. Subsequently he found his large game chiefly in the horse and reindeer, and the stone-pointed spear became more prominent as a weapon of offence. In later times, but still while using no stone implements but those made by chipping, he hunted various wild animals more nearly like those which existed in Europe in the times of the ancient Romans. His weapons now were made smaller and lighter. Such in outline was the condition of man in the Palaeolithic Age.

The Neolithic period of Europe, or the time when man in that region used weapons of ground and polished stone, is of a later date than the Palaeolithic times I have glanced at.

No such continuous history of man in America is yet known, for the subject is only now receiving the attention which has been bestowed upon it in Europe for many years, and the landmarks of the older civilization of the Old World seem to be wanting in the New. When the American Indian of this region first became known to Europeans he was still in the Stone Age, but his weapons and his arts were such as

to show that he had arrived at a condition of culture equivalent to the Neolithic Age of the rude inhabitants of Europe. Discoveries have, however, lately been made which make it highly probable that there was an older and ruder age in America as well as in Europe. Dr. Abbot, the pioneer in this line of research, has found in the gravel terraces along the Delaware River at Trenton in New Jersey, rude stone implements which far antedate the occupation of that region by the tribes known there when the continent of America was discovered. Most of the objects found were very rudely chipped, and belonged to a people of very primitive habits. Within a year or two a similar discovery, consisting however of stone chips only, was made in the terraced deposits of Central Minnesota.

With such buried remains of man's occupancy of the earth our Bocabec relics do not compare, as they rest upon the surface, and are unquestionably less ancient. I have already referred to some of the geological evidences of the recent accumulation of these relics, but I may mention other features which stamp these remains as those of a recent Neolithic people. At the very bottom of these shell-heaps stone axes were found which, though rudely formed, were fashioned by grinding; and although the pottery found with these rude implements differed in pattern from that occurring in the higher levels of the shell-heaps, in other respects it showed nearly the same stage of advancement in the ceramic art.

It is somewhat surprising that there should be no evidence of forest growth on the shore of Bocabec River at the site of the village when first it was occupied by these men of the Stone Age, for a mere film of vegetable matter is all that separates the oldest kitchen-midden from the clay below, while the mould above the shell-heaps is from three inches to one foot in depth. These people, however, may have been driven back by the encroachment of the sea upon land in the rear of their former huts, which they had already cleared of trees and vegetable mould.

ETHNIC RELATIONS OF THE PEOPLE.

Finally, as regards the origin of the people who made these kitchen-middens at Bocabec a few words may be said.

The habits, manners and customs of the people who were known as the aboriginal inhabitants of this country when Champlain discovered the Bay of Fundy have greatly changed through the corrupting influence of contact with the new comers. Enough of their old habits and mode of living remain, when considered in the light of the accounts that have come down to us from the early explorers, to establish the similarity of their habits and mode of living to that of the men of the Stone Age who lived at Bocabec. Furthermore, the indication of a conical form to the huts, which I think is sufficiently shown by the over-lapping of the kitchen-midden upon the sleeping bench, and by the great width of the base of the doorway of the hut, point strongly to a resemblance between these huts and the well-known wigwam of the Indians.

The choosing of a small beach for the village site, the fact that they appear to have had canoes or boats of some sort to transport the vast quantities of clams which formed an important article of their diet, and which could not have been dug with ease or found in sufficient quantities in front of their village (for, as I have said, the principal clam-flats are at some distance from the village), the capture of fish which would not take the hook, but must have been taken by spear, harpoon, weir or net; the dependence of the people on hunting for the more acceptable variety in their food; the character of the rude pottery; the use of coarse woven fabrics, and a variety of other features of their culture and mode of life, are such as we know to have been common to them and the Indian tribes of Acadia.

We are, however, far from having absolute proof that these stone-age people were of the same race as the present (so called) aborigenes of the country. One needs only to read Sir Wm. Dawson's "Fossil Man" to see how many points of analogy there are between customs, tools and weapons, the remains of art, the methods of the chase, and the mode of

life of the men of the stone-age in Europe and of the Indian tribes of North America. The various features of the culture and arts of the men of Bocabec are thus not necessarily those of an Indian tribe, but rather that of a people who had reached a stage of advancement similar to that in which the "Indian" nations were found when the Western World was revealed to the gaze of Europeans.

REFERENCE TO WOOD-CUT.

EXPLANATION OF VILLAGE SITE.

- A** — Rocky ridge on west side of village.
B — Ruins of "Phil's" House.
C — Area of plowed land,—level—covered by a layer of clam shells about 3-10 inches thick; here the hut bottoms are obliterated.
D — Swale—uneven surface, covered with weeds and bushes, and having scattered shell heaps.
E — Part of the village undisturbed by the plow. Kitchen-middens deep and hut bottoms distinct.
F — Low part of the swale, with irregular hillocks and shell heaps, now liable to be swept by the surf in heavy gales.
G — Gravelly sea-beach in front of the village.
 The hut bottoms which have letters or numbers are those where the excavations referred to in this article were made.

EXPLANATION OF HUT BOTTOM "A."

- H** — Kitchen-middens before and behind the hut bottom.
I — Stones at the outer margin of the hut bottom.
J — Layer of beach gravel, used to raise the sleeping bench, outlining the form of the hut bottom.
K — Fire-place, with charcoal, bones, sherds, etc.
L — Layer of surface mould.
M — Layer of pottery clay outside of hut.
N — Bed of clay (Leda clay) underlying the hut bottoms.

ARTICLE II.

Reprint of Article IV. in Bulletin No. III.

MAMMALS OF NEW BRUNSWICK.

BY MONTAGUE CHAMBERLAIN.

INTRODUCTION.

So far as has been ascertained, there have been but two catalogues of the Mammals of this Province previously published; one of these appeared in a work by Abraham Gesner, Esq., issued in 1847, entitled "New Brunswick; with notes for Emigrants, comprehending the early History, etc.;" the other is placed among the appendices to "Field and Forest Rambles," a work on New Brunswick, by Dr. A. Leith-Adams, published in 1873. Neither of these catalogues being correct — when judged by the result of more recent investigations — a new one has been called for, and it is to meet this demand that the present paper is now published.

All of the species mentioned have been identified by the writer, excepting a few otherwise noted in the text; but in deciding upon the relative abundance he has had to depend, to a large degree, upon the opinions of others, and while the best available information has been obtained, it is very probable a difference of opinion may exist regarding the correctness of some of the determinations. A criticism of the catalogue is invited from observers throughout the Province, with a view to having whatever errors it may contain rectified in a future edition.

Want of space prevents his mentioning the names of all the gentlemen who kindly gave the writer the benefit of their observations, and to whom he desires to express his thanks; but he is under especial obligation to Mr. James Vroom, St. Stephen, and to Mr. John Stewart, Woodstock, for valuable notes.

The classification and nomenclature is that of Jordan's "Manual of the Vertebrates," excepting a slight difference in the Bats, copied from Dobson's "Catalogue of the Chiroptera."

CATALOGUE.

1. PANTHER. (*Felis concolor*.) Dr. Gesner records this species as "rare" (in 1847). No recent instances of its occurrences are known.
2. CANADA LYNX. "LOUP-CERVIER." "LOOCERVEE" (*Lynx canadensis*.) Common.
3. BAY LYNX. "WILD CAT." (*Lynx rufus*.) Common.
4. WOLF. (*Canis lupus*.) Was common from about 1840 until about 1860; since then it has entirely disappeared. Dr. Gesner states that Wolves were first seen in New Brunswick in 1818.
5. RED FOX. "SILVER FOX." "BLACK FOX." "PATCH FOX." "CROSS FOX." (*Vulpes vulgaris*.) Abundant.
6. SABLE. PINE MARTEN. (*Mustela americana*.) Common.
7. FISHER. BLACK CAT. (*Mustela pennantii*.) Rare.
8. LEAST WEASEL. (*Putorius vulgaris*.) Common.
9. COMMON WEASEL. ERMINE. (*Putorius ermineus*.) Common.
10. MINK. (*Putorius vison*.) Common.
11. WOLVERINE. (*Gulo luscus*.) Some thirty years ago it was occasionally met with; but no recent instance of its occurrence is known.
12. SKUNK. (*Mephitis mephitica*.) Abundant.
13. OTTER. (*Lutra canadensis*.) Rather common in favorable localities.
14. BROWN, BLACK, or CINNAMON BEAR. (*Ursus americanus*.) Common.
15. RACCOON. (*Procyon lotor*.) Common along the Bay of Fundy coast; but very rare in the interior.
16. MOOSE. (*Alce americanus*.) Not uncommon.
17. CARIBOU. (*Rangifer caribou*.) Common.
18. VIRGINIA DEER. (*Cariacus virginianus*.) Uncommon, though increasing. This Deer was formerly restricted to the valley of the Magaguadavic; but has lately spread into other portions of Charlotte and York Counties, and a few have been taken in Carleton and Victoria. There is no

record of any having been observed east of the St. John River. Dr. Gesner states that this species was first seen in New Brunswick in 1818, the same year in which the Wolf appeared, and that by 1847 it had become plentiful.

19. LITTLE BROWN BAT. (*Vespertilio subulatus*.) Common.

20. RED BAT. (*Atalapha noveboracensis*.) Rare.

21. HOARY BAT. (*Atalapha cinerea*.) Uncommon.

22. COMMON MOLE, (*Scalops aquaticus*.) Abundant.

23. HAIRY-TAILED MOLE. (*Scapanus breweri*.) Very rare. I have seen but one specimen, which was taken in Charlotte County.

24. STAR-NOSED MOLE. (*Condylura cristata*.) Common.

25. COMMON SHREW. (*Sorex platyrhinus*.) Common.

26. WESTERN SHREW. (*Sorex cooperi*.) Rare.

25. MOLE SHREW. (*Blarina brevicauda*.) Common.

28. FLYING SQUIRREL. (*Sciuropterus volucella*.) Common.

29. GREY SQUIRREL. (*Sciurus carolinensis*.) A few have been observed in Charlotte and Carleton Counties, near the western border.

30. RED SQUIRREL. *Sciurus hudsonius*. Very abundant.

31. GROUND SQUIRREL. "CHIPMUNK." (*Tamias striatus*.) Common.

32. WOODCHUCK. GROUND HOG. (*Arctomys monax*.) Common.

33. BEAVER. (*Castor fiber*.) Not so numerous as formerly, and now principally restricted to the wilderness portions of the Province, though Mr. Stewart writes to me: "I find the Beaver are coming back to the streams in Carleton and York Counties that have been abandoned by the lumbermen."

34. JUMPING MOUSE. "WOOD MOUSE." (*Zapus hudsonius*.) Uncommon.

35. BROWN, or NORWAY RAT. (*Mus decumanus*.) Abundant in the towns near the seaboard, and gradually spreading inland along the rivers. On the St. John River, it has been traced as far inland as Grand Falls.

36. BLACK RAT. (*Mus rattus*.) Mr. G. A. Boardman reports finding a few examples near St. Stephen.

37. HOUSE MOUSE. (*Mus musculus*.) Abundant near the seaboard.

38. DEER MOUSE. WHITE-FOOTED MOUSE. (*Hesperomys leucopus*.) Common in the interior.

39. LONG-EARED MOUSE. (*Evotomys rutilus*.) Common.

40. MEADOW MOUSE. (*Arvicola riparius*.) Abundant.

41. MUSKRAT. MUSQUASH. (*Fiber zibethicus*.) Abundant.

42. PORCUPINE. (*Erethizon dorsatus*.) Common.

43. RABBIT. NORTHERN HARE. (*Lepus americanus*.)
Very abundant.

MARINE MAMMALS.

HARBOR SEAL. Common.

HARP SEAL. Occasional, in winter.

HOODED SEAL. A few have been observed along the Gulf of St. Lawrence coast.

PORPOISE. Common.

WHALES have been occasionally reported in the Bay of Fundy and off the "North Shore;" but the species are, for the most part, conjectural.

ARTICLE III.

PROTOLENUS — A NEW GENUS OF CAMBRIAN TRILOBITES.

BY G. F. MATTHEW, M.A., F.R.S.C.

Fragments of a trilobite which appeared to be an *Olenellus* had in past years been found in the beds of Band *b.*, Division 1, of the St. John group, at Hanford Brook, St. Martin's, and in the summer of this year, 1892, I sent my son, W. D. Matthew there, to search for better examples. Though unsuccessful in this quest, he found remains of other forms of trilobites in these lower beds of the Cambrian, which serve to extend our view of the range and variety of the early Cambrian genera. Among these remains were the head-shields and body-joints of the genus herein described.

PROTOLENUS.* n. gen.

Head-shield semicircular, moderately vaulted, outer part of the cheek movable, prolonged at the genal angle into a spine.

Middle piece of the head more or less quadrate. *Anterior margin* wide and having a narrow distinct fold at the rim. *Glabella* conical or cylindro-conical, prominent, marked by furrows on the sides, and distinct from the occipital ring. *Fixed cheeks* of variable width, bordered by a long, continuous or nearly continuous eyelobe. Extension of the dorsal suture both in front of and behind the eye, more or less direct to the margin.

Movable cheek regularly curved, area wider than the distinct fold, spine usually long.

Thorax of many joints, pleuræ grooved for part of their length, slightly geniculate, curved backward in the distal part, extended into points or spines.

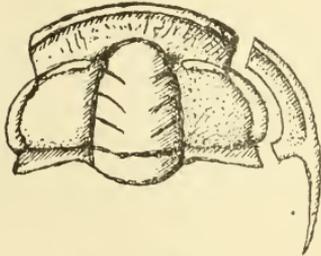
Pygidium in the Canadian species unknown (small ?) ; in the Sardinian species like that of *Paradoxides* (or of *Olenus*.)

**Protos*, first, *olenus*, as one of the *Olenidae*.

PROTOLENUS ELEGANS, (W. D. Matthew, sp. n. s. s.) n. sp.

Head-shield semicircular and more decidedly vaulted than in the succeeding species.

Middle piece oblatly subquadrate. *Front Margin* broadly arched, front area sloping down from the glabella and cheeks,



Protolenus elegans. Middle piece of the head-shield, the movable cheek and one joint of the thorax. All of the natural size.

and limited by a narrow, well defined marginal fold. *Glabella* prominent, about one quarter longer than wide, marked at the sides by three distinct furrows, directed backward. *Occipital ring* broadly rounded behind, separated from the glabella by a distinct furrow. *Fixed Cheek* broad, subquadrate, bounded in front by a heavy ocular fillet which is broadest at the

inner end, where it rises from a depression in the shield on the line of the dorsal furrow. Ocular lobes prominent, long, moderately arched; suture extending almost directly to the margin, both before and behind the eyelobe. *Posterior Margin* bounded by a narrow fold somewhat geniculated one-third from the end, furrow broad, widening toward the end.

Movable cheek with a narrow area, narrow marginal fold, and a long slender spine, arched inward behind, and nearly as long as the body of the cheek.

Thorax of many segments, the joints having a prominent ring, grooved across at the anterior third; pleura with a broad shallow groove, fading out one-third or one-half from the end of the pleura; the posterior bounding ridge of the pleura is geniculated about one-third from the end of the groove, and the pleura itself is continuous with the anterior bounding ridge and is prolonged into a slender spine.

Pygidium unknown.

Sculpture consists of minute shallow pits invisible to the unassisted eye. In one form of the species (perhaps a sexual variety) the slope of the head in front of the glabella and

ocular fillet is wider than in the common form, and is ornamented with forking and inosculating raised lines running toward the anterior marginal furrow ; such lines also appear on the surface of the fixed cheek, radiating from its posterior inner corner.

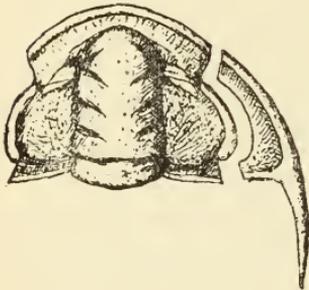
Size. Length of middle piece of the head-shield in the variety with wide anterior margin, 22 mm., in the other 20 mm. : width at the front of the middle piece 24 mm., at the eyelobes 28 mm. Length of the movable cheek (including spine) 26 mm. : width at the eyelobe 4 mm., behind it 6 mm.

Horizon and Locality. In sandy shales of the upper part of Assise 2 in Band b. of Division 1 of the St. John Group, at Hanford Brook.

PROTOLENUS PARADOXOIDES.* n. sp.

Head shield elongate semicircular.

Middle piece subquadrate. *Front Margin* strongly arched in front, arched upward at the contact with the glabella, so



Protolenus paradoxoides. Middle piece of the head-shield, and the movable cheek. Both of the natural size.

that there is a sharp ridge here in place of the usual furrow. *Glabella* nearly a half longer than wide, indented at the sides in front of the eyelobe. There are three pairs of furrows, inclined backward and a trace of a fourth (anterior) furrow, directed forward.

Occipital ring rounded forward at the back, divided from the glabella by a distinct furrow, which is more deeply impressed in the outer third : there is an obscure

tubercle at the centre of the ring.

Fixed Cheeks, ovate, flat, of moderate width and having a pear shaped tubercle opposite the third (anterior) furrow ; this tubercle is oblique to the ocular fillet, which crosses it but is faintly marked. Ocular lobes, distinct, moderately arched, continuous to the posterior marginal furrow. The dorsal suture runs direct to the margin of the shield, both before and behind the eye.

*Contracted for euphony from *paradoxidoides*.

Movable cheek narrow, area somewhat wider than the fold; at the genal angle is a long spine directed backward.

Thorax, only detached joints are known, the pleura is flat with a diagonal furrow extending part of its length.

Pygidium unknown.

Sculpture. The area in front of the glabella and ocular fillet is covered with forked and anastomosing raised lines, running toward the anterior marginal fold, and the fixed cheek is decorated with similar lines running from the posterior inner corner, forward and outward. The whole surface of the crust is covered with minute tubercles, visible only with the aid of a lens.

Size. Length of the middle piece of the head 21 mm. Width at the front 21 mm., at the eyelobe 27 mm.

Horizon and Locality. In purple streaked grey sandstones of Assise 3 in Band *b.* of Division 1, at Hanford Brook, St. Martins.

This species differs from the preceding in the longer, larger, more cylindrical glabella; the narrower, flatter fixed cheek, etc.

The following section of Band *b.* of the Acadian Division 1, of the St. John group will show the stratigraphical position of the genus *Protolenus*; all the horizons herein named being below the *Paradoxides* beds.

- No. 5. Twenty feet. No trilobite known. The fauna consists chiefly of Brachiopods—*Acrothele*, *Lingulella*, etc.
- No. 4. Twenty feet. No trilobites. Ostacods of the genus *Beyrichona*.
- No. 3. Thirty feet. Several genera of trilobites—*Ellipsocephalus*, two or more species, *Protolenus* (*P. paradoxoides*), *Conocephalites*, etc. This is specially the zone of *Ellipsocephalus*.
- No. 2. Fifty feet. In the upper part an *Ellipsocephalus* different from those in Assise 3 occurs in company with *Protolenus* (*P. elegans*.) The middle of this assise is specially the home of *Protolenus* (*P. elegans*) where it is found plentifully with *Beyrichona tinea*. The lower half of the assise has yielded no trilobites but contains *Acrothele* and other brachiopods.
- No. 1. Forty feet. In this coarse sediment the fossils are fragmentary and poorly preserved. Nevertheless a trilobite has been recognized in it, (an *Ellipsocephalus*?) represented only by a fragment of the head-shield. The ostracod, *Hipponoiharion Eos*, is confined to this assise, and brachiopods of the genera *Acrothele*, *Acrotreta*, *Linnarssonina* and *Lingulella* have been found.

APPENDIX A.

REPORT OF THE COUNCIL OF THE NATURAL HISTORY SOCIETY OF NEW BRUNSWICK FOR 1890.

The Council of the Natural History Society begs to lay before the members a summary of the progress of the society during the past year as collected from the reports of officers and committees.

ESSAYS AND LECTURE COMMITTEE. The course of essays and lectures has been carried out as usual and the meetings have been well attended. The following papers or addresses were given by members on the dates mentioned:

1890.

- FEB. 4th, Winter Plants.—By G. U. Hay.
MAR. 4th, Surface Geology.—By W. J. Wilson.
APR. 1st, Physiology of Digestive system of Animals.—By Dr. A. F. Emery.
MAY 6th, The Eophyton.—By G. F. Matthew.
OCT. 7th, Archæozoon Acadiense.—By G. F. Matthew.
NOV. 4th, Native Ferns.—By G. U. Hay.
DEC. 2nd, The Human Heart.—By Dr. G. E. Hetherington.
- 1891
JAN. 6th, Post Pleiocene deposits at St. Martins, N. B.—By Geoffrey Stead.
JAN. 6th, How the Natural History Society could assist in Education —By John Brittain.

FINANCE COMMITTEE. The Finance Committee report that the

Treasurer has a balance on hand of.....	\$102.77
The balance on hand at beginning of year was.....	250.04
The receipts for year amounted to.....	427.78
And the disbursements to.....	575.05

The acquiring and removing to our rooms, of the Mechanics Institute Museum, necessitated a large expenditure.

LIBRARIAN. The Library has received numerous additions consisting chiefly of reports from other societies.

CURATORS. The additions to the Museum referred to called for several changes in the arrangement of specimens in the various rooms. The minerals and fossils have been moved to the large room at the top of the building, to make room for the various collections down stairs. The minerals from the Mechanics' Institute have been arranged temporarily in their own cases, but much work remains to be done to incorporate them with our former collections. A list of the benefactors who have contributed to the museum during the year will be read in connection with this report.

GEOLOGICAL COMMITTEE. The Committee on Geology make no very lengthy report as no concerted work in that department has been undertaken during the past year. The work done by the President, however, in connection with the fossils in the Laurentian Limestone near St. John, as described by him in papers read before this society, and published in the last issue of our Bulletin is of importance, especially as it may help to settle the much debated question whether the objects found in these old rocks are of animal origin or not. The discovery in the Post Pleiocene at St. Martins, of two fossils new to Canada, by another member of the society (Mr. G. Stead) is also worthy of mention. The committee recommends that during the coming year some special work in the study of local geology should be attempted, either by the revival of the field club, summer camps, or other means which would enlist the sympathy and co-operation of the largest possible number of members.

COMMITTEE ON BOTANY. The Botanical Committee make the following provisional report: The members of this committee, with other botanists interested in the investigation of our local flora, have discovered over a dozen species of plants new to our province. The additions to our flora show that the interest among our students is still active. The committee hope that the study of plants will receive yet more attention, especially mosses, fungi and lichens, which are yet imperfectly known.

PUBLICATION COMMITTEE. The ninth Bulletin of our society has been issued, and copies sent to the members. It

contains a sketch of the life of Professor Charles F. Hartt, who was a life member of our society and one of its founders. It also contains the President's annual address and two short geological articles by the same writer. Mr. W. F. Ganong has contributed in this number, his notes on the marine animals of the Bay of Fundy.

The council would add that the question of having a more suitable building, and one owned by the society, has been before them. They trust that this most desirable object may be promoted in every way possible, by all who have an interest in natural history and especially in the preservation of the many and valuable specimens now in their charge, and continually coming into the museum.

The council desires to thank all who have aided in the work of the society, and the city press for the regular insertion of notices of meetings during the year.

Respectfully submitted,

J. ROY CAMPBELL,

Secretary to Council.

DONATIONS TO THE MUSEUM.

DATE.	DONOR'S NAME AND DESCRIPTION OF ARTICLE.
1890 Feb. 21	W. F. HATHEWAY.—Fossil bones from phosphate beds, Florida. G. F. MATTHEW.—Tracks of marine animals (<i>Eoichnites</i> , etc.,) from Div, 2, St. John Group.
Mar. 7	KILGOUR SHIVES, Campbellton. — Chrysalis of a large moth, Dunsinane, Kings Co.
21	CHARLES E. BUNTING, British Columbia.—Two wooden idols, from Sitka. Fish and Birds' nests, prepared for cooking, Rice cake, Opium for smoking and pipe bowls, Chinese charm and hair ornaments, and advertisements, Plate of a turtle, all from China.

DONATIONS TO THE MUSEUM—(Continued).

DATE.	DONOR'S NAME AND DESCRIPTION OF ARTICLE.
1890	
Apr. 1	W. W. STREET.—Partridge, mounted.
June 17	MRS. STEWART, St. John.—Neuropterous insect.
	ANDREW SMITH, St. John.—Large moth.
	WM. MURDOCK, C. E.—Slab of marble, composed of crowded fossils (<i>Archaeozoon</i>). Green Head, St. John Co.
Aug. 1	PROF. W. F. GANONG, Cambridge, Mass. — Three species of Sponge, eight species of Radiates, two species of Hydroids, eight species of Articulates, three species Eggs of Vertebrates, sixty-two species of Mollusca, also Echinoderms, Polyzoa, Worms and Ascidians in alcohol— all marine invertebrates of the Bay of Fundy.
Oct. 6	R. E. GOSNELL, Commissioner for Exhibition from British Columbia. — Two large plants (wild Raspberry and Huckleberry) two Echinoderms, one Coral (<i>Oculina</i>), four Molluscs (<i>Modiola</i> , <i>Fusus</i> , <i>Pecten</i> , <i>Patella</i>). Kelp fishing line used by the natives—all from British Columbia.
Nov. 4	R. P. STARR.— Rare plant of the coal measures, (<i>Knorria</i>) Springhill, N. S.
	MISS M. E. STEWART, St. Stephen, N. B.—Barnacle (<i>Balanus</i>) and sea moss, and large tree cone — California.
	AUSTIN STEAD. — Violet (<i>Viola primulifolia</i>), Lily Lake, St. John.
Nov. 4	H. F. PERKINS.—Moonwort (<i>Botrychium matricarifolium</i>), and Adder's tongue fern (<i>Scolopendrum vulgare</i>). Clarendon, Charlotte Co.
	5 E. C. JONES.—Fossil fern (<i>Neuropteris</i>), Chamounix, Switzerland.
Dec. 2	REV. J. M. DAVENPORT.— Various seeds and nuts from Trinidad, British West Indies; crude isinglass from Oronoco River.
	MRS. P. S. BOWDEN. — Mollusc (<i>Ptericola pholadiformis</i>), Parrsboro, N. S.

DONATIONS TO THE LIBRARY.

DATE.	DONOR'S NAME AND DESCRIPTION OF BOOK.
1890 Feb. 4	THE AUTHOR.—Six pamphlets on Geology of Belgium; Biographical notices, Parts I. to IV.; Cretaceous System in Belgium, Parts I. to IV., by H. Forir, Liege, Belgium.
	KONGL. SVENSKA VETERSKAPS AKADEMIE.—Memoirs, Vol. 13, Nos. 1 to 4; Bulletin, No. 44 and 45.
	NATURAL HISTORY SOCIETY, Montreal.—Vol. III., Nos. 7 and 8; Vol. IV., Nos. 1, 2, 3, 4.
6	U. S. NATIONAL MUSEUM.—Bulletins Nos. 33 to 37; Proceedings, Vols. X. and XI.
10	THE AUTHOR.—New plants from the Erian and Carboniferous, by Sir J. W. Dawson.
18	DIRECTOR GEOLOGICAL AND NATURAL HISTORY SURVEY, Ottawa.—Catalogue of Canadian Plants. Part V. List of Canadian Hepaticæ. Annual Report, N. S., Vol. III., Parts I. and II., with maps of Asbestos area and of N. E. New Brunswick.
	FEUILLE DES JEUNES NATURALISTES.—Proceedings, Nos. 232 to 242. Catalogue No. 8 and 10.
Mar. 7	BELFAST NATURALISTS FIELD CLUB.—Proceedings. Series II. Vol. III., Part II., Part III.
Apr. 1	CANADIAN INSTITUTE, Toronto.—Annual Report, 1889. Proceedings, 3rd series; Vol. VII.; Fasc. 2.
	E. GILPIN, C. E., Halifax. — Quarterly Journal Geological Society, London, Nos. 181, 184.
	DR A. F. EMERY.—Animal Physiology, by Dr. Wesley Mills.
May 1	ACADEMY OF NATURAL SCIENCES, Philadelphia.—Proceedings, 1889, Part III.; 1890, Parts I. and II.
	N. Y. MICROSCOPICAL SOCIETY.—Journal, Vol. VI., Nos. 2, 3, 4.
	SOCIÉTÉ R. MALOCOLOGIQUE DE BELGIQUE, Brussels.—Proceedings, July, 1888 to July, 1889; January to July, 1885.
	U. STATES FISH COMMISSION, Washington.—Report, 1887.

DONATIONS TO THE LIBRARY.—(*Continued*).

DATE.	DONOR'S NAME AND DESCRIPTION OF ARTICLE.
1890	
May 1	OTTAWA FIELD NATURALISTS CLUB.—Vol. III., No. 4; Vol. IV., Nos. 1, 2, 3, 4, 5, 6, 7, 8.
	ELISHA MITCHELL SCIENTIFIC SOCIETY, Chapel Hill, N. C.—Journal, Vol. IV., Part 2nd.
	THE AUTHOR.—List of North American Noctuidæ, Part I., by A. R. Grote.
	WASHBURN COLLEGE, Topeka, Kan.—Bulletin of Laboratory, Vol. II., No. 2.
	AMERICAN MUSEUM OF NATURAL HISTORY, New York.—Bulletin, Dec. 1889 and Feb. 1890. Report, 1889–90, Vol. III., No. 1, and pp. 117–122.
	ESSEX INSTITUTE, Salem.—Bulletin, Vol. XXI., Nos. 7, 8, 9, 10, 11, 12; Vol. XXII., Nos. 1, 2, 3.
18	SIR J. W. DAWSON.—Postpleiocene flora of Canada.
	DR. L. C. ALLISON.—Description of 300 animals, pub. 1719.
June 1	MINNESOTA ACADEMY OF NATURAL SCIENCES, Minneapolis.—Bulletin, 1889.
	COMMISSAÕ GEOGRAPHICA E GEOLOGICA DA S. PAULO, Brazil.—Boletim, 1887, 1888, 1889; Nos. 1 and 2.
	THE AUTHOR.—Os picos altos do Brazil, by O. A. Derby.
July 15	DIRECTOR BRITISH MUSEUM, London.—Guide to Exhibition Galleries, Parts I. and II.
	LINNEAN SOCIETY, New York.—Abstract, 1889–90.
	NEWPORT NATURAL HISTORY SOCIETY.—Proceedings, 1883, 1883–4, 1884–5, 1885–6, 1886–7, 1887–8.
	SMITHSONIAN INSTITUTION, Washington.—Report National Museum, 1886, Part II., 1887; 1887, Report of Director. Bulletin U. S. National Museum, No. 38, Proceedings, Vol. XII., 1889. Report, 1883.
	U. STATES GEOLOGICAL SURVEY, Washington.—Ninth Report, 1887–8—Monograph of L. Bonneville, Gilbert—Mineral resources, 1888, Day—Bulletins 58 to 64 and 66. Annual Report, 1886–7, Parts I. and II. Bulletins Nos. 55 to 57, Monographs XV. and plates (2 vols.), XVI. (1 vol.)

DONATIONS TO THE LIBRARY.—(*Continued*).

DATE.	DONOR'S NAME AND DESCRIPTION OF ARTICLE.
1890	
July 28	GEOLOGICAL SOCIETY, London.—Abstract, Nos. 544-560.
Aug. 8	ROYAL SOCIETY OF CANADA, Ottawa.—Transactions, Vol. VII.
Oct. 1	THE AUTHOR.—Bibliography of North American Palæontology for 1886, by J. B. Marcou. NATURAL HISTORY SOCIETY, Trenton, N. J.—January, 1886. U. STATES DEPARTMENT OF AGRICULTURE, Washington.—North American fauna, No. 3.
20	BOSTON SOCIETY OF NATURAL HISTORY.—Proceedings, Vol. XXIV., Parts III. and V.
Nov. 4	VEREIN FÜR ERDKUNDE, Leipzig.—Mitteilungen, 1889. G. F. MATTHEW.—Sixth Annual Report of State Geologist, New York. THE AUTHOR.—Natural Resources of British Columbia, by R. E. Gosnell; Mineral Resources of British Columbia, by D. Oppenheimer.
11	COLORADO SCIENTIFIC SOCIETY, Denver.—Proceedings, Vol. III., Part II.
25	THE AUTHOR.—Lower and Middle Taconic of Europe and North America, by Jules Marcou.
Dec. 2	SANTA BARBARA SOCIETY OF NATURAL HISTORY.—Bulletin, Vol. I., No. 2.

N. B.—The Library Committee wish to remind members of the Society that the rooms are open for the issue of books on Tuesday evenings at 7.30. The committee hope that members who have the opportunity to do so will use their endeavours to add to the library by donations or otherwise. There must be in the city numbers of books and magazines on Natural History, the owners of which having read them, would find them more useful in this collection than on the shelves of a private library. Several donations of this kind have been received in past years, and found useful, and any further gifts will be gladly acknowledged.

OFFICERS AND COMMITTEES OF THE NATURAL HISTORY
SOCIETY FOR 1890.

Patron — His Honor Sir S. L. Tilley.

COUNCIL FOR 1890.

President — Geo. F. Matthew, M. A., F. R. S. C.

Vice-Presidents — Geo. U. Hay, Ph. B., R. Penniston Starr, Esq.

Treasurer — Alfred Seely, Esq.

Corresponding Secretary — G. Ernest Fairweather.

Recording Secretary — J. Roy Campbell.

Librarian — S. W. Kain.

Curators — W. J. Wilson, Jas. A. Estey, Wm. Murdock.

Additional Members — Thos. Stothart, W. F. Best, Edwin Fisher.

STANDING COMMITTEES FOR 1890.

Physics and Chemistry — W. F. Best, G. U. Hay.

Meteorology — G. Murdock, W. F. Best, W. Murdock.

Geology — W. J. Wilson, G. F. Matthew, L. W. Bailey.

Botany — G. U. Hay, J. Brittain, H. F. Perkins.

Entomology — J. Brittain, Mrs. C. E. Heustis.

Invertebrates — W. F. Ganong, S. W. Kain, G. Stead.

Fishes and Reptiles — P. Campbell, S. W. Kain, W. G. Harding, M. D.

Ornithology — T. W. Daniel, A. Morrissey, P. Cox.

Library — S. W. Kain, Misses Knowlton and F. Murray, G. E. Fairweather, T. Stothart, G. F. Matthew, G. U. Hay.

Essays and Lectures — G. F. Matthew, G. U. Hay, J. A. Estey, E. Fisher, J. Montgomery, W. J. Wilson, J. R. Campbell.

Publications — G. F. Matthew, G. U. Hay, A. Seely, W. F. Best, G. E. Fairweather.

Rooms — G. E. Fairweather, W. J. Wilson, G. F. Matthew, P. Hall.

Finance — A. Seely, E. Fisher, J. R. Campbell.

Press — G. U. Hay, G. E. Fairweather, G. F. Matthew, S. W. Kain.

APPENDIX B.

REPORT OF THE COUNCIL OF THE NATURAL HISTORY SOCIETY OF NEW BRUNSWICK FOR 1891.

The Council of the Natural History Society desires, in accordance with the provisions of the constitution, to present to the society their annual report for the past year.

FINANCE. The Treasurer's report shows the following:

Balance on hand from last year.....	\$103.08
Dues collected.....	75.00
Bulletins sold.....	.30
Provincial Grant.....	125.00
	<hr/>
	\$303.38
Expenditures.....	126.04
	<hr/>
Balance on hand.....	<u>\$177.34</u>

ESSAYS AND LECTURES. During the year past, eight regular meetings have been held and the following papers or lectures were delivered on the dates named.

1891.

- FEB. 17th, Chemistry of the Six Days of Creation.—By W. B. McVey.
- MAR. 3rd, Silent Language of the Muscles.—By Dr. Foster McFarlane.
- MAY 5th, On Sugar.—By W. F. Best.
- DEC. 1st, Dictyomena, or the Tread-net Bell of the Cambrian seas.—By G. F. Matthew.

In the month of June a very successful and largely attended Field Meeting was held at Pisarinco and vicinity. Among those who led research parties during the day were Dr. Bailey and Mr. John Brittain of Fredericton, and Mr. J. Vroom of St. Stephen.

At the regular meeting on October 6th, at the invitation of the council, addresses were delivered by the Rev. George Bruce, Dr. I. Allen Jack and Dr. A. A. Stockton on the

work and object of the proposed University Extension Course, and in accordance with the resolutions of the Society, the council assisted the committee in charge of the course, in forwarding the movement. A number of these lectures have been delivered in the rooms of the society.

GEOLOGICAL COMMITTEE. Some additions to our museum during the past year to which this committee might refer are of interest as helping to complete the series of fossils of the St. John group. One of these the well known *Dictyonema flabelliforme*, an animal of wide distribution in the Cambrian seas, and of value in fixing a definite age for the rocks in which it is contained. This was discovered last spring at Navy Island by one of our members, Mr. G. Stead. With the discoveries of fossils previously made in different parts of the St. John group, that group has now become the most complete standard of comparison for the several successive faunas (assemblages of animals) of the Cambrian age in eastern North America.

BOTANICAL COMMITTEE. This committee report that many new plants, some twenty in number, have been found in New Brunswick since they made their last report. The committee will endeavour to prepare a list of them for publication in the Bulletin.

LIBRARY. Beside a number of presentations to the library the usual exchanges for the Society's Bulletin, and reports from other societies have been received.

MUSEUM. Numerous and valuable additions to the museum have been made during the year. The work of classifying and mounting the botanical collections has been continued by the custodian.

The council wish to express their thanks to those gentlemen who have delivered lectures or addresses before the society, to the donors and benefactors, and also to the daily press for the inserting of preliminary notices of meetings.

Respectfully submitted,

J. ROY CAMPBELL,

Secretary to Council.

REPORT OF THE GEOLOGICAL COMMITTEE.

The Geological Committee would submit the following report on the palæontology of the Cambrian rocks at St. John.

LIST OF THE FOSSILS FOUND IN THE CAMBRIAN ROCKS IN AND NEAR ST. JOHN, BY G. F. MATTHEW, M. A., F. R. S. C.

As the study of the organic remains found by the author and others in the Cambrian rocks around St. John is now nearly finished, it is possible to give a list of these remains, showing the zoological standing of the species and the various horizons at which they have been found.

In order to make the catalogue more useful for reference, a brief description is given of the rocks of the several levels at which the fossils were found.

These rocks are divisible into two series, there being a break in the succession of the beds at the top of the Basal Series, where its upper beds have been considerably worn to furnish material for the lowest beds of the next series, the St. John Group.

Although we make two divisions in the lower series, we have not ventured to call them stages, as the faunas, so far as known, are not sufficiently distinct to make it advisable. We therefore regard this as one stage.

BASAL SERIES OF ROCKS OR ETCHEMINIAN STAGE.

The section at Hanford Brook is one of the clearest known for this series, and from the base upward is as follows (all the following sections are ascending):

		Thickness in feet.
Div. 1.	<i>a</i> Coarse purplish red conglomerate,.....	60
	<i>b</i> Grey and purplish flags, shales and sandstones,.....	70
	<i>c</i> Purplish red sandstones with greenish layers,.....	240
Div. 2.	<i>a</i> Purplish red conglomerate, more friable than 1 <i>a</i> ,....	35
	<i>b</i> Soft purplish red slates with greenish glauconite grains, the upper part firmer and more sandy; greenish grey layers interspersed, especially toward the base,...	175
	<i>c</i> Purplish sandy shales, with a few bands of greenish shale,....	300
	Space without exposures,.....	320
		<u>1,200</u>

Other good exposures of this series are found at Ratcliff's, Millstream, Simonds, and at Caton's Island on the Long Reach of the St. John River.

ST. JOHN GROUP (ACADIAN GROUP, Dawson.)

This series is much more important for its faunas than the preceding, and for this reason is divided into three stages.

Division 1, or Acadian Stage.—A section at the north end of St. John (at Seely street) gives the following succession :

	Thickness in feet.
a Coarse grey sandstone, or quartzite,.....	50
b Coarse grey sandy shale. (Zone of <i>Agraulos articephalus</i>),....	50
c Fine grey and dark grey shales, with calcareous nodules. (Zone of <i>Paradoxides Eteminicus</i>),.....	25
d Fine dark grey carbonaceous shales. (Zone of <i>Paradoxides Abenacus</i>),.....	75
	200
	200

This division is also visible on the south side of the St. John Basin, at the shore of Courtney Bay, near the Alms House, where its thickness is three times as great as at Seely Street; the increase is mostly in Section *d*. It also crosses the city from Duke street and Mecklenburg street on the east, to Lower Cove slip on the west; here it is no longer visible, partly because it has been eroded and partly because of the filling in of streets. On the western side of the harbour it occupies part of the Mill Pond in Carleton, and extends up the valley south of King's Square, to the west of the Mill Pond.

Division 2, or Johannian Stage.—This is a very prominent member of the St. John Group in the Old City and in Carleton, or West End. Also in Portland, or North End, there is a good exposure at Wright Street, where the following measured section was made :

	Thickness in feet.
a Dark grey slates with thin seams of grey sandstone,.....	220
b Coarse grey slate and grey flagstone, the flags predominating. (Zone of <i>Lingulella Starri</i>),.....	300
c Grey flagstone and grey slate in frequent alternations. (Zone of <i>Lingulella radula</i>),.....	230
	750
	750

In the centre of the St. John Basin the thickness of this division, especially of its upper part (Section *c*), is greatly increased. The whole division there counts about 1,000 feet of measures. It is visible on the east side of Courtenay Bay, from its head to the Alms House brook. In the Old City it forms a broad belt across the centre, bounded on the north by a line from Union street east, to the Carleton Ferry, and on the south by one from Orange street east, to Reed's Point. On the west side of the harbour it rises prominently into a ridge at King's Square, south of which its width extends for the space of one block (or square).

Division 3, or Bretonian Stage.—This division includes at the summit a small thickness of beds, which belong to the Ordovician system; but although not Cambrian, they form a part of the St. John Group, and are therefore included in this statement.

The Bretonian consists entirely of fine shales of dark color, much of it being intensely black and carbonaceous. It contains three faunas and so marks the passage of a long interval of time.

	Thickness in feet.
<i>a</i> Black shales alternating with dark grey shales, and having calcareous nodules. (Zone of <i>Parabolina spinulosa</i>), . . .	100 ?
<i>b</i> The same as the last, but finer. (Zone of <i>Peltura scarabeoides</i>),	100 ?
<i>c</i> Black carbonaceous shales. (Zone of <i>Dictyonema flabelliforme</i>),	300
? Same as the last, fauna unknown,	175 ?
<i>d</i> Similar shales with a few sandy seams. (Zone with <i>Tetragraptus quadribranchiatus</i>),	25 ?
	700

These soft rocks lie in the valley along the boundary line between the Old City and Portland (“South End and North End,”) and extend thence through the harbour to the “Falls” of the St. John River where their thickness is seven hundred feet. Another belt of the rocks of this division extend across the city from Market Square and Water street north, to St. David's street on Courtenay Bay. The rocks of this division always occupy low land, except on the south side of “the valley,” where they rise on its southern flank, crossing Jeffrey's Hill, and extending to the City Hospital, etc.

Thus, of Cambrian rocks in the St. John Basin, taking the measurements where the structure is not too much complicated by faults and folds, and where the several members attains their greatest thickness, we have the following :

	Thickness in feet.
Basal Series (Etcheminian) at Hanford Brook, St. Martins,	1,200
Division 1 (Acadian) at the Alms House, Simonds,.....	650
Division 2 (Johannian) at King's Square, Carleton,.....	1,000
Division 3 (Bretonian) at Straight Shore, Portland,...	700
	3,550

The thickness of Division 2 is probably greater in the city than in Carleton ; it appears to be 2,000 feet, but there are no doubt folds in the beds, not easily detected, that produce this great apparent thickness.

Probably the whole thickness measured, where the several divisions show the greatest bulk, and including the Basal Series, would not fall far short of 4,000 feet.

This is not equal to the thickness of the Welsh Cambrian rocks which is greatly increased by intercalated beds of volcanic ashes, etc.

The faunas, or assemblages of animals in the St. John rocks, as shown by their remains, exhibit a remarkably close resemblance to those of Cambrian rocks around the Baltic Sea, though separated from them by the wide Atlantic. On the other hand they have very little resemblance to the Cambrian faunas of the interior of America, though only a few hundred miles lie between.

In the following table the species in each genus are arranged generally in the order of their antiquity, and the following abbreviations are used:—v=variety; sp.=species; r=rare; cf=compare with; nar=narrow. Also for authors:

Htt. = C. F. Hartt.	L. = Linnæus.
Dn. = Sir J. W. Dawson.	Ang. = Angelin.
Dav. = T. Davidson.	Brög. = Brögger.
Salt. = J. W. Salter.	Eich. = Eichwald.
Hick. = Hy. Hicks.	Pand. = Pander.
Walc. = C. D. Walcott.	Wahl. = Wahlenberg.
	Lins. = J. Linnarsson.

Where no reference is given the species have been described by the author in the volumes of the transactions of the Royal Society of Canada, or are unpublished. To the latter category belong Nos. 22,25,27,35,36,64a and b,67,77,78,79,137,140,146.

FOSSILIFEROUS HORIZONS, ETC.—(Continued.)

	Basal Series		SAINT JOHN GROUP.															
	Division 1.	Division 2.	DIVISION 1.					DIV. 2.			DIVISION 3.							
			a	b	c ¹	c ²	d	a	b	c	a	b	c ¹	c ²	?	d		
Brachiopoda— <i>Cont'd</i>																		
45 <i>Lingulella</i>																		
<i>Martinensis</i>			*															
46 L.—(?) <i>inflata</i>			*															
47 L.— <i>Dawsoni</i>				*	*	*												
48 L.— <i>linguloides</i>						*												
49 L.— <i>Starri</i>								*										
50 L.— <i>radula</i>									*									
51 L.— <i>lævis</i>										*								
52 L.— <i>lepis</i> , Salt.?										*								
53 L.— <i>Nicholsoni</i> , <i>Dav.?</i>											*	*						
54 <i>Acrotreta</i> , <i>Baileyi</i>			*?		*													*?
55 — <i>Gulielmi</i>				*														
56 <i>Acrothele</i> <i>Matthewi</i> , <i>Hartt</i> , sp.			*?	*	*													
56 <i>a</i> v. <i>prima</i>			*		*													
56 <i>b</i> v. <i>lata</i>			*	*	*?													
57 <i>Kutorgina</i>																		
<i>Latourensensis</i>					*													
58 <i>K.</i> — <i>pterineoides</i>				*														
59 <i>Orthisina</i> (?) <i>Billingsi</i> <i>Hartt</i> , sp.					*													
60 <i>O.</i> — (?) <i>quacoensis</i>					*	*												
61 <i>O.</i> — (?) <i>Johannensis</i>										*								
62 <i>Orthis lenticularis</i> , <i>Wahl.</i> , sp.											*							
62 <i>a</i> v. <i>lævis</i> ,											*							
62 <i>b</i> v. <i>atrypoides</i>											*							
62 <i>c</i> v. <i>lyncooides</i>											*							
62 <i>d</i> v. <i>strophomen-</i> <i>oides</i>											*							
63 <i>O.</i> — <i>Carausii</i> , <i>Hick?</i>											*							
64 <i>O.</i> — <i>electra</i> , <i>Bill.</i>											*							*
64 <i>a</i> v. <i>major</i>											*							*
64 <i>b</i> v. <i>lævis</i>											*							*
65 <i>O.</i> — <i>orthambonites</i> , <i>Pand.</i> , sp.											*							*
66 <i>O.</i> — <i>Euryone</i> , <i>Bill.?</i>											*							*
67 <i>O.</i> — <i>Clytie</i> , <i>Hall</i> , v. <i>acadica</i>											*							*
68 <i>Strophomena atava</i>											*							*
69 <i>Camarella parva</i> , <i>Bill.?</i>											*							*

FOSSILIFEROUS HORIZONS, ETC.—(Continued.)

	Basal Series	SAINT JOHN GROUP.														
	Division 1.	Division 2.	DIVISION 1.					Div. 2.			DIVISION 3.					
			a	b	c ¹	c ²	d	a	b	c	a	b	c ¹	c ²	?	d
Trilobita—(Continued.)																
131a	v. suricoides				*											
131b	v. breviatus				*											
131c	v. malicitus				*											
131d	v. quacoensis				*											
132 P.	—micmac, Htt.				*											
132a	v. pontificalis				*											
133 P.	—regina				*											
134 P.	—Abenacus					*										
135	Parabolina spinulosa, Whl. sp.										*					
136 P.	—heres, Brögg. v. lata															
136a	v. grandis											*				
137	Parabolinella posthuma											*				
138	Protopeltura acanthura, Ang. sp. v. tetracanthura											*				*
139	Peltura scarabeoides Wahl. sp.											*				
140	Cyclognathus rotundifrons															*
141	Leptoplastus latus															*
142	Ctenopyge flagillifer, Ang. sp.											*				
143 C.	—spectabilis, Brögg. var.											*				
144 C.	—pecten, Salt.?											*				
145	Conocephalites contiguus											*				
146	Euloma, sp.															*
Tracks, Burrows and Trails—																
147	Medusichnites								*							
148	Eoichnites Linnæanus, Torrell, sp.											*				
149	Ctenichnites ingens											*				
150	Psamnichnites gigas, Torrell															*

FOSSILIFEROUS HORIZONS, ETC.—(Continued.)

	SAINT JOHN GROUP.															
	Basal Series		DIVISION 1.				Div. 2.			DIVISION 3.						
	Division 1.	Division 2.	a	b	c ¹	c ²	d	a	b	c	a	b	c	c	?	d
Tracks, Burrows & Trails— (Continued.)																
151 Monocraterion magnificum										*						
152 Arenicolites Lyelli, Torr, v. minor *										*						
153 A.—brevis										*						
154 Fræna ramosa										*						
155 Goniadichnites trichiformis								*								
Incerti sedis—																
156 Eocoryne geminum						*										
157 Lepidilla anomala						*										

From this catalogue it will be seen that the middle and upper part of Division 1 in which the Cambrian fossils were first found, continues to be the richest collecting ground. Division 2, as a comparatively barren ground, divides the lower from the upper faunas. Fossils of the lower orders prevail in the Basal Series; but the Hydrozoa, with a few exceptions, show themselves abundantly only in the Upper division (St. John Group). The Linguellæ show their control of the Cambrian rocks by their uniform distribution; but the Trilobites, though abounding in the Upper and Lower divisions of the St. John Group, have left scarcely any remains in the intermediate strata.

The Agnosti in this list are arranged in three groups or sections; Nos. 97–100 are *Limbati*; 101–106 are *Longifrontes*; 107–108 are *Brevifrontes*; the fourth section of this genus, *Lævigati*, is unknown in the St. John Group. Of the three groups present it will be observed that the *Limbati* have the widest range, and that the *Brevifrontes* are confined to the horizon 1d.

COMMITTEE ON INVERTEBRATES.—A part of the fine collection of Invertebrate marine animals from Passamaquoddy Bay, presented to the Society by Prof. W. F. Ganong, have been mounted and placed on exhibition in one of the rooms of the museum. They are specially valuable for reference, as they have been compared with collections in Harvard Museum and the Museum of Comparative Zoology at Cambridge, Mass., and the names accurately determined. Many of these objects are the skeletons or shells of animals of economical importance, of which two groups—the Echinodermate and the Mollusca—were described in Nos. VII. and VIII. of the Society's Bulletin. They are therefore to the Canadian student of the Invertebrata and of the food products of the country, a valuable typical series of specimens. A suitable case for the preservation of this collection is greatly required.

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DATE.	DONOR'S NAME AND DESCRIPTION OF ARTICLE.
1891	
Mar. 3	W. D. MATTHEW.—Piece of trap dyke with secondary growth of calcite. Laurentian.
June 24	SIR J. W. DAWSON.—Series of photographs showing remains of reptiles from Joggins. Carboniferous.
	J. BAXTER, M. D., Chatham, N. B.—Egg of Night Heron. Paper pulp made at Chatham. Flexible sandstone (<i>Itacolumbite</i>). Assam, China.
Sept. 29	REV. J. M. DAVENPORT.—Sponges, Coral, Chiton, Echini from Bermuda.
Oct. 17	GEORGE HAMILTON.—Small stone tomabawk from Virginia.
	MR. MARSHALL REED, Campbellton.— <i>Chalimilla oculata</i> from Frith of Forth.
31	H. F. PERKINS.—Wasp's nest. Eggs of lizard and snake. Lancaster, N. B.
Nov. 3	R. BRYCE GEMMEL.—Centipedes, green lizard, shell of crab, from Demarara, B. G. Edible frogs from Dominique, West Indies. Plumbago from mines at Marble Cove, N. B. Felted ball of hair from stomach of a cow.
	CHAS. F. BAKER.—Water Beetle.

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1891 Jan. 21	<p>N. YORK MICROSCOPICAL SOCIETY.—Journal of, Vol. VII., No. 1.</p> <p>FEUILLE DES JEUNES NATURALISTES, Paris.—Proceedings of, Nos. 243 to 255; Catalogues 12 and 13.</p> <p>OTTAWA FIELD NATURALISTS CLUB.—Transactions, Vol. IV., Nos. 10–12; Vol. V., Nos. 1–9.</p>
Feb. 13	<p>CANADIAN INSTITUTE, Toronto.—Transactions, Vol. I., Part 1, No. 1; Part 2, Nos. 2 and 3; Vol. II., Part 1. Fourth Annual Report.</p> <p>LIBRARY OF PARLIAMENT, Ottawa.—Supplement to Catalogue.</p> <p>NOVA SCOTIA INSTITUTE, Halifax.—Proceedings, Vol. VII., Part 4.</p>
24	<p>AMERICAN MUSEUM OF NATURAL HISTORY, New York.—Bulletin, Vol. III., No. 1; Annual Report, 1890–1.</p>
Mar. 3	<p>ACADEMY OF NATURAL SCIENCES, Philadelphia.—Proceedings, Part III. (1890); Parts I. and II. (1891).</p> <p>SMITHSONIAN INSTITUTION, Washington.—Report, 1888; Report U. S. National Museum, 12 and 13; Report Missouri Botanical Garden, Report, 1889.</p> <p>E. GILPIN, C. E., Halifax.—Quarterly Journal Geological Society, London, Nos. 185 to 188.</p>
20	<p>ESSEX INSTITUTE, Salem.—Bulletin, Vol. XXII., Nos. 7 to 12; Vol. XXIII., Nos. 1 to 7.</p>
April 14	<p>NATURAL HISTORY SOCIETY, Montreal.—Canadian Record of Science, Vol. IV., Nos. 5–8.</p> <p>24 GEOLOGICAL SURVEY DEPARTMENT, Ottawa.—Summary Report, 1890; Contributions to Canadian Palaeontology, Vol. III.; do. Vol. I., Part III.; Contributions to Canadian Micropalaeontology, Part III.</p>
May 19	<p>THE AUTHOR.—Geology of Quebec and its Environs, by H. M. Ami.</p> <p>THE AUTHOR.—Time Reckoning for the 20th Century, by Sanford Fleming.</p>

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May 19	UNITED STATES FISH COMMISSION. Washington. — Bulletin, Vol. VIII., Report, 1887.
	26 SOCIÉTÉ MALACOLOGIQUE DE BELGIQUE. Brussels—Proceedings, Aug. '89 to Aug. '90.
June 5	ROYAL SOCIETY OF CANADA, Ottawa. — Transactions, etc., Vol. VIII., Proceedings, 1891.
	23 BELFAST NATURALISTS FIELD CLUB —Annual Report, Series II., Vol. III., Part IV.
	24 SIR J. W. DAWSON, Montreal.—On <i>Dendrerpeton Acadianum</i> , etc. DEPARTMENT OF AGRICULTURE, Ottawa.—Bulletin, No. 11.
July 14	PEABODY MUSEUM, Cambridge.—Annual Report, 23d and 24th, Vol. IV., 3 and 4.
	17 VEREIN FÜR ERDKUNDE, Leipzig.—Mitteilungen, 1890. Beiträge zur Geog. des Festen Wassers. BOSTON SOCIETY OF NATURAL HISTORY.—Proceedings, Vol. XXV., Part I.
Aug. 4	GEOLOGICAL SOCIETY, London.—Abstract, Nos. 561 to 577. THE AUTHOR —Carboniferous Fossils of Newfoundland, by Sir J. W. Dawson.
Sept. 1	GEOGRAPHICAL AND GEOLOGICAL SURVEY OF SAO PAULO, Brazil.—Explorations of R. Itatetiniga. Bulletins, Nos. 4 to 7.
	11 U. S DEPARTMENT OF AGRICULTURE, Washington.—North American Fauna, No. 5.
	15 LINNEAN SOCIETY, New York.—Abstract for Year to March 5th, 1891.
	24 LITERARY AND HISTORICAL SOCIETY, Quebec.—Transactions, No. 20.
	30 THE AUTHOR —Seventy Years of New Brunswick Life, by Col. W. T. Baird.
Nov. 14	HAMILTON ASSOCIATION, Hamilton.—Journal, etc., Part VII.
Dec. 1	THE AUTHOR —Check List of the Birds of British Columbia, by D. Wilson.
	12 FRUIT GROWERS ASSOCIATION. ETC, Toronto.—Annual Report, 1890.

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LIST OF FOSSILS OF THE CAMBRIAN ROCKS
NEAR ST. JOHN.

ERRATA.

The following errors occur in the columns of this catalogue:

- No. 27 The mark (asterisk) is opposite No. 28.
No. 28 The mark is opposite Loganograptus.
No. 66 The mark is opposite No. 67.
No. 67 For Clytie, Hall, read Meneviæ, Hks.
No. 77 & 78 For Cyrtotheca read Creseis.
No. 106 Does not occur in Division 1*d*.
No. 112 For Agraulos read Ellipsocephalus.
No. 124 The mark is opposite No. 125.
Nos. 140, 141 and 142 The marks for these are respectively one line
too low in the page.
No. 143 The mark is omitted, but should be in Division 1*b*.

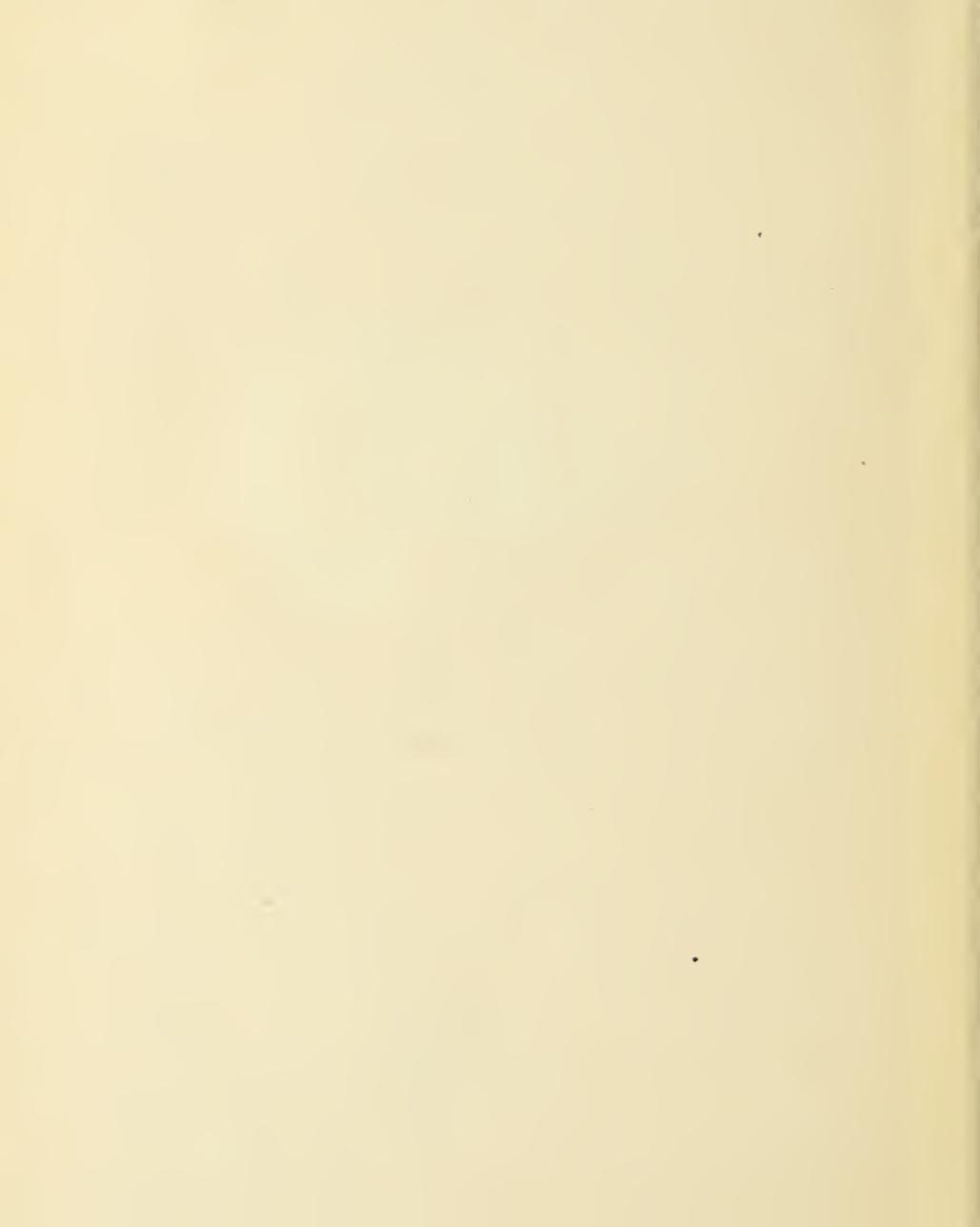
Also:

- At page xii, line 8 of the text, for Linguellæ read Lingulellæ.
“ “ “ 17 “ list “ Incerti read Incertæ.

ADDENDA.

Band *b* of Division 1 also contains:

- 112*a* Ellipsocephalus galeatus, n. sp.
112*b* E———— grandis, n. sp.
134*a* Protolenus elegans, n. gn. & sp.
134*b* P———— paradoxoides, n. sp.







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