DOCUMENTS

PRINTED BY ORDER OF

THE LEGISLATURE,

OF THE

STATE OF MAINE,

DURING ITS SESSION

A. D. 1838.

SECOND

ANNUAL REPORT

ON THE

GEOLOGY OF THE PUBLIC LANDS,

BELONGING TO THE TWO STATES OF

MAINE AND MASSACHUSETTS.

BY C. T. JACKSON,

GEOLOGICAL SURVEYOR.

AUGUSTA:
LUTHER SEVERANCE, PRINTER.
1838.

INTRODUCTION.

In order to form a comprehensive idea of the Geological Structure of the Public Lands in Maine, it is necessary to consider some of the results to which we have arrived, in examining other portions of the State, so far as to determine the relative positions and ages of the various great rock formations, which present themselves to view, while we apply the general principles of geological science to their elucidation.

In making our explorations of the State, we have endeavored to record with strict accuracy, every observation which we were able to make while on the spot where the phenomena presented themselves, and specimens of all the rocks have been collected by us, and were invariably labelled immediately after they were obtained, so that they are faithful indications of the true geology of the country.

In addition to our more especial geological duties, we have endeavored to give a portion of our attention to the interesting topographical features of the State, and have measured the altitude of many remarkable eminences and table lands, so that we might be enabled to present sectional views of the relief of the country.

At the same time, I have laid down with care, the various rock formations, which I have represented in colors upon the best maps of the State that could be procured.

An uncolored map by the late Moses Greenleaf, Esq., has served as a basis for our general records, while the admirable manuscript plans of the Penobscot and Allagash waters, drawn by Col. Joseph Treat, while employed to make a survey of those regions, under the orders of the late Governor Lincoln, of Maine, have been copied by my directions, and were used for laying down in detail, the various rocks which present themselves in that great section of the public lands.

A general map of the public lands, drawn under the direction of the Massachusetts Land Agent, G. W. Coffin, Esq., and intended for the purpose of laying out the various townships belonging to the two States in common, was also found to be very useful as indicating the positions of those portions of the public domain in which the two States are still interested, while the map being drawn on a large scale, gave us ample room for the insertion of our observations respecting the geology of the country, which we were called upon to explore.

Since there were several rivers which had never been surveyed, upon which our researches extended, and those rivers were not put down correctly upon the State map, I was called upon to draw plans of them sufficiently accurate for our purposes. By means of a good pocket compass placed in the bow of the canoe, we could easily run the courses of these rivers, and the distances of the various points were ascertained, either by noting the intersections of township lines, or by estimating by the eye the distances by diameters of the rivers as we proceeded. More accurate surveys of those waters ought to be made, but such surveys of the geography of the country would have required too much of our time, and have prevented our making such observations as were the especial objects of our explorations. A large portion of the State we have already explored, and the heights of some of the most interesting places have been determined, either by barometrical measurement or by triangulation. After making the measurement of Mt. Ktaadn, the barometers were so much injured by the rough usage, to which they were necessarily exposed in such a laborious journey amid tangled thickets, that they could no longer be relied upon, and consequently they were not carried over to the Aroostook river.

All the elevations reported were, however, made when these instruments were in perfect order, and many of their results have been most carefully proved by comparison of the heights taken in detail and added together, and by direct calculation, as also by the operation of triangulations, by means of a small portable theodolite pocket sextant, and Sir Howard Douglas's reflecting semi-circle. It was my intention to have caused a geological map of the public lands to be drawn, illustrated by sectional views of its geological structure; but such plans could not possibly be drawn in season to accompany the present report. If they should be desired hereafter, I shall most cheerfully comply with the orders of government.

Should future surveys be called for, in adjusting the vexed question of the North Eastern Boundary line of the United States, it will be necessary to carry a set of good mountain barometers along the line which is claimed by us under the treaty of 1783; and I doubt not, that the chain of highlands which separate the waters flowing into the Atlantic Ocean from those that flow into the St. Lawrence, will be readily found in the district where the present claim is made by the United States.

It will be seen, in the report of my excellent assistant Mr. James T. Hodge, that there is a chain of highlands in the district in question, there being a number of mountains which divide the waters flowing north from those which flow to the south. Should the boundary line be submitted to the exploration of a board of engineers, I apprehend they would find no difficulty in tracing it according to our claim.

The claim set up by Great Britain to more than *ten thousand square miles* of the territory of Maine, on the plea that the St. John does not empty into the Atlantic Ocean, but pours its waters into the Bay of Fundy, and that the chain of highlands designated in the treaty of 1783, is the range which divides the Penobscot and Kennebec waters from the Allagash and Walloostook, is certainly too absurd for serious refutation, and shows only an unjustifiable desire of that country to extend its territory into lands belonging justly to this country.

It is greatly to be deplored, that few of our legislators or commissioners have ever visited the disputed territory, and that they are not prepared to act understandingly upon the subject, while they have not even the advantage of consulting a correct map of that region, since no accurate surveys have yet been made along the northern boundary.

I will ask, however, if we are prepared to make a sacrifice of one of the most valuable timber and agricultural districts in the State of Maine, of if we shall willingly give to Great Britain the great military power over our territory which she would be able to possess, should we relinquish to her, in any degree, our boundary line.

The question is not, however, merely one of property in the backwoods of Maine, although such a consideration is of no small importance, but it is one of great military and civil interest, in which not only Massachusetts and Maine are concerned, as proprietors of the soil, but all New England and the whole confederacy of the States are interested; for the British claim extends entirely from the St. John, at Mars Hill, to the westernmost branch of the Connecticut river, and would give to that government facilities which, in time of war, would extend her power along the central parts of Maine, by the sources of all her great rivers, to the Connecticut, which empties its waters into Long Island Sound, thus surrounding all the New England States, upon the frontiers of which a most harrassing warfare might be carried on; while the strong arm of the Union would thus be crippled, so that its strength could not be so powerfully exerted in the defence of our common country. Although war is a great evil, yet exigencies may arise by which we may be forced into such a contest, and I would urge upon government the importance of maintaining unaltered our ancient well-defined boundary, which ought to be forthwith surveyed and marked by suitable monuments.

I shall not enter farther into the discussion of this important subject, nor agitate the question respecting the constitutional power of the United States Government to cede any portion of the State of Maine, now inhabited by citizens of that State, by allowing the line claimed by the British Government; but I will observe, that the country is now arrested, in the increase of its settlements and in its commercial business, by the unsettled state of this question. The moment the boundary line is adjusted, agreeably to our claim, the tide of emigration will begin to flow rapidly towards the banks of the Aroostook and to the Madawaska territory, and many active and enterprising individuals will be deterred from distant western emigration, and will turn their labor towards the Eastern forests, and soils, and minerals, while that important section of the country will become a great agricultural and manufacturing district.

In describing the geology of Maine, I have denoted the localities of many valuable rocks and minerals, while the relative positions and ages of the great rock formations have been carefully ascertained.

Along the western line of the State, where it joins New Hampshire, the principal masses of rocks belong to the primary class, and are mostly granite gneiss and mica slate, which have been burst open by intruding masses of molten rocks, injected from below, which have been protruded from beneath the granite, and cut through that rock in long dykes, or great veins of rock, that have been forced up through long rents in the superincumbent mass.

The granite itself bears ample proofs of its igneous origin, and it was forced up in a molten state, since the deposition and consolidation of the stratified rocks that rest upon it, they being variously broken and distorted by this violent upheaving.

The epoch of this granitic eruption we have ascertained to have been since the deposition of the transition argillaceous slates. By this disruption, the strata have been turned up so as to incline highly to the horizon, while various remarkable changes have been effected in their composition and structure.

The lower slate strata pass by regular gradations into micacious slate, and that in turn graduates into gneiss, which rests immediately upon the sides of the granite mountains, and all these rocks show by their contortions, fractures and chemical changes which they have undergone, that they have been subjected to violent mechanical and igneous disturbance.

The limestone beds which abound in the gneiss and mica slate rocks extend entirely across the counties of York, Oxford and Kennebec, from the New Hampshire boundary line to the Kennebec River, are of the granular crystalline variety, filled with minute crystals of green coccolite or pyroxene, and it is the opinion of geologists, that such beds of limestone were originally formed from marine shells, which were deposited with the sedimentary matter that was subsequently converted into gneiss by the igneous action of the subjacent granite. The mountains in York and Oxford counties evidently belong to the same group of erupted rocks as those of the White Mountain range in New Hampshire, and they extend from the boundary line of that State entirely to the Kennebec River.

Between the Kennebec and Penobscot Rivers, along the great road from Augusta to Bangor, the talcose and argillaceous slate rocks present themselves to view, and these stratified rocks repose directly upon the granite which shews itself along the whole sea coast of Lincoln county, and bursts through the strata upon the Penobscot at Mt. Waldo and Mosquito Mountains in Frankfort.

Proceeding from Bangor to Lubec, and to the shores of the St. Croix river, we passed over various granitic rocks, and along a great bed of greenstone trap, which has been forced up through all the solid rocks from below the granite, to the top of the new red sandstone formation, exhibiting the most marked and wonderful effects of the action of fire, and forming the largest mass of similar origin hitherto described.

As we ascend the St. Croix, we discover its banks to be composed chiefly of new red sandstone, resting upon the transition argillaceous limestone, filled with numerous marine shells, which shews itself at Perry, and along the shores of Cobscook Bay; and this sandstone is cut through by numerous and powerful dykes of greenstone trap, which igneous rock has exerted so remarkable an action upon the sandstone, that no one could doubt, for a moment, that the injected rock was thrown in, in a liquid incandescent state. Following the eastern boundary line through the forests, along the banks of the St. Croix, to Houlton, and thence, traversing a line parallel to the St. John river, along our boundary, we first pass over masses of granite and sienite rocks which have burst through the slate strata, along the St. Croix road, and come next to the transition limestone, near Houlton; and from that frontier post, northward, we find a continued succession of limestone and slate strata, cut by numerous trap dykes, and beds, veins of iron ore, and manganese.

If we now return to the Penobscot waters, we shall discover along the southern boundary of the public lands, in Williamsburg, Brownville, Barnard and Foxcroft, inexhaustible supplies of valuable roofing slate, and important beds of excellent bog iron ores. The slates running nearly parallel with the Piscataquis river, on the northern side of which they are of the best quality.

Ascending the Penobscot to Mount Ktaadn, we first pass by numerous ledges of argillaceous slate, which extend from Frankfort, below Bangor, entirely to the Grand Falls, upon the west branch of the Penobscot, where we come to the granite rocks which belong to the great Ktaadn range. The whole country around Mount Ktaadn is composed of granite rocks, and that mountain forms the point of the great central elevation of the strata in that part of Maine, for the stratified rocks to the north and south of it, recline upon its sides.

Continuing our route northward, along the line of lakes which are connected by the Allagash waters with the St. John, and through that route to Canada, we pass over the newer transition slates and grau-wacke rocks, containing beds of limestone, valuable for agriculture, and reach the shores of the St. Lawrence at the mouth of the Riviere du Loup.

By ascending the Seboois we gain another transverse section of the strata to the eastward of Mount Ktaadn, and traverse numerous conglomerate rocks, grau-wacke, and slate strata, filled with numerous and valuable beds of madrepore limestones, and on reaching the Aroostook, we follow that broad sweeping river through its meanderings, as it makes its great curvatures though the public lands, and projects itself over a fall of 15 feet into the St. John, a little above the confluence of the Tobique stream. The Aroostook is remarkable for its wide spreading intervales, and excellent limestone soil, while its banks are covered with a luxuriant growth of various valuable forest trees.

The rocks upon this river are chiefly limestone, slate, grau-wacke and trap rocks, which exist in abundance. Valuable beds of iron ore are also found included in the green and red calciferous slates upon this river, and from the occurrence of fine grau-wacke impregnated with carbon, it is highly probable that anthracite will be discovered in that vicinity, when clearings shall expose the out-cropping edges of the strata, now concealed from view. A belt of the rocks belonging to the anthracite coal formation extends from Sugar-loaf mountain upon the Seboois to the Aroostook, and to Mars Hill upon the St. John, forming a tract of country 40 miles wide by 60 miles in length, and this same formation has been traced by the assistant geologist quite to the shores of the St. Lawrence in Canada.

If we draw a line from the shores of the St. Croix to Quebec in Canada, it will cut across all the great rock formations of Maine, and considering the Mount Ktaadn group of granite mountains as the centre of elevation, we shall find the stratified rocks to belong to newer formations as we recede from it in N. W. and S. E. directions, until we come to the fossiliferous lime-stones and sand-stones of the St: Croix on the one hand, and the secondary limestones on the other.

Having presented the above generalizations, I would remark that the nature of the soils in various parts of the State appears to depend upon the nature of the rocks which occur to the northward of the localities where they are observed, more than upon the nature of the rocks immediately beneath; for there are indubitable proofs that the whole mass of loose materials have been swept from the surface of their parent ledges towards the south, and the precise direction of the diluvial current by which this was effected, has been found to have been from the N. 15° W. to S. 15° E., while the exact extent of this aqueous transportation has not yet been satisfactorily determined.

On the Aroostook it is probable that nearly all the soils which form the intervales upon the banks of that river are of alluvial origin, or were brought down and deposited by that river while its course winding its way among various rocks, principally grau-wacke, limestone slate and trap, would enable the waters to take up and deposit various rich alluvions.

The character of the country in most cases determines the occupations of the inhabitants; so it will appear from the geological character of this river, that the settlers will engage first in the lumber trade, which will be followed by the more sure and profitable occupation of farming; while iron founderies, with their various machine shops, will lay the foundation for a thriving manufacturing business, and will supply the important implements used in agriculture and the arts. The limestones will be burned for lime, which is required for building and for agricultural use, and the Tobique gypsum will always afford the means of bringing out the virtues of the limestone soil, which is covered with a rich black vegetable mould, that will be rendered more nutritive to plants by skilful treatment. With such resources the public domain cannot fail to become a most valuable territory, and all that is now wanting to give an impetus to its settlement is, first, to finish the great roads, so as to give ready access to the Aroostook and Madawaska, so that the settlers may have the means of transporting their produce to market; and secondly, to adjust the boundary question, so as to remove the injunction now placed against the cutting of timber, an injunction which evidently favors the lumber dealers upon the St. John, while it prevents American citizens from engaging in a profitable occupation, and obstructs the free settlement of the country.

REPORT.

To His Excellency

EDWARD KENT,

Governor of Maine:

SIR:—In accordance with my instructions, I have made a general reconnoissance of the Geology of such portions of the Public Lands, belonging jointly to the States of Maine and Massachusetts, as would prove advantageous to the State, from their situation, and the facilities of communication with them. It being evident that no immediate benefit would arise from minute researches in the midst of trackless forests seldom if ever visited by civilized men, I thought it would be advisable to devote our attention chiefly to those districts that lie upon the borders of the great rivers which intersect the public domain, for those regions are the only districts which are at present accessible to the lumberman and settler, since the rivers are the only highways which there exist, by which the various articles of supplies and trade can be transported. The important sections of this great territory now accessible, are intersected by the Penobscot, Seboois, Allagash, St. Francois, Madawaska, St. John and Aroostook, while numerous great lakes, surrounded by dense groves of valuable timber, and useful rocks, serve to give access to a large portion of the country.

There are commonly recognized two grand divisions in the public property—the timber districts and the settling lands; and it frequently happens that a tract of land is adapted to but one of these purposes. This is especially the case upon the Penobscot, where the lofty pine and hemlock trees frequently abound upon a soil, that would not repay the agriculturalist for the labor of its cultivation.

Upon the Seboois and Aroostook it is, however, otherwise; and good timber is found upon rich settling lands. This is especially the case with the latter river, which is one of the most remarkable in the country, and its borders are certainly richer as an agricultural district than any other portion of Maine.

An attentive observer will remark that the soil upon the Penobscot is chiefly composed of an alluvion from argillaceous slate and granite rocks, and that it is generally a cold and wet soil, producing a great abundance of hemlock and pine trees, the hemlocks greatly predominating along the margin of the rivers and lakes, while the heaviest pines grow on the more elevated land.

On the Aroostook, it will be remarked, that very few, if any, hemlock trees exist, and the predominating growth is a mixture of various hard wood forest trees, the sugar maple, ash and yellow birch abounding, while occur scattering some of the most lofty pine trees ever beheld.

There are evident reasons why this should be the case; for the richest soils are always most crowded with a mixed growth, and the Aroostook soils are mostly of limestone alluvion, and are exceedingly rich and good settling lands, remarkable for their heavy crops of wheat, rye, and other grains.

The geological structure of the Penobscot is very simple and monotonous in its character, while that of the Seboois and Aroostook is extremely interesting, and furnishes an abundance of valuable materials for the supply of the inhabitants and for foreign trade.

In order to accomplish as much as possible in our survey, it was necessary to lay down a plan of operations, and, after due consideration, the following method was adopted.

A sectional line was laid out along the Penobscot River, through the public lands, to the Allagash stream, and upon that stream into the St. John, from whence the route was continued through to the St. Lawrence by the Madawaska, and returning, a survey was made of the St. Francois.

A large map having been carefully compiled, which gave all the important details of the country, on a scale of a mile to the inch, we were enabled to record minutely the geology of the country traversed. These maps were put into the hands of the assistant geologist, who had become familiar with my method of making and recording observations, and written instructions were given him as to the subjects which he was to investigate and record. Thus prepared, Mr. Hodge was furnished with a boat and two men familiar with the region in question, and set out for his long and fatiguing voyage to Canada. The results of his observations are herewith presented, and, since all the observations were exactly recorded according to my directions, and the specimens collected have all been examined by me, I am willing guarantee their correctness.

While the assistant was engaged in the performance of this work, I devoted three months to the examination of other districts of Maine, and subsequently entered upon the public lands, where I spent two months in the various explorations of its topography and geology. Thus the time spent by the assistant upon those districts was four months, and two more were devoted to them by me, so that a full proportion of our labors have been devoted to the examination of the public lands.

After the assistant had completed the Penobscot and Allagash section, he accompanied me in reviewing a portion of the work, and then I laid out and completed the great line of observations upon the east branch of the Penobscot, the Seboois and Aroostook rivers, which sweep through the lands belonging jointly to the two States, and give admirable sections of the geological structure of the country.

Thus we have been able, by our joint efforts, to complete the exploration of all the great rivers upon those portions of the public lands which are at present available to the lumberman and settler, while the sources of the Walloostook still remain unexplored, and may be examined hereafter, when the country in that portion of the wilderness becomes of commercial value. Thus far, nothing is known of that district, and it is not divided into townships, since no surveys have ever been made there. From the accounts which I have obtained from the Indians, I should not suppose that it would prove very interesting to the geologist.

During the warm months of the past summer, the dense swarms of black flies and mosquitoes almost disabled us in our labors, but afterwards, when the weather became cooler, we were enabled to work to greater advantage, and at that season a vast amount of geological information was obtained.

Since no surveys have ever been made of the St. Francois, Aroostook and Seboois rivers, we found it necessary, for the purpose of keeping our records of the geological structure of the country, to make plans of them on a large scale, and I have thus been enabled to make a faithful record of all our researches upon those rivers. Our plan of the Aroostook is drawn on so large a scale that it would form a map twenty-five feet in length, and thus presents ample details; every rock, ledge, island, or other remarkable object is thus put down very accurately, while the nature of the soil, the height of the river's banks, and the nature of the forest trees, are all distinctly noted, and the houses of the settlers are all put down as they present themselves on our way.

Since it was thought probable at that time that difficulties might perhaps occasion a rupture between the British Provinces and Maine, I was more especially anxious to record the marked topographical features of a country which would necessarily become the theatre of action in case of war.

There are now said to be, per census, about 450 inhabitants settled upon the banks of the Aroostook, and they are chiefly citizens who have emigrated from other portions of Maine, and are strongly attached to our institutions and laws. They have never submitted to foreign jurisdiction, but met the first attempt of the kind by open and successful resistance. They claim, and will receive, the protection and aid of Maine.

Madawaska is populated by the descendants of the ancient Acadians, who were driven from their homes in Nova Scotia, in 1755. They are generally unacquainted with the English language, but speak a peculiar dialect or patois of the French tongue. They know but little of the geography or politics of the country, and desire to live unmolested by the dissensions of the two countries who claim jurisdiction over them. Their habits are simple and frugal, while they live chiefly by hunting, fishing, and trapping of beaver and otter. Since a detailed account of that district was laid before the Legislature in my last annual report, it will not be necessary to repeat those observations here.

It is sufficient to remark, that it is a matter of great importance to us, that the Madawaska people should become attached to the institutions of our country, instead of being brought up to consider themselves subjects to the crown of Great Britain.

Madawaska is a valuable agricultural district, capable of producing an abundance of grain, for the soils are chiefly from the limestone rocks, and are rich and productive.

Limestones abound in the whole tract of country from the Seboois and Aroostook, to the River St. Lawrence in Canada, and that whole district is capable of being an important agricultural country.

The researches of the present season have brought to light many important resources in the public domain, which were before unknown. Beds of iron ore of immense magnitude, favorably situated for advantageous operations, occur on the Aroostook, and all the marked characteristics of the regular anthracite coal formation exhibit themselves over a great belt of country, from the Seboois to the Aroostook and St. John, and extend to the Temiscuata lake, near the frontiers of Canada.

The observations which we have here recorded cannot fail to augment the value of the public lands, for every new resource in the country, when discovered, tends to enhance the value of that district.

The new road now in progress from the Houlton great military road to the Aroostook, and from thence to Madawaska, will, when completed, afford ready access to those valuable regions, and settlers will soon crowd into that part of the country, which will become so densely populated, as to defy the power of foreign aggression.

It should be the policy of the two States of Maine and Massachusetts to afford every facility to the actual settler upon that district, for there is no more effectual method of settling the boundary question, than by actually taking possession of the country within the limits of our ancient and well known boundary line.

In drawing up our Reports upon the public lands, I have thought it would be expedient to present as much topographical information respecting the country, as could conveniently be interwoven in such a report; and since, if we had confined onrselves to a mere geological description of the country, it would have been difficult to present those details, I have found it more practicable to present our observations in the form of a journal, which gives the various particulars of interest to those who may be desirous of visiting those regions. Thus we shall be able to give a more just picture of back-woods life, and prepare the reader for the journeys which he may be called upon to make, should his business ever call him upon the public lands.

I would also remark, that the cold weather commenced the last autumn much earlier than usual, so that the reader must not be alarmed by the fact that we were obliged to break our way through ice, and travel amid snow storms in the month of October.

After making our surveys of the other portions of the State assigned me, our steps were bent towards the public lands, and we were then ready for our excursions up the Penobscot and Aroostook waters.

On the ninth of September, Mr. Larrabee and myself returned to Bangor, where we found Mr. Hodge, the assistant for Massachusetts, awaiting our arrival, after having made his excursion through the public lands to Canada.

We there made preparation for a journey to Mount Ktaadn by the route of the west branch of the Penobscot river, through Millinocket and Pamidumcook lakes, to the base of the mountain.

The objects of this survey were to make a sectional view of the banks of the Penobscot, and to measure the altitude o

Mount Ktaadn, which, as its aboriginal name signifies, is the highest mountain in the State.

Having, on a previous occasion, ordered a light batteau to be built for our use, we were enabled to make every preparation required for the excursion in a short space of time, and set out on the thirteenth of September.

On reaching Oldtown, we found that the batteau would not carry our whole party, with the necessary supplies of provisions, and, on that account, I purchased a birch canoe, and hired an excellent Indian (Peol Michael) to take one of the assistants and a part of our baggage.

The provisions required for an excursion of ten days, consisting of hard bread, rice and pork, were put into the boats, and we set out on our route up the Penobscot.

Samuel Bolton and Thomas Fobes, of Oldtown, were employed to navigate the boat, which arduous duty they performed in an able and satisfactory manner.

Those who have never been on such a journey, would be surprised at the dexterity of the Penobscot boatmen, as they drive their frail batteaux through the rapids and among dangerous rocks. The slightest failure on their part on passing the numerous water-falls, would place the lives of those on board in imminent peril, and the traveller has good reason to be thankful, if the boat by their care is saved from being overturned or sunk in the river.

When the waters rush swiftly down a rapid slope of smooth and rounded rocks, forming what are called gravel beds, the most strenuous exertions of the boatmen are required to stem the current, and, not unfrequently, their setting poles are caught between the rocks, so as to be jerked from their grasp.

Batteaux are navigated up stream by means of slender poles of spruce, about twelve or fifteen feet in length, armed with an iron point, confined by a ferule, or iron band, around its extremity.

One boatman stands in the bow, and braces his foot against the stem, as he labors. The other stands in the stern, and they both pole on the same side, as they proceed up the margin of the stream. Descending the river they make use of paddles.

Great experience is required for the safe navigation of the Penobscot, and even with such practical knowledge, many persons lose their lives in those waters.

Canoes of birch bark, when navigated by Indians, are comparatively safe and easy means of conveyance, but the passenger must also understand how to balance himself in the canoe, and must keep himself perfectly cool amid dangers, trusting to the skill of his aboriginal navigator, for safe deliverance.

Canoes will not, however, bear a heavy burthen, and the utmost care is requisite to prevent their being split asunder on the rocks. They are also liable to be worn out in a long cruise. On this account, it is always desirable to have both a batteau and a canoe, so that if one is destroyed the other may be put in requisition.

Since we were required to collect heavy loads of specimens, a boat was absolutely necessary, and was found very serviceable.

A batteau, for such an excursion, should not weigh more than two hundred and eighty pounds, and ought to be pitched and painted, so as to prevent the absorption of water; for it would be impossible to transport a heavy boat over the numerous and difficult carrying places that we are obliged to pass.

The river was low, and although this circumstance rendered navigation difficult, still it was favorable for our purpose, since we desired an opportunity of inspecting the strata, laid bare by the river.

On asking the Indians if we should meet with many rocks, they replied, "Ah! too many!" and with this assurance we set forth, duly equipped with hammers, crowbars, chisels, camping apparatus, and all the surveying instruments required in our work.

13th Sept. Following our course up the river, we stopped at Sunkhaze for the night, having remarked on our route that the rocks along each side of the stream were uniformly argillaceous slate, of a compact kind, charged with siliceous matter, and intersected by numerous veins of quartz. The strata run parallel with the river's course, and dip to the S. E. 80°.

Few objects of interest present themselves in the geology of this day's route. The river's banks are low, and are formed of round pebbles of siliceous slate, and granite boulders. Barometer stands at this place 9 P. M. at 29.870 T = 52°.

On reaching the mouth of the Piscataquis, a river so named from the Indian word for (a branch) we stopped for the night at the house of Mr. William C. Hammat, a gentleman who has cleared for himself a tract of land at this place, and has prepared a very good farm, having a handsome dwelling and farm houses. Having been entertained hospitably by this gentleman, we left on the following morning for our cruise to Ktaadn, accompanied by Messrs. Hammat and Simmons, who volunteered to join our party.

At Lincoln the land has been cleared of forest trees, and the soil is good. Above this town the growth is mostly small hard wood, such as white maple, beech and birch trees. The only rocks in place along the river are argillaceous slate. There are also deep diluvial deposits, forming rounded hills at Matamiscontis, on the western side of the river.

At night, on the 13th of September, encamped at the Na-ma-ka-nock island, amid a dense grove of maple, birch and hemlock trees, some of the trunks of which served us for fuel, while the hemlock boughs formed a very comfortable bed. Here we prepared our meal, consisting of fried fat pork and biscuit, which are the usual articles of food required while travelling in the forests, and they are relished by the traveller as the greatest delicacies, for labor gives a keenness to the appetite, making even coarse fare agreeable.

The Penobscot boatmen are well skilled in the art of camping in a comfortable manner, and soon prepare their fire for the night, make a bed of boughs, and pitch the tent in such a manner as to afford a complete shelter. Having partaken of our meal, we reposed upon the boughs spread upon the earth, our feet being turned toward the fire.

This being our first encampment for the season, the novelty of the scene prevented sleep; the night was very pleasant, and the broad moon slowly descending in the west added her effulgence to beautify the scene, her image being reflected by the rippling waters, while various contrasts of light and shade from the dense foliage, and the pale moonbeam and glaring red camp fire, gave an effect full of beauty, and worthy the attention of an artist.

Amid pleasant scenes we are however subject to contrasts of a less agreeable kind, and here our Indian while cutting wood suffered a severe accident; his hatchet accidentally slipping, was driven deeply into his leg between the two bones, so as to expose the anterior tibial artery. I was then called upon in my surgical capacity, and having my instruments with me, dressed his wound in the usual manner, and early the next morning we took him to Matanawcook island, where he made arrangements with another Indian, Louis Neptune, to supply his place while he was recovering from his wound. This arrangement having been made, we continued our journey.

Two miles below Natham's Island the slate ledges again appear, but are quite uninteresting. The strata dip to the S. E.

Snow's Island, seven miles below Mattawamkeag Point, is covered with a heavy growth of rock maple and hemlock trees, and has a very picturesque appearance.

Two miles below Five Islands Falls, there is found a bed of roof slate, but not of good quality.

16th Sept. Arrived at Mattawamkeag Point, where we left a part of our load, and then continued our course.

17th Sept. Leaving the Point, we ran up to Nickatow, or as its Indian name signifies (the Forks) of the east and west branch of the Penobscot. Here we obtained a view of Mount Ktaadn, and took some observations. Its highest peak bears N. 28° 30′ W., and its angle of elevation is 1° 20′. These measurements being taken near the deserted house at the Point where we passed the night.

After breakfast the next morning we ascended the west branch of the river, and came to rapids about one mile above Nickatow. Two miles below the Little Schoodic river, slate suitable for roofs is found, but it is not so good as that found at Brownville. The water now becomes extremely rapid, rushing through heaps of large rounded masses of granite. Boulders of greenstone trap abound along the river's course.

Five miles above the Little Schoodic we came to Shad Pond, which is but an expansion of the river.

We then reached Millinocket stream, which is sluggish for the principal part of its course, but becomes very rapid and rocky near the lake.

Having ascended this stream about three miles, we encamped for the night amid a beautiful grove of ash, maple and birch trees. This township is one of the most valuable timber districts upon the river, and large numbers of pine trees are obtained during the winter season.

When we had passed through several difficult and rocky rapids, we entered Millinocket Lake, a most beautiful sheet of water, containing a great number of small islands, from which circumstance it takes its name.

The islands are composed of the detritus of granite rocks, and the shores of the lake are composed entirely of similar materials.

Mount Ktaadn is seen rearing itself majestically on the N. N. W., and appears as if on the margin of the lake, although it is more than 15 miles distant.

I made several sketches of the mountain from different points of view, and took the exact bearings and angles of elevation of the several peaks.

The eastern extreme of its summit bears N. 20° W. The western extreme N. 30° W. Central peak N. 20° W. Angle of elevation from the lake, 3° 25′.

Several nearly perpendicular bands of the rock, left bare by eboulments or slides, are conspicuously seen, and their steepness threatens us with great difficulties in making our ascent to the summit of the mountain. Forest trees appear to be extremely diminutive, and disappear below the top of the slides. While I was engaged in noting the bearings of this mountain, the clouds suddenly darted down upon its summit, and concealed it from view; while we could observe that a violent snow squall was paying homage to Pomola, the demon of the mountain. Presently the storm ceased, and the clouds having thus paid their tribute, passed on and left the mountain white with snow. This took place on the 20th of September.

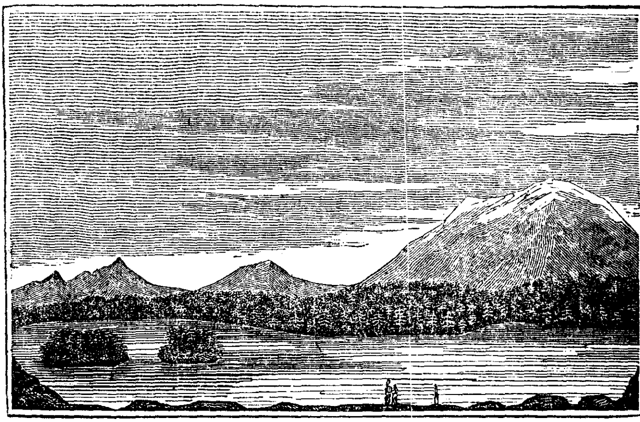
A remarkable saddle shaped mountain, composed of two peaks, and called the Travellers, presents itself—the western peak bearing N. 8° W., and the eastern N. 6° W. This mountain is seen from many different points of view, and hence its name. It is not designated upon the State maps.

Crossing the lake, we reached the carrying place at the head of a long creek, where we pitched our camp amid a few poplar trees, which are of second growth, or have sprung up since the forests were burnt. The want of good fuel and of boughs for a bed was severely felt, since we were obliged to repose on naked rocks, and the green poplar trees appeared to give more smoke than fire. The night was cold, and the wind violent, so that sleep was out of the question.

Early in the morning, we prepared to carry our boats over to Ambejijis Lake, and the labor was found very difficult, since the water was low, and we had to traverse a long tract of boggy land, before reaching the other lake. This bog is underlaid by marl, derived from myriads of fresh water shells, such as the Ciclas, Planorbis, Unio and Anadonta, and where the ice had torn up the peat, the marl was exposed to view. Tracks of moose and carribco abound in this mud, since they frequent the shallow parts of the lake, to feed upon the lily pads, or the leaves of the Nuphar lutea, which here abound. A noble looking cariboo suddenly started from the woods, and trotted quietly along the shores of the lake, quite near to us, but we were not prepared to take him, and he presently darted into the forest and disappeared.

Snow fell abundantly upon Ktaadn last night, and clouds are now seen driving swiftly over its summit.

On reaching Ambejijis Lake, which was effected before night, we stopped awhile to rest, at a bar of granite-gravel, which separates it from Pamiduncook or Bar Lake, and from this spot I took a view of Joe Merry Mountain, which appears rising to a considerable elevation on the south-west. This mountain is not indicated upon the State map, nor upon that of the public lands. It is composed of granite, and is a commanding point of view for examining the surrounding country, so that it is frequented by explorers for timber. The following wood cut will give a good idea of its appearance from Ambejijis Lake.



View of Joe Merry Mountain from Ambejijis Lake.

The following bearings were taken. Western extreme of summit, S. 65° W. Eastern extreme, S. 62° W. Angle of elevation of summit above lake, 2°.

Two rocky peaks appear to the south of this mountain, which bear S. 55° W., and S. 49° W. Crossing over the bar, we took another view of Mount Ktaadn, the central peak of which bears N. 30° W., and appears to be the highest point. Angle of elevation 3° 25′.

Outop Mountain is seen to the N. 22° W., and appears in form exactly like a volcanic cone, but it is probably composed of granite, since blocks of that stone may be discovered on its sides by the means of the telescope. Its angle of elevation from the lake is 1° 15′.

Proceeding up the lake, we reached the river, where there are very troublesome rapids and falls, over which we passed, and camped upon the western bank, at Katepskonegan Lake. This name signifies carrying place, since it is necessary to carry the canoe by.

The forest trees on its shores are chiefly hard wood, such as rock maple, yellow birch, ash, &c. Pines, hemlocks and fir trees also abound, but the pine timber trees are not on the immediate shores of the lake.

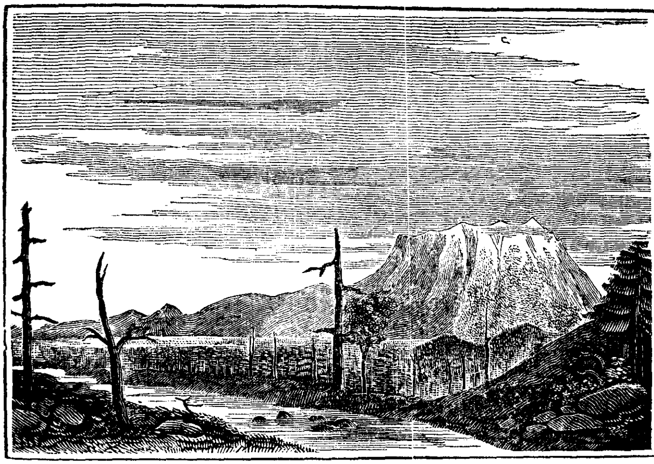
Our provisions having been reduced, owing to the circumstance that our journey proved much longer than we had anticipated, I thought it necessary to put the whole party on a regular allowance, which was mutually agreed to. Our Indian, Neptune, succeeded in catching half a dozen musquash, which we were glad to share with him, and a few trout which were also taken, and served to save a portion of our more substantial food. Finding that our provisions would not last many days, and that there was no probability of obtaining any until we returned to Nickatow, we hastened our journey.

At the head of Katepskonegan lake we have another magnificent view of Ktaadn, the highest peak of which bears N. 22° E., and the angle of elevation is 5° 20′. Outop bears N. 18° W.; angle of elevation 2°.

Leaving our boats, we walked to Pock-wock-amus Falls, where the river rushes over a ledge of granite, numerous huge blocks of which obstruct the course of the water.

Large trout are caught abundantly at this place, and we stopped a short time to obtain a supply. They are readily taken with a common fishing hook and line, baited with a piece of pork, or even with a slip of white paper, which is to be trailed over the surface of the water. Some of the trout thus taken would weigh from three and a half to four pounds.

When our boats came up we took our places and went up to a little island just above the outlet of Muddy Lake, where we camped for the night. From this point the following view was taken, and will serve to give a correct idea of the aspect of the mountain.



View of Mt. Ktaadn, bearing N. 27° E. from west branch of Penobscot.

The highest peak bears N. 27° E.; western slide N. 13° E.; second slide from west N. 17° E.; eastern extremity N. 37° E.; western extremity N. 8° E.; angle of elevation of highest peak 7° 15′; head of second slide 6° 50′; lower western peak 5° 10′.

Outop Mountain bears N. 17° W.

Barometer stands at 29.470 T= 66° F.

On the 22d of September, we prepared ourselves for ascending the mountain, taking with us our tent, a few cooking utensils, and all the food remaining excepting a small quantity of Indian corn meal, which we concealed on the island for use on our return.

Our party, all clothed in red flannel shirts, and loaded with our various equipments, made a singular appearance, as we landed on the opposite shore and filed into the woods. Our party consisted now of ten persons, and each one of us took upon his shoulders as much as he was able to carry, the surveying instruments, knapsack and hammer falling to my lot.

Our course was directed towards the second western slide, by which we intended to make an ascension of the mountain. Plunging into a dense foliage of undergrowth, that has sprung up since the forests were burned, we travelled some distance and then turned to the left, in order to take advantage of a high ridge of land less covered with trees. At 10½ A. M. the barometer stood upon the ridge at 29.340 inches T = 59°.

Blue-berries of large size abound and press the smaller bushes to the earth. Bunch-berries, or the fruit of the Cornus canadensis, abound. Wild red cherries also occur in loaded panicles, and the trees have been broken by the bears that have frequented them for the fruit.

Beautiful specimens of the Trillium pictum Convallarius, of several species; Crategus, &c.; grow abundantly on the burnt lands.

At noon we reached the Aboljacknagesic (or open land) stream, where we stopped to partake of a scanty meal. At 1 P. M., barometer h. 28.820 T. = 60°.

The waters of the Aboljacknagesic stream rush over huge piles of granite rocks, some of them being nearly twenty feet square, and standing in such positions as to show that they came to the sides of Ktaadn. The temperature of the water was found to be 40° F., while that of the air was 60°.

Water boils at this place at 210° F. Continuing our journey, we travelled through a thick grove of young cedars and a swamp filled with the Rhus toxicodendron or poison dogwood; crossed the stream again where it falls over granite rocks, boulders of trap and masses of grauwacke, containing marine shells. At 4 P. M. we reached the foot of the slide. Barometer = 28.200 T. = 59° F.

Ascending the slide, we measured a base line on it, 2000 feet in length, at an angle of 10° 40′ above the horizon.

From the lower station the angle of elevation of the central peak is 22° 15′; from the upper station the angle of elevation was 25°. Eastern peak from lower station 15° 55′; upper station 17°. These observations, calculated, will give the height of the mountain from the base of the slide.

Having reached a height where the forest trees were so diminutive that we could not camp any higher up, for want of fuel, we pitched our tent. This place is about half way up the mountain; from it we have an extensive view of the surrounding country. Moose Head Lake appears very near, and many mountains, rivers, and lakes may be descried around. 5½ P. M., barometer 27.770 T. = 52. Water boils at 206° F.

Passed a fine night, but without any other food than a small piece of clear pork, our bread having been exhausted the day previous. Towards morning, the sky began to threaten rain, and we hastened to ascend the mountain before it should take place; 23d, 6 A. M., barometer = 27.420, T. = 44°.

Leaving our camp on the mountain side, at 7 A. M., we set out for the summit of Ktaadn, carrying with us our hammers, knapsacks, and instruments for measuring its altitude. Travelling steadily up the slide, clambering over loose boulders of granite, trap and grau-wacke, which are heaped up in confusion along its course, and are capable of being set in motion by a careless step, we at length reached a place where it was dangerous longer to walk on the loose rocks, and crossing over to the right hand side, clambered up among the dwarfish bushes that cling to the side of the mountain. At the top of the slide the barometer stood at 25.580, T. = 36°.

Here all traces of arborescence disappear, and only a few low spicy blueberries and mountain cranberries are found, clinging to the rocks. The ascent now became exceedingly laborious, owing to large overhanging rocks, which were covered with moss, and, being wet, were very slippery, so that it was difficult to mount over them. Snow and sleet drove fiercely against us, and our clothing being wet began to freeze.

Two of our party became discouraged, on attaining this point, and there being no necessity of their accompanying us, they were allowed to return to camp. Along the whole course of the slide, we found an abundance of rounded diluvial boulders of grau-wacke, and compact limestone, filled with impressions of marine shells, showing that the diluvial current once passed over the summit of this lofty mountain.

The remainder of our ascent was extremely difficult, and required no small perseverance. Our Indian guide, Louis, placed stones along the path, in order that we might more readily find the way down the mountain, and the wisdom of this precaution was fully manifest in the sequel. At 10 A. M., we reached the table land, which forms the mountain's top, and ascends gradually to the central peak. Here the wind driving snow and hail, rendered it almost impossible to proceed, but we at length reached the central peak. At 11 A. M., I placed my barometer beside the shelter of a high rock, and observed the altitude of the mercurial column to be 24.820 T. = 30° F.

On comparing the height of the mercurial column in our barometers, at the various stations where they were placed, and making due corrections for the descent of the mercury and the difference of temperature in the instruments, and in the atmospheric layers, and for the curvature of the earth, in the latitude given, we are enabled to calculate from those data, the exact height of Mount Ktaadn.

By calculating separately, the height of all the separate stations, and then adding them together, it is found that the difference, or sum of error, between the heights obtained by that operation, and by the direct calculation from the summit of the mountain to the sea level, is but 8 feet, so that the results which we have obtained, are undoubtedly correct. Thus we have ascertained that the true altitude of Mount Ktaadn above the level of the sea is 5,300 feet, or a little more than one mile perpendicular elevation. It is, then, evidently, the highest point in the State of Maine, and is the most abrupt granite mountain in New England.

When this operation was completed, finding that it was impossible to make many geological researches, amid such a furious northeast snow storm, we set out on our return from this region of clouds and snow. Louis declared that Pomola was angry with us for presuming to measure the height of the mountain, and revenged himself upon us by this storm.

Mount Ktaadn is composed entirely of granite rocks, of a good texture, containing black mica and white felspar, with a little quartz. A few dry dwarfish plants, such as the Saxifraga, Carex and Iceland moss, grow upon the rocks.

Descending, we had nearly gone astray, and might have descended the wrong slide, had it not been for the precautions of Louis, who had marked our path back to the slide by which we had ascended. Clouds and darkness hung upon the mountain's brow, and the cold blast almost deprived us of breath. Encrusted with snow, we effected our descent, sliding carefully upon the surface of the rocks. Our boatmen, on reaching the head of the slide, tumbled down some large blocks of granite, that descended with a terrible fracas, dashing the rocks into fragments, as they bounded along. A ravine lies upon the eastern side of the slide, and is of immense depth, and overhung by projecting rocks.

On returning to our camp, we collected various specimens of curious rocks in the slide, some of which we brought home, while a large heap of those we were unable to carry were left at our camp.

Finding that our provisions were entirely exhausted, Mr. Larrabee and two of our men were determined to return to the river that night, while the remainder of our party encamped upon the mountain side, and passed a sleepless night, without food, and amid a driving snow storm. Owing to the small size of the trees, it was exceedingly difficult to keep our fire burning, and the night was very cold and uncomfortable.

Early the next morning, we struck our tent and descended the mountain, but so enfeebled had we become by hunger, privations and fatigue, that it was with difficulty we could carry our several burthens. Every now and then, our knees would give way beneath us, and cause us to fall upon the ground.

When we had reached the base of the mountain, we discovered some wild choke cherries, hanging in bunches from the trees, which the bears had often climbed and broken for the fruit. Felling one of these cherry trees, we ate the astringent fruit, and were in some measure resuscitated in strength, so as to march with renewed vigor. A bed of blueberries also presented itself, and we stopped to dine upon them.

Following the course of the Aboljocknagesic stream, we came to a cascade, where the river falls over a large sheet of granite. At the mouth of this river, we met Larrabee and

Simonds, who had cooked all the Indian meal that was left at our old camp on the island, and brought the cakes for our relief. After partaking of this scanty, but very welcome meal, we took the boats, and ran down to the island, intending to move homeward as rapidly as possible, not having any more food, and being several days journey from any house or camp.

Fortunately we descried a canoe, in which two young men were ascending the river on an exploring party, and we quickly gave chase and induced them to sell us 20 biscuits, which, being two to a man, on short allowance, we hoped to be able to reach Nickatow.

September 25th, Monday, 7 A. M., at the island,

Barometer = 29.400, T. = 42°.

Descending the river, we passed through Katepskonegan lake, and camped at the foot of Pamiduncook.

On the 26th, we met with Col. Webster, of Orono, who was going to Nah-me-can-te stream, to clear out certain rocks that interrupted lumbering operations. He kindly supplied us with some biscuits, and we continued our route.

Passed through Katachicwac lake, where there are three rapids, then came to Quakis, where we obtained a supply of trout, which answered for food until we reached Nickatow, where there is a house, at which we stopped and obtained supplies. All the rocks at Quakis lake are granite, and the water falls over huge boulders of that rock. The forest trees are a mixed growth of hard and soft wood, maple, birch, beech, hemlock, &c. This lake is a beautiful sheet of water, now surrounded by autumnal foliage.

On the 27th we arrived at Mattawamkeag point, and there I left the boats, in order to go down to Bangor, for supplies for an excursion up to the Aroostook river.

On the 4th of October, we left Mattawamkeag point, having with us a batteau and a canoe, provided with a competent supply of bread, rice and pork, for a month's cruise.

Our route lay up the east branch of the Penobscot, to the Seboois river, from whence one of our boats was sent to examine the Grand Falls on the east branch, and the Seboois was then followed to its sources. The weather had become so cold, that we were no longer troubled by venomous insects, and only suffered from cold feet and hands, when confined to the boats.

On entering the east branch, we proceeded one mile, and then encamped amid a beautiful grove of maple trees. The country thus far is composed of argillaceous slate rocks, and diluvial embankments called horsebacks. The river's banks are low, and the water is not rapid. Several small and picturesque islands, covered with lofty maple trees, lie in the midst of the stream.

Ledge Falls, two miles up this branch of the river, shows the slate rocks running N. E. and S. W., and dipping 70° N. W. Grey limestone occurs imbedded in this rock, and is valuable for agricultural use.

The river above the falls is broad and tranquil, and its banks are thickly crowded with maple, hemlock and birch trees. A short distance above the falls we again found limestone rocks, and the strata dip S. E. 80°.

The river's banks become more elevated as we proceed, and tall pine trees abound on the left hand side of the stream. As we continue, the water becomes more rapid, and there are troublesome gravel-beds. Numerous islets covered with grass occur in the river. Seven miles above Nickatow we found grau-wacke in strata with the slate, and the latter rock is charged with pyrites.

One hundred yards from the left hand bank of the river, there is a long ridge of table land, elevated 200 feet above the stream, and running north and south for the distance of three miles. This high embankment was formerly washed by the river, as may be evidently seen on inspecting its surface. The soil is diluvial, and the direction of the embankment is the same as we have observed in examining most of the horseback ridges of the State.

From the summit of this ridge we have a very fine panoramic view of Mt. Ktaadn and its adjacent highlands, while the Penobscot waters are seen winding their way through the country below. This tract of land is known under the name of the Brown township, and it was burnt over in 1825. Numerous charred stumps of large size show that it was once heavily clothed with pine timber.

Continuing our route, the banks of the river became more lofty, rising from 20 to 100 feet directly from the stream, and the water is here rapid and rushes amid numerous large blocks of granite and slate rocks.

Arrived at Grindstone Falls, where the river pitches over ledges of argillaceous slate, and among huge blocks of granite. The slate strata run N. 33° E., and dip 80° S. E. by E., the rock being roofing slate of a bluish green color, and alternating with beds of grau-wacke and limestone.

About half way up the falls, the dip of the strata becomes suddenly reversed, and they incline to the N. W. 60°. It is remarkable that the grau-wacke beds do not coincide with the fissile layers of slate, but dip in an opposite direction. Grindstone Falls receive their name from the circumstance that the current of water causes the rounded rocks to wear deep "pot-holes" in the slate, which they effect by continual whirling and attrition of their surfaces, aided by the gravel that is continually washed into the cavities.

It is evident that the river has forced its own way through this ledge, for the broken and worn rocks, rising from 50 to 70 feet on each side, bear marks of its violence.

While we were engaged in exploring the rocks, our men tried to shove the boat up the falls, but the violence of the current prevented their effecting their object, the boat being instantly filled and sunk in the attempt; while all our baggage and provisions that remained on board were swept off and carried down the stream. A scene of unwonted activity now ensued, in our endeavors to save our articles as they were rapidly borne down the foaming waters. The boat fortunately was not much injured, and we succeeded in hauling it upon a rock, and bailed out the water, after which we gave chase to our lost articles, and succeeded in saving those that were most essential to our safety. The bread barrel, although scuttled, was but half full of bread, and floated down stream, with its opening uppermost, so that but little of it was injured. Our bucket of rice burst open and was lost. The tea-kettle and other cooking apparatus sank in the river, and were fished up by a hook and line. The tent was found about a mile down the river, stretched across a rock. The maps and charts were all soaked with water, so that it required almost as much labor and patience to unrol them, as the papyry of Herculaneum. Our spare boots and shoes were irrecoverably lost. Having rescued the most important articles from the water, we carried by the falls, camped, and dried our papers and provisions, being thankful that no worse an accident had befallen us. Fortunately we had taken the precaution to remove our surveying instruments and the blankets from the boat, before the falls were attempted.

Having kindled a camp fire and dried ourselves, a storm of rain began to pour around us, but our great fire was not easily damped, and we passed a comfortable night beneath the shelter of a water proof tent.

October 6th. This morning we corked and pitched our boat, repairing the damage it had sustained in the falls, and at 10 o'clock set out on our journey. The river is now tranquil, and its banks are 60 feet high on the left, and 5 or 6 feet on the right. Presently we came to Crowfoot Falls, which are rapids produced by numerous blocks of granite.

Just below Mud Brook, a small stream that empties into the east branch, we descried a large moose crossing the river, and gave chase for him. A bullet was quickly rammed down upon a small charge intended for partridges, and on firing at the moose, the lead being too heavy for the charge of powder, failed to produce any effect, and so we were disappointed in our game.

Near this place there are several small gravelly islands, covered with a profusion of deep purple beach plums, but since they had been frozen they were found to be tasteless and insipid. Bog iron ore, and black oxide of manganese, are found near Brown's Island, forming a bed on the river's side four inches in thickness.

At Whetstone Falls there occur ledges of siliceous clay slate, from which these rapids take their name.

Arrived at Mr. William Hunt's, 24 miles above Nickatow, and passed the night there. This gentleman has prepared for himself at this place a very good farm, on which he raises supplies of provisions for the lumber cutters. He has dwelt here five years, and has brought the soil into a good state of cultivation, and during the present summer has raised one hundred bushels of wheat, and an abundance of potatoes and hay.

Mr. Hodge had been sent up the east branch of the Penobscot, and we were to meet him at the forks of that river and the Seboois. Proceeding thither, we met him on his return from the Grand Falls, and we proceeded in company up the Seboois. This stream is much wider than we had imagined it to be, and the waters are easy for the first day's cruise. Slate and limestone ledges shew themselves in the bed of the river and along its banks. The forest trees are luxuriant, and are mostly of hard wood growth, such as rock maple, red oak, hornbeam, besides an abundance of hemlock and spruce trees.

The soil is good alluvial loam, derived from limestone and slate.

4 P. M. Here we came to burnt land, and before entering it, as night was at hand, we thought it expedient to camp. The rocks along the river's course for this day are calciferous slate and limestone, while the bottom of the stream is covered with pebbles of the same kind of rocks. A violent hail storm, followed by a vivid rainbow in the eastern sky here served to vary the scene as we prepared our lodging for the night.

In the morning (8th of October) we found that there had been a slight fall of snow during the night, and ice one eighth inch thick formed in our boat and along the margin of the river. Proceeding up the stream, we came in view of Peaked Mountain, a singular saddle shaped hill on the left hand side of the stream. The rocks along from this place upward are composed entirely of grau-wacke, the strata of which run N. 10° E., and dip 80° S. 10° E.

This rock forms the principal mass of the mountain, and it extends far into the country around, alternating with clay-slate and limestone rocks. It belongs to the regular anthracite coal series. Large beds of limestone made up of madrepores, are included in its strata, and are extremely valuable for the manufacture of lime.

Diluvial boulders of amygdaloidal trap, jasper, red ferruginous slate; epidote-rock, and huge boulders of madrepore limestone abound. We searched the rocks for a long distance in the burnt forest, to ascertain whether there were discoverable any indications of coal. The rocks certainly belong to that formation, and are frequently glazed with carbon, but no bed of coal was discoverable.

Indeed, such is the state of the wild lands, that there is but little probability of our finding a bed of this combustible, unless considerable labor and expense are bestowed in digging into the earth, for where coal occurs the soft strata are generally so much decomposed that it is covered with deep soil, which would be likely to conceal it from view. An upturned stump may, however, yet reveal its existence; or it may happen that some trench, cut by a mountain torrent, may bring it to light; but it is not our duty to do more than to indicate the proper localities for such researches. Mining, hereafter, may be carried on here, when, by digging a well or cellar, some fortunate individual lights upon a coal bed.

From the base of Peaked Mountain, we triangulated its height above the Seboois, and found its perpendicular elevation to be 800 feet above the river at its base. This mountain is composed of conglomerate or grau-wacke, and is cut through its centre by a huge mass of greenstone trap, which has produced some very curious changes in the strata. Its southern peak is composed of amygdaloidal trap, and slate melted into hornstone, forming a curious breccia.

The central peak is composed mostly of coarse conglomerate, or grau-wacke, which is in part cut by the trap, forms the northern peak. Boulders of old red sandstone, of diluvial deposition, are found upon its surface. Veins of calcareous spar and calcareous tufa occur in this rock.

From the highest point of this mountain, we have a magnificent view of the surrounding country, and I counted no less than 27 high mountains that were seen around. Ktaadn, white with snow, rears itself in the west, and clouds are seen to descend upon its summit, discharging their burdens of snow and hail. Chase's Mountain, a conspicuous point, bears N. 55° E. Sugar-loaf Mountain N. 14° E. Ktaadn's highest peak bears S. 80° W. Piscataquis ridge S. 23° E. The Travellers N. 42° W. Another lofty mountain, unknown, N. 45° W. Highlands around Houlton are seen in the east. The Seboois winds in a serpentine manner from the north and around the mountain's base.

The labor of clambering up this craggy and steep mountain was amply repaid by the beauty of the scenery viewed from its summit, and we should have remained there longer had we not been forced to retreat by a furious hail storm from Ktaadn, that drove violently from that mountain, and reminded our Indian of his threat that Pomola would be revenged upon us for measuring the height of his mountain.

Descending, we found that two Indians, Francois Bear and Thomas Murray, had stopped at the base of the mountain to hold a talk with us. They were on a hunting excursion for otter and beaver furs. Learning that we should come to some very difficult carrying places, it was suggested that we might advantageously employ the aid of these Indians for a few days, and I then engaged them to accompany us to the Aroostook. We afterwards found that this was a most fortunate arrangement, as the voyage would hardly have been completed without their aid, since the season was far advanced, and the carrying places proved very tedious, requiring great labor, which would have delayed us till the river froze, so as to prevent our passage.

October 9th. This morning is very cold (2° below freezing) and ice covers every part of our boat.

Continuing our voyage we passed along amid high precipices of grau-wacke rocks, rising to the elevation of two or three hundred feet directly from the river. On reaching Jerry-brook, we came to the old red sandstone formation in township No. 5, 7th range, on the western bank of the Seboois. The strata run N. E. and S. W., and dip to the S. E. 70°. It belongs to the regular coal series, and rests upon the grau-wacke.

Sugar-loaf mountain presents its lofty cone on the eastern bank of the Seboois, from which it is three miles distant. Being desirous of examining this remarkable eminence, we took such instruments as were required, and set out for the mountain, travelling through a dense forest of maple, beech, birch, hemlock and pine trees. Owing to the abundance of fallen trees and rotten logs that obstructed our path, the journey was found more laborious than we had anticipated. Ascending this mountain, when we had reached a spot from whence we could see the river, I took its angle of depression below the level, and there set off a base line to the summit of the mountain, at an angle of 40° 15′, and clambering over the craggy rocks to its highest peak, the base line was measured 900 feet. The angle of depression of the river was again taken, and from these elements we ascertained that the height of the mountain is 1900 feet above the level of the river at its base.

From this point Ktaadn bears S. 61° W. Peaked Mountain S. 12° E. Chase's Mountain N. 75°E. The Travellers W. Shin Pond S. E. Seboois Falls N. 17° W.

I remarked also, that on the map of the public lands, Shin Brook is put down as running between the Seboois and this mountain, while it really is on its eastern side, and makes a broad sweep around it, and enters the river near the falls. No less than 50 mountains and 17 lakes may be seen from the summit of the Sugar-loaf.

This mountain is composed of grauwacke and clay slate, cut through by a huge trap dyke, the igneous influence of which has converted the slate in contact with it into a beautiful blood-red jasper, hornstone and compact felspar. In fact every shade of metamorphosis produced by the action of a molten rock may be here observed. Epidote and calcareous spar abound in the amygdaloidal trap, and are some of the products of its action upon the neighboring rocks.

This great dyke is no less than 500 feet wide, and it rises higher above the sea than I have ever before seen that rock attain, and is certainly a most wonderful phenomenon. The bed of jasper is no less than 10 feet wide, and occurs on the N.W. side of the mountain's top. We remained until sunset exploring the various minerals found on this mountain, and, although the view of the setting sun from this eminence was a splendid sight, it reminded us that we had a long journey to perform before we could reach our camp at the falls, and caused us to hasten our descent.

On entering the forest below, we found ourselves enveloped in total darkness, and it was a most painful task to travel through the woods, stumbling over logs, thrashed in the face by the boughs of trees, or stumbling over rotten logs into a peat bog. The moon, however, soon rose above the horizon, and glimmering through the trees, served to direct our course.

Our assistant, Mr. Hodge, choosing his own route, was soon lost, and wandered far up Shin Brook, mistaking the roar of the falls upon that stream for those of the Seboois. On reaching the river, we forded the stream and arrived safe at the camp, from whence I sent out a party in search of Mr. Hodge, who was found encamped alone under the bark of a hemlock tree, the stump of which he had set on fire, and had determined to remain until morning. He was guided by the men back to our camp, where more comfortable quarters were prepared for him.

10th. After labelling our specimens, we continued our journey, and examined the rocks at Che-ga-laps-cagos Falls, which were grau-wacke like that before described. Carried by the falls, where there occur an abundance of red slate rocks, running N. 35° E., and dipping N. W. 80°.

Above the falls we come to numerous dykes of trap rocks imbedded in the grau-wacke, and an abundance of rich red jasper is found at their junctions. Large blocks of limestone filled with madrepores and encrinites, are profusely scattered on the soil. Several veins of magnetic iron ore of small dimensions were also found.

11th October. This morning we set out for Godfrey's Falls, one of the most difficult carrying places on our route. The river's banks are 150 feet high on our course, and the forests have all been burnt. The soil is of excellent quality, and contains carbonate of lime. Rocks like those formerly described abound, and the strata dip N. W. 60°. Proceeding a little further, the dip becomes reversed, and again it is changed to the N. W.

Reached Godfrey's Falls, which are produced by a fall of the Seboois over high ledges of slate rocks. The banks rise perpendicularly on each side to the height of 200 feet, and we have to carry all our effects and the boats up a ledge, at an angle of 45°, and then through the burnt forest for the distance of four miles, before we again reach the river. By the aid of our Indian party we shall be able to effect this in two days. It was a singular spectacle to witness the passage of our party by this carrying place, each having an enormous pack upon his shoulders, and scrambling up the craggy ledge. After reaching the top of the ledge of rocks, and having every thing brought up there, we set out with our loads, and travelled over burnt logs to the river above the falls, where a camp fire was kindled and we rested for the night.

The next morning, 12th of October, proved to be rainy, and made the labor of carrying far more laborious.

13th October. Having brought all our effects over, we set out again upon the Seboois river, which is here sluggish, running amid low grassy meadows in a serpentine manner. Two miles farther up, we came to rapid water, which rushes amid numerous blocks of slate and trap rocks. A violent hail storm rendered our journey very uncomfortable while we were crossing Long Pond, beyond which we proposed to visit an old logging camp, and there pass the night.

In crossing through the woods below this lake our party discovered an important bed of limestone, and in the afternoon I returned with them to explore it more carefully. The limestone proved to be a bed included in grau-wacke rocks, and most curiously brecciated by the intrusion of scoriaceous trap, which has run through the various crevices, and cemented the broken fragments together, forming an elegant breccia marble of various colored stripes standing in every imaginable position. Some of the masses have been rendered compact and subcrystalline by igneous agency, while others contain distinct remains of madrepores and encrinites. This bed is no less than 90 feet wide, and large masses project above the soil. It is situated near the mouth of the first Seboois lake, upon township No. 7, 7th range, and will prove of great value to the inhabitants when the country is settled. Having loaded ourselves with specimens, we returned in the evening to our camp between the lakes.

14th October. This morning we crossed the second Seboois lake, which is a beautiful sheet of water about two miles long, and of nearly the same width. Reaching the opposite shore, we carried our baggage over a logging road to the third lake, which is a long sheet of water, extending N. W. and S. E. seven miles, and it is two miles wide. The rocks are argillaceous limestone, grau-wacke and greenstone trap.

The forest trees are large, being mostly cedar, pine and hemlock. On reaching the upper extremity of this lake, we entered a small sluggish stream, where the ice had formed upon its surface three-fourths of an inch thick, so that we were forced to break our way through it with the batteau, while the canoes followed in the channel thus opened. This operation injured our boat so that we were obliged to stop and make repairs. The forest trees are mostly hackmetack or larch, juniper, and yellow birch.

15th. Last night was very uncomfortable, and the snow driving into our tent kept us wet and cold. This morning we shall carry over to La Pompique stream, by which we propose to descend into the Aroostook. Francois, being familiar with these regions, is to serve as guide. Each of us taking our load, we set out on the journey through the forest, following a spotted township line. On reaching La Pompique, we found it frozen, and the ice being an inch and a half thick, it was found exceedingly laborious to break our way through it with the batteau, our progress was therefore very slow and tedious.

The forest trees along this stream are larch, spruce, juniper, pines, and black alders ; the larch and junipers being the most common. Many of the pines are very large and lofty, and they have never yet been visited by the axe of the lumberman. As we descended the stream, the ice became gradually thinner, and at length we came to deep and open water. Here Francois took me into a swamp to show me a beaver house, which is five feet high, and of a conical or dome shape, made up of sticks and mud. Our guide had recently destroyed the last beaver of the family, so that the house was untenanted. On examining its structure, it appeared that it was composed of four or five stories, and had a subaqueous communication with the little dams around. It is formed of sticks gnawed into regular lengths of about two feet, and these sticks were generally of yellow birch, the bark of which serves the animals for food during the winter. Around the house were the stumps of trees that had been felled by these sagacious animals, and some there were six inches in diameter. Half a mile from this place we came to a beaver dam, where these animals have laid a barrier two feet high across the stream.

The river being here too shallow and rocky for the boats, we carried over to deeper water, following a crooked hunting path for the distance of half a mile.

16th. Having brought all our baggage over, we intended this day to reach the Aroostook. Following La Pompique, we had a good opportunity of seeing the lofty timber trees that abound along its course. When we had reached deep water we pushed rapidly along, and arrived at the Aroostook, at 4, P. M. and camped a little below the mouth of La Pompique stream. The Aroostook here is a broad and beautiful river, having a deep alluvial soil of a chocolate color, and covered with lofty forest trees of various kinds, indicative of a rich soil. When we had made our camp fire, we claimed a song the Indians had promised, and they gave us first a grand TE DEUM in Latin. Strange indeed did it sound to us to hear a Latin hymn from the sons of the forest, amid the wilderness, where axe had never resounded ! After this, we desired the war dance as being more in character with the scene, and our three Indians performed it, singing a peculiar chaunt in their own language. The Indians Francois and Thomas, having performed their duty as guides and laborers in a satisfactory manner, were paid and discharged, since their services were no longer required.

17th. This morning the tent was struck, and we proceeded slowly down the river, exploring the banks of the stream, and collecting specimens of the various soils, while at the same time I kept a plan of the river as we passed along, and recorded upon it every remarkable object in our course.

The rocks in the stream are large boulders of greenstone trap, but there were no ledges visible until we had descended eight miles, when the calciferous slate shews itself and runs N. 45° E., and dips 50° S. E. Beds of good limestone are included between the strata. Loose masses of amygdaloidal trap, and boulders of jasper abound. Bog iron ore also occurs in small beds six or eight inches thick, and accompanied by black oxide of manganese.

Having run about 12 miles, we encamped amid a beautiful grove of lofty rock maple, yellow birch, and ash trees.

18th. This morning, after labelling and packing specimens, we set out for our descent of the Aroostook. The rocks, here and there, show themselves, and are argillaceous slate, the strata of which run N. E. S. W. and dip N. W. 30°. Encamped left hand side of the river. Rain fell in the night.

19th. Without entering into minute details, it might be advisable to give a general account of the country through which the Aroostook winds its way, to the St. John. This river is a broad and beautiful stream, having a gradual and easy descent, free from obstructions, so that a raft may run freely from La Pompique, to the falls at its confluence with the St. John. Its bottom is composed of pebbles for the principal part of its course, and there are a few low islands in its midst. The soil, for the first 12 miles, is an alluvium of an ash-gray, or chocolate brown color, made up of the fine particles of slate, limestone, and greenstone trap, brought down the river, and deposited with the vegetable matter along its course.

Lower down, we came to yellow loam, of a fine kind, derived from the limestone rocks, and luxuriant in its produce.

The average width of the alluvial region, cannot be less than six or eight miles, and in some places, it is much wider. It is a well wooded region, and is the best settling land in the State.

At the confluence of La Pompique, with the Aroostook, the latter river is 60 yards wide, and the water about 5 feet deep, while its banks are 5 or 6 feet high on each side, and are of alluvial origin. The soil is of a chocolate brown and ash color, free from pebbles or blocks of stone. Rounded blocks of greenstone trap occur in the bed of the river, but no ledges are visible. Proceeding down the river, we soon came to ledges of calciferous slate, belonging to the grau-wacke series, and the beds of limestone. Below the limestone ledges, the soil changes its character, it becoming a light yellow loam, free from pebbles, and is evidently of alluvial origin. On the dark colored soil above mentioned, flourish an abundance of lofty pines, larch, juniper, fir, spruce, cedar, and yellow birch trees. The yellow loam is remarkable for the tall rank grass, called blue joint, which skirts the margin of the river, and is from four to five feet high, and extremely luxuriant. The forest trees are of a mixed growth, but the sugar maples are most abundant, and are of gigantic size. Elms, white birch, black and white ash also abound. The soft wood grows mostly on the low lands, while the uplands in the rear are densely crowded with hard wood trees, among which, are scattered magnificent pines.

Proceeding 13 miles down the river, exploring the various slate and limestone ledges, we encamped for the night. Early the next morning, we continued our voyage, the water became deeper, and the river widened to 80 feet. Ash and elm trees abound, while the immediate shores of the river are densely crowded with alder bushes. We passed a small river on the right, called the Am-qual-kus stream. Having reached a curve called the Oxbow, we found that the Indians had there held an encampment, and almost every birch tree had been stripped of its bark to furnish torches, used in spearing salmon. The Oxbow forms a curvature of one mile, and the neck of land included between the two portions of the curve, is but 20 rods across, so that it is customary for the Indians to carry their canoes over this portage. Several acres of this neck of land has been cleared ; the soil is of good quality, being of alluvial origin, and resting upon a stratum of bog iron ore.

Continuing our route, we passed several small islands in the midst of the river. Ledges of slate and quartz rocks occur on the left hand side; the loose rocks in the river are mostly composed of a coarse conglomerate or grau-wacke, and greenstone trap.

18th. Encamped for the night on the left hand side of the river. Early the next morning we set out on our voyage, and ran down to the confluence of the Aroostook and St. Croix, where there are several settlers. Visited Mr. Thomas Goss, who is one of the oldest inhabitants on the river, having resided there 10 years. He has, within four years, cleared at this place a very good farm, and succeeds in raising all the produce required for his family. He informed me, that wheat grows very well upon his land, and is of good quality, weighing 60 lbs. to the bushel, and producing 50 lbs. of flour.

Corn succeeds well in good seasons on the uplands, and potatoes are extremely luxuriant, and one of those which he showed us weighed $2\frac{1}{2}$ lbs. The soil is of a light yellow loam, covered to the depth of four or five inches, by a black vegetable mould. Mr. Goss is of opinion, that from 15 to 20,000 tons of square pine timber were carried down to the St. John from the Aroostook, during the past year. A party was at that time engaged in this unlawful business, and the land agent of Maine had just sent an emissary to forbid their depredations.

On the right, about half a mile below Mr. Goss' house, there are limestone ledges. The strata run S. W., and dip 40° S. E. The St. Croix, at its confluence with the Aroostook, is about equal in width with that river, and is an important tributary. Upon it, are excellent mill sites, with a good fall of water, of six or eight feet. The mouth of the St. Croix is 80 miles above the falls of the Aroostook, and 40 miles above the Presq' Isle. During freshets, a raft may run from this place to the mouth of the river in one day, but when the waters are low, as they are at present, three days would be required. There are several log cabins near this place, where the settlers are preparing to clear the land.

Proceeding down river, we found that the water became deeper, and the banks on each side more elevated, rising to the height of thirty to forty feet. A few ledges of limestone crop out. At the mouth of the great Machias, (which is a tributary stream entering the Aroostook on its western side,) ten miles below the St. Croix, we reached the residence of Mr. Dalton, who has built a small but good house, and cleared a small tract of land. It is 52 miles above the Aroostook falls. Opposite this place, there are high ledges of grau-wacke, of a fine texture, filled with the remains of plants, and glazed with carbonaceous matter. Marine exuviæ, such as terebratulæ, favorsites, madrepores, and corrallines, abound. The strata run N. E. S. W., and the dip is anti-clinical, or to the S. E. and N. W. Thin grau-wack slates, covered with impressions of fuci, are abundant. This rock belongs to the regular anthracite coal formation, and it is highly probable, that beds of that valuable combustible will be found in this vicinity. The rock may be used profitably for mill stones, for the construction of lime kilns and iron furnaces. Limestone abounds in this vicinity, and forms cliffs rising ten or twelve feet from the river's level.

Mr. Dalton states, that in good seasons, he has raised forty bushels of good wheat to the acre, and he found that the crops improved on the second and third tillage of the soil. This is doubtless the case, as by ploughing, the black vegetable mould which is from four to six inches thick, becomes mixed with the loam, increasing its fertility. Indian corn succeeds well in good seasons, likewise all the usual culinary vegetables. The manufacture of maple sugar is here carried on to a great extent, during the spring season. The process is as follows: holes being bored into the trees with an auger, a piece of wood is inserted, in which a grove is cut, in order to conduct the sap into receiving vessels, which are made of birch bark, and are called by the French name casseroles. Three men can manage 1,000 maple trees, and boil down the sap as it is collected. The sugar season begins about the middle of March, and continues to the middle of May. Three men usually obtain from 1,500 to 2,000 pounds of sugar during the season, and it sells from 10 to 20 cents per pound.

Twenty quarts of sap yield one pound of sugar, at the first tapping of the trees; on the second the same quantity of sap yields one and a half, and on the third two pounds are obtained. The chief obstacle to this manufacture is the want of good evaporating kettles, common iron pots being generally used. If large tinned copper boilers could be obtained, the business could be carried on in a more rapid and profitable manner, while the sugar would be of a much better quality. If good utensils were used in its manufacture, and more skill employed in clarifying the syrup, I have no doubt that excellent white sugar might be made at a much lower cost than the inhabitants now pay for the foreign article.

One mile below Dalton's we came to the Little Machias, a small river entering the Aroostook from the west, and ten miles up this river there is a lake, and mill privileges are said to occur on it. Grau-wacke, of fine texture, resembling the grey sandstone, filled with numerous petrifactions of corrallines, madrepores, favosites, and impressions of terebratulæ and spiriferae. The accompanying slates are glazed with carbon, and contain remains of fuci or sea-weed. This rock is used for mill stones, and will answer for the construction of lime-kilns and furnaces. Limestone of good quality also occurs near this place.

October 19. After passing an uncomfortable night encamped in the woods and exposed to a violent snow storm, we set out for Mr. Currier's, ten miles above the Presq Isle river, passing on our way several islands covered with hard wood trees, chiefly sugar maples. The river curved most beautifully as we descended, and occasionally the banks protected from the violence of the storm which was still raging. We here observed an abundance of argillaceous slate and grau-wacke, filled with beds of limestone, and cut through by occasional dykes of greenstone trap. The land becomes more elevated and the river's banks rise from 40 to 100 feet.

On the 20th of October we encamped at night, and next morning continued our course down the river, notwithstanding the continuance of the snow-storm. We here observed a ridge of land elevated 300 feet above the river's level, and densely covered with a luxuriant growth of maple and other forest trees. Strata of black limestone, filled with an infinity of veins of calcareous spar occur on the left hand side of the river, and continue to the distance of 10 or 12 miles, cropping out here and there along its banks.

Near Mr. Currier's I discovered a valuable mine of rich iron ore. It is of that variety called compact red haematite. It occurs on the hill, S. E. from the house, and about half a mile distant. Its out croppings may be seen in two different places upon the side and on the summit of the hill. The lower bed runs N. 9° E., and dips 85° eastwardly; the upper bed runs N. 5° E., and dips also to the eastward. This ore occurs in calciferous slate charged with manganese, its colors being red, green and black. The strata run N. 16° W. In order to ascertain the extent of this ore, I caused the soil to be removed in several places, and, on finding the boundaries of the principal bed, it was measured and found to be 36 feet wide. The soil overlaying it was covered with an abundance of red sorrel, which served to indicate the position of the ore, and by digging along its margin we always found the haematite below. The soil is very thin, and composed entirely of disintegrated ore. I measured the limits of the bed as far as I was able to expose it, and found its length to be 450 feet. It continues into the forest, and is probably connected with the great bed of iron ore which I discovered last year upon the Meduxnikeag, at Woodstock. The hill at Currier's is more than 100 feet above the river's level, so that a mine may be easily wrought and drained. Let us now calculate from the measurements which we have made, the quantity of iron ore which may here be obtained.

Thus the bed is 450 feet long, 36 feet wide, and can be drained easily to the depth of 100 feet. 450×36×100= 1,620,000 cubic feet of ore, each cubic foot weighing 240 lbs. 1,620,000×240=388,800,000 lbs of ore, which yielding 50 per cent, of iron, would give 194,400,000 lbs. of iron, or 97,200 tons. This multiplied by $50, the value of a ton of iron, will give $4,860,000, as the value of the iron in this bed within the limits measured.

At the present time iron is worth $100 per ton at Woodstock, upon the St. John, and costs vastly more upon the Aroostook, so that we cannot doubt that a most profitable investment may be made in working this ore. Such a discovery as this amply proves the importance of a geological survey of the country. The following are the results I have obtained by analysis of this ore, Sp. Gr.=3,863 weight of a cubic foot, calculated from the Sp. Gr.=241 lbs.

In 100 grains the ore contains as follows:

Water,	6.00
Insoluble residue, consisting of silex,	8.80
Per oxide of iron,	76.80
Ox. manganese,	8.20
	99.80
Loss,	20
	100.00

76.8 of per oxide of iron contains 53 of pure iron; hence we may say that the ore will yield 50 per cent of bar iron or 60 per cent of cast iron, for about 7 per cent of carbon enters into the composition of the latter variety. Ten miles above this place, on the margin of the river as already described, occur materials required for the erection of an iron furnace. Limestone, suitable for a flux, abounds in the immediate vicinity, and on the Tobique stream opposite the mouth of the Aroostook, is an abundance of new red sandstone, suitable for the lining of the furnace, and for hearth-stones, while charcoal may be had in any quantity for the mere labor of cutting and burning the wood. By means of charcoal, the finest varieties of iron may be manufactured, like that brought from Sweden, and capable, like that metal, of forming the best cast steel.

A gentleman in Boston, well acquainted with iron works, has furnished me with the following statistical observations respecting the expenditures and profits of iron furnaces.

In Vermont, near Troy, there has been lately established a large blast furnace, by which three tons of cast iron are obtained per diem, from the granular magnetic ore of that town.

The charcoal used each day amounts to 600 bushels, and costs per bushel 4 cents,	$24 00
Cost of ore and flux for 3 tons of iron—$10 per diem,	10 00
Labor, $10,	10 00
Interest on capital of $100,000, per diem,	16 67
Cost of three tons of cast iron,	$60 67

Three tons of cast iron, st $45 per ton, sell for	135 00
Deduct cost of manufacturing,	60 67
Profit on three tons,	$74 33

When two tons are made, the profit is $43,33.

This gentleman also states that the following are the items of expenditure and profit, at the Franconia, N. H., iron works, where magnetic iron ore is also wrought, the average width of the veins being but two feet, from which one man can blast out two tons daily, at the cost of $6 per ton.

Six laborers are employed at the furnace, viz. two top men, who attend to the charge; three fire men, who have the care of the blast and of the casting; and one gutter man.

Two tons of iron are made each day. Limestone, used for flux, is carted six miles to the furnace.

700 bushels of coal are used daily, costing 4 cents per bushel,	$28 00
Cost of the ore, $6 per ton, 4 tons,	24 00
Cost of flux, and roasting of the ore,	2 00
Labor of six men,	10 00

Interest on capital, and contingencies,		16 67
Cost of two tons of pig iron,		$80 67
Two tons of pig iron sell at the foundry for	100 00	
Deduct cost,	80 69	
Daily profit,	$20 33	

But, in the form of castings, made at the works, the iron sells frequently for $75 per ton, which would give $69 33, daily profit. Bar iron sells for $100 per ton.

I trust that we may soon have a number of smelting furnaces in operation in Maine, and that no longer so large and valuable resources will be allowed to remain neglected, while the State is paying enormous sums of money, to England, Sweden and Russia, for her supplies of this indispensable metal.

A small blast furnace, capable of yielding a ton and a half of iron daily, has been erected at Shapleigh, in York county, Maine, and cost but $13,000. Such a furnace could be erected upon the Aroostook for about $20,000, and would answer for the supply of the present demand for iron in that district. As the country becomes settled, more extensive works may be erected, and all the usual departments of the business may be carried on. I have estimated the cost of a furnace upon the Aroostook higher than that of one in a more densely populated part of the State, because the price of labor required for the erection of the works would be necessarily greater, since the chief workmen would be obtained from some other section of the country. The principal materials required for the building of the furnace can, however, be obtained for the mere labor of extracting them, and they occur close at hand.

Situated so favorably upon the borders of a great river, where water power can be advantageously employed in working the machinery of the blowing apparatus, &c., amid interminable forests of hard wood trees, which will furnish a never failing supply of charcoal, possessing in fact every advantage required; this ore is of incalculable value, and not only sufficient to supply all the future inhabitants who may subsequently settle on this river, but also those upon the St. John and the whole Penobscot country. Besides this, it is capable of becoming of national importance, in furnishing supplies of cannon and small arms, and will hereafter become an admirable site for a national foundry.

From the direction in which these beds of iron ore run, it is highly probable that they continue through the country, and connect themselves with those which I formerly discovered in Woodstock, N. B., thus passing directly above the United States military post at Houlton. Should this opinion prove to be correct, such a discovery will prove of immense importance to the United States, for it is extremely difficult to carry heavy ordnance to that frontier post, and in case of war it would be almost impossible to furnish a supply of cannon, and the balls required in defence of that fortification. Although war is a great evil, yet it is always the best policy to hold ourselves in readiness to meet such an exigency, and by such alertness on our part the probability of such an issue will be further removed; and it is an established maxim that "in time of peace we should prepare for war."

After making a careful exploration of the iron ore at Currier's, we set out on our voyage to the mouth of the Presq Isle, 10 miles below this locality. Limestone of a blue color, filled with an infinity of calcareous spar veins, occurs abundantly on each side of the Aroostook. So much of the day having been taken up in the examination of the iron ore and limestones, we were unable to proceed far before night, and encamped upon an island covered with maple and birch trees, a little more than a mile below.

Oct. 22d. Early this morning struck our tent, and proceeded down river, examining the numerous limestone rocks that crop out on each side. Passed by several log houses, where recent clearings of the wood land had taken place. The country becomes more elevated, and hills three or four hundred feet high rise from the right bank of the river. The forest trees are very abundant, and are of a mixed open growth of hard wood, fir and pine. A little below a large island 3½ miles above Presq Isle river, we came to the dwelling of Mr. Peter Bull, who is one of the first settlers on this river, having resided there 15 years. His first dwelling was an ordinary log hut, but since that time he has erected a handsome house, having a brick chimney, and being well glazed. He informed me that he manufactured his own bricks from the clay found a quarter of a mile below, on the river. His lime, however, was brought from the city of St. John, and cost him $16 per tierce! Very few of the settlers indulge in the luxury of plastered walls and ceilings, on account of the expense of lime. Yet the very rocks under their feet are excellent limestone, but they were not aware of the fact, nor did the people then know anything of the simple process of converting them into lime. It was formerly the custom to obtain their flour from Woodstock, and it cost the people there no less than $20 per barrel; but now they generally raise their own wheat, and there are two flour mills in operation on the tributary streams. Some of the inhabitants grind their own wheat in small mills turned by hand, the mill-stones being obtained from the grindstone ledge.

After spending the night at Mr. Bull's, we again took our boats, and proceeded down stream, when arriving at Mr. Gardiner's, a few miles below, I was called to visit a sick patient, and having given advice, continued our voyage to Hooper's, half a mile above Presq Isle, where we stopped for the night. This place is 36 miles above the Aroostook Falls, and a raft will run to that place during freshets, in 4 hours. But as the waters run at the present time, it would require 12 hours.

The most rapid rate of the current during high freshets, is nine mills an hour, and the slowest is three miles, the mean rate being six miles.

The soil upon Hooper's farm is a rich yellow loam, from disintegration of limestone rocks, and it is of a diluvial and alluvial character.

On Monday morning, 23d October, we entered the Presq Isle river, and ascended that stream to the farm of Mr. Dennis Fairbanks, who had sent me an invitation to call upon him. His dwelling is a mile and a half up this stream, and he has there established saw and flour mills. On reaching his establishment, we were very cordially received, and our time was spent in exploring the resources of the country around.

Mr. Fairbanks has dwelt there 9 years, and has brought his estate into a good state of cultivation. He pursues almost every branch of trade required in a new settlement, makes his own agricultural tools, machinery, and even his boots and shoes, showing unusual dexterity in these various occupations.

His mills are three stories high on one side, and two on the other, and the building is handsomely shingled and painted.

In this building is an excellent flour mill, and it is kept in continual operation. A part of the building serves also as a carpenter's shop, where Mr. Fairbanks carries on the work according to his need. He has also a saw mill, and saws boards, which are sent to the boundary line for sale.

After examining his manufacturing establishments, I visited the fields where he had lately reaped a most abundant harvest. The wheat stubble was extremely crowded, and of so large size, that from curiosity I was disposed to split open one of the straws and measure it, when I found that it was one and a third inches in circumference. Indeed, I never saw more convincing proofs of the fertility of the soil. When I had collected all the specimens of soil that I wished for analysis, I was desired to enter the two large barns belonging to this gentleman. His crop had been so luxuriant that he had been obliged to put up a new building to contain it, and both the barns were found to be crowded from the floors to the ridgepoles with sheaves of wheat, rye and oats; there being, as was estimated, no less than 800 or 1000 bushels of grain, garnered in; and all this was obtained from less than 30 acres of land!

The wheat weighs 60 lbs. to the bushel; rye 56 lbs.; oats 40 lbs. It was stated to me that he had raised 50 bushels of oats upon an acre of land. Indian corn, turnips, potatoes, pumpkins, and all usual culinary vegetables grow well upon this soil. The average crops of wheat for the past three years upon the Aroostook, have been 20 bushels to the acre. "Indeed," remarks Mr. Fairbanks, "there were never greater natural advantages offered to the farmer than are to be found upon this river. Nothing is wanting but industry, enterprise and education." Having learned that there were indications of iron ore seven miles above here upon the Presq Isle, I sent Mr. Hodge, with Louis, in a canoe, to make explorations; but on his return he stated that there were nothing but slate limestone and greenstone trap rocks at the place designated.

A road has been cut through from the Presq Isle to Mars Hill, fifteen miles distant, and during winter a sled may pass by that route to Houlton, but the stumps have not yet been cleared away, so as to allow of the passage of wheel carriages. The journey may be performed on horseback in one day. During the British survey for a rail-road through these regions to Quebec, the engineers spent much of their time in this vicinity, and erected an observatory upon a hill N. 75° W. from Fairbanks' house.

A little lead ore is said to have been found in blasting the limestone and slate rocks, while erecting the saw mills on this river, but I could not obtain any specimens, as the water was too high.

Mr. F. says that, the spring before last, depredations were carried on extensively by British subjects, 10,000 tons of timber of the Aroostook having been carried down the St. John. During the past spring, he thinks that not more than 3,000 tons were plundered and sent down to St. John. It is difficult for the British Warden of the disputed territory to detect these unlawful transactions, for the timber is mixed at the mouth of the Aroostook with that brought down the St. John, and thus the depredators escape detection.

October 25th. Having collected all the information in my power, I left the hospitable home that had been so freely tendered to my whole party, and ran down again to the Aroostook, and continued our voyage to the falls at its mouth, the distance being 36 miles.

The country now becomes more elevated, and lofty mural precipices of limestone and calciferous slate rise on each bank of the river, while the country in the rear is broken, hilly, and is covered with an abundant mixed growth of forest trees. Good blue limestone, with calcareous spar veins, abounds on each side of the river.

At the Aroostook Falls, the water is very rapid, and rushes over ledges of slate and limestone rocks, for three fourths of a mile. Then the river precipitates itself over a steep and broken ledge of 12 or 15 feet into a wide basin below. The rocks here are blue limestone and slate, in wavy strata, cut by numerous dykes of greenstone trap, and there are deep "pot holes" worn in the limestone by the grinding motion of rounded stones, moved by the impetuous current. Some of these holes are 5 feet in diameter, and 4 feet deep. This waterfall is overhung by a heavy growth of cedar trees, and forms a very picturesque appearance when viewed from below.

At the junction of the dykes with the slate, the latter rock is fused into hornstone and chert. The strata run N. E. and S. W., and the dykes cut through the strata at right angles, or run N. W. and S. E.

The short portage by the falls is three quarters of a mile in length, and the road was very muddy, owing to the late rain and snow storms. Our boats and baggage were carried over this road by means of a horse sled, hired for the purpose.

The long portage is much better than this, but is 3 miles in length. The assistant, with the Indian and the canoe, chose that route, and having nothing to carry but the canoe, arrived at the St. John before us. On reaching the river below the falls, night set in, and the rain began to pour in torrents. Fearing to attempt the passage of the rapids in the dark, we encamped in the woods just below the falls, and early the next morning ran down the St. John. At the mouth of the Aroostook, there are several houses inhabited by American and Irish settlers. The falls are on the British side of the boundary line, and will become valuable for the purpose of establishment of saw mills when the boundary question is settled, and the injunction against cutting timber is removed, since the Aroostook territory will furnish an almost inexhaustible supply of large pine timber, and the St. John from this point is wide, deep and navigable.

Nearly opposite the mouth of the Tobique, a few miles below the Aroostook, on an island, there is an excellent tavern kept by Mr. Tibbetts, where we stopped to dine and to obtain packing paper and boxes for our specimens. At the mouth of the Tobique there is an Indian settlement, where a large tribe of Indians reside, and gain a livelihood by trapping otter and beaver. These Indians are quite distinct in appearance and manners from the Penobscot tribe, and speak a peculiar language. At the time of our arrival there, they had just brought in a number of otter and beaver, and were busy in preparing their skins, while we remarked that they reserved the flesh of these animals for food.

The Tobique river is an important tributary to the St. John, and upon its banks near the red rapids (so called from their falling over new red sandstone) there is an abundant supply of good gypsum, valuable for agricultural use, and capable of being extensively wrought for the supply of the Aroostook territory.

Since I had formerly sent the assistant geologist to make explorations up this river, I thought it unnecessary for me to visit the locality, and I beg leave to refer to his report, herewith presented, for a more particular description.

Oct. 26th. Proceeding down the St. John, we stopped at the River de Chute, where I proposed to make an excursion to Mars Hill, but owing to continual rainy weather, I thought it would be impossible for me to effect my purpose of triangulating its height, and therefore left Mr. Hodge to wait for clear weather, and then to make the necessary exploration, while, in the meantime, we continued our route to Woodstock. The assistant having ascended Mars Hill and obtained the required information respecting its composition, reported that the mountain is entirely covered with forest trees, but here and there he succeeded in finding the outcropping ledges, which proved on examination to be grau-wacke, exactly like that upon the Sugar-loaf mountain, and like that rock belonging to the regular anthracite coal measures. On the summit of Mars Hill there is a high board platform, formerly used by the engineers in their surveys.

On reaching Woodstock I sold our boat and some of our camping apparatus no longer required for our operations, and hired the stage coach to carry us with our specimens and baggage to Houlton, in season to take the Bangor stage, which we found just ready to leave. Our party being large, we readily induced the driver to wait until we had dined, and then set out for Bangor by the route of the military road to Mattawamkeag Point, and then we returned to Bangor. The men were then paid and discharged, and when all due arrangements had been made for closing the survey, I took passage for Boston, and arrived there on the 9th of November.

On reviewing this journal of observations, it will be at once perceived that the country which we have explored is a most valuable territory, possessing every advantage required by settlers. Heavy timber offers a reward to the enterprising timber dealer. A rich soil, capable of producing an average crop of 20 bushels of wheat to the acre, and in some cases producing from 30 to 40 bushels, offers an ample reward to the husbandman. Inexhaustible supplies of limestone, valuable both for building materials and for agriculture; vast and inexhaustible mines of rich iron ore, amid interminable forests which will supply an abundance of charcoal, required for the manufacture of the finest kinds of iron and steel; hills and precipices of fine grau-wacke, suitable for building furnaces and lime-kilns, and for the construction of dwellings, as also for the manufacture of millstones, required in grinding wheat—the country presents every natural advantage that might be required to call forth the enterprise and industry of the farmer and manufacturer.

Besides this, it is highly probable that, as the country becomes settled, important beds of anthracite may be disclosed by the various excavations made in the course of settlement; for by sinking a well or digging a cellar, beds of coal may be discovered, that have escaped our detection during a rapid reconnoissance of a densely wooded country, where the thick layers of dead leaves, and the superficial soil may have concealed them from our view.

When the new Aroostook road is open, so as to afford ready communication with that most valuable agricultural region, the tide of emigration will turn in that direction, and as the country becomes more populated, it will successfully resist all foreign encroachments, and forever place that portion of Maine beyond the power of foreign jurisdiction. Thus far the few inhabitants of the Aroostook have successfully resisted British jurisdiction, and have maintained their own independence, acknowledging no law but their own arbitration. The present population is estimated at from 450 to 500 persons, and they are mostly of American origin, and are civil and correct in their deportment.

It is deeply to be regretted, however, that while a young generation is rising up there, that they have not the advantages of education, there being no schools or means of instruction in that country. I saw one religious meeting held in a private house, and noted the general decorum of the people who had thronged the dwelling. Upon the shore of the river lay a small fleet of their piroques or log canoes, that here serve in the place of carriages, which are unknown in a region where there are no roads.

The State should stretch forth its helping hand to the inhabitants of the Aroostook, and afford the people the advantages of public schools, otherwise a vast number of young people will there grow up in a state of lamentable ignorance. By thus taking an interest in their welfare you will secure their affections, and their patriotism will be exerted in your behalf whenever any exigency may arise calling for their aid in the protection of the rights of the State.

I would not, however, confine our views to mere acts of policy, for we ought in justice to extend to those people advantages which are the birthrights of all American citizens.

In the course of two years there will be a free communication between the Aroostook and Bangor, and a great number of enterprizing settlers will take up their residence there, and by farming they will obtain an ample reward, and that region will become, as it is destined by nature to be, the Granary of the North.

C. T. JACKSON.

MR. HODGE'S REPORT

ON THE ALLAGASH SECTION, FROM THE PENOBSCOT TO THE ST. LAWRENCE RIVER.

According to the instructions received from Dr. Jackson, I left Boston on the 9th of June, and proceeded immediately to Bangor. While delayed by the necessary preparations for an excursion into the interior, I had an opportunity of gaining some information in regard to the geology of Howland and its vicinity. This town lies at the junction of the Penobscot and the Piscataquis rivers; is based upon slate, of the older transition series, which breaks out in many places on the banks of both these rivers. It is not of a kind which would answer for roofing, or writing slates; but from the representation of Mr. Hammatt, and from specimens I have seen, brought from the head of the Seboois, I have no doubt good slate may be there obtained. The general direction of the slate is N. N. E. S. S. W. and dip about 75° E. S. E. Much of the township, particularly on the borders of the rivers, is covered to a good depth with rich alluvial soil, which is, however, sometimes heavy, owing to a predominance of clay; but it produces large crops of potatoes, hay and grain.

Back from the streams, the soil is evidently derived from the decomposition of slate, and being occasionally mixed with sand and gravel, presents with its undulating surface, abundant proofs of diluvial action. The township is well watered by the two large rivers above mentioned, the Seboois, which intersects it, and by many smaller streams. On most of these, there are good water privileges ; two saw-mills are now in operation.

About five miles up the Seboois comes in a spring, strongly charged with sulphuretted hydrogen. In dry seasons, it is strongly impregnated with this gas, and deposits the yellow sub-sulphate of iron around. The water is then powerfully astringent and tonic.

In the clay near the banks of the Piscataquis, have been found the same "cigar-shaped" fossils that are so abundant at Bangor. They are called siphoniæ, and are supposed to be formed from the remains of molluscous animals. In form they resemble cigars, and different kinds of fruit, and nothing analogous to them is now living.

On the eastern side of the Penobscot, opposite Howland, lies an extensive level tract of country, which has been entirely burned over several times in the course of the last 15 years. It extends nearly to Lincoln, and four or five miles back from the river. Wherever this district has been settled, the soil has been found good, producing heavy crops. In going from Howland to Cold Stream Pond, in Enfield, we pass through the burnt district, to a more hilly country. The soil suddenly changes from a slate to a granite soil. Boulders of granite lie scattered about in abundance, & the rock itself is found in place three-fourths of a mile west from the pond. Granite forms the hills which border the pond, and the slate rocks upon their sides are curiously altered by its action. They are changed into micaceous, alternating with silicious slate, traversed by numerous veins of quartz, and singularly veined and striped—sometimes coated with carbonate of lime, and sometimes colored by oxide of iron. The presence of carbonate of lime, had led to the belief, that the rock was limestone, and preparations have been made to burn it.

Having engaged two boatmen, and purchased a batteau, to transport us with our provisions, &c., upon the rivers, I left Howland on the 22d June, and proceeded up the Penobscot river.

As Dr. Jackson has since made nearly the same tour as far up as Mount Ktaadn, I shall pass cursorily over those places examined by him.

I visited one of the granite quarries at Lincoln, 48 miles above Bangor. The rock forms a hill of about three acres, a mile and a half E. N. E. from the village on the road to Lee. Other hills in the neighborhood are of the same formation ; but the rock has been opened at only one other locality, a mile beyond this. From the two quarries, at least a thousand tons of stone have been wrought within the two last years. Part of this has been carried down the river on rafts to Oldtown and Bangor, and the remainder used in the village for cellars and underpinning. This has been taken only from the surface. Wherever the rock is exposed, seams are observed crossing it, and sometimes veins of another variety of granite. By making fissures parallel to the seams, the workmen split out perfectly true blocks of 50 feet in length, and of any width and thickness under four feet square. The stone is very sound, and free from iron, retains a sharp edge when smooth hammered, is of good grain, and of a fine dark color. It sells in the quarry for one cent per foot, and when rough split, from seven to ten cents per foot, according as the demand is for a smaller or larger quantity.

Two miles south from Lincoln, are ledges of micaceous and silicious slates, very much resembling those at Cold Stream Pond. Their direction is N. E. by E. and S. W. by W., and they are so nearly vertical, I could not ascertain their true dip. As lime is worth at Lincoln $4 a cask, it was hoped limestone might be found at this place.

On the 25th, we reached the Grand Falls of the Penobscot, and I spent the succeeding day in examinations of the vicinity. The river here is but a few rods in width, running between high ledges of slate, over which it falls about 20 feet. The banks below the falls are about the same height, and being worn away by the action of the water, which in the spring rushes through this passage with great velocity, the edges and quality of the rock are fairly exposed. The strata are irregular, so that is difficult to ascertain their true dip and direction. Just below the falls, they run E. N. E., W.S.W., and dip S.S.E. Half a mile farther down, they run N. E. S. W. and dip N. W. The slate is argillaceous, and contains beds of quartz and talcose slate. Good roofing or writing slates cannot be obtained. At the mouth of Noliseemack stream, which comes into the river below the falls, is a ledge of quartz rock, the strata of which run E. and W. The hills around are covered with boulders of granite, most of them crumbling to pieces. Owing to the swarms of black flies at this place, it was with great difficulty I could make any observations.

As the river is difficult to ascend for a mile above the falls, we returned to Noliseemack, or Shad Pond, and passed up the Millinoket stream two miles, to the foot of a road which leads across to the Penobscot, above the rapids. Shad Pond, near the mouth of the Millinoket, is shallow, and at this time, we pushed our boat through an acre or more of buck-beans, which had taken root at the bottom, and bloomed above the surface in the greatest profusion and beauty.

At the landing our boat was taken out of the water, and fastened with its freight upon an ox-sled. We accompanied it in its perilous voyage of two miles, on foot, over a rough hilly road, filled with boulders of granite and slate, until we arrived a little below the foot of Quakis. This is a narrow pond, 3 miles long, through which the current runs to its outlet. It is surrounded by low banks, which are covered with pine, birch, and oak. At its foot, is a ledge of roofing slate, of poor quality. From Quakis we continue up a mile through quick water and rapids; the river filled with large rounded boulders of granite, and come to another small pond, called Elbow Lake—thence through the North Twin Lake, 3 or 4 miles to Pemadumcook Lake. The land on the borders of these lakes is low, and contains no ledges of rocks ; but its surface is scattered over with multitudes of boulders of granite, some of them of large size. The growth does not indicate a rich soil, and what timber once grew here, has been mostly cut off. Only one attempt has been made to clear a farm above that on the Millinoket, and it turned out unsuccessfully. Excellent brook trout abound in the rapids, and are taken with the greatest ease, often almost jumping into the boat for the bait, which is nothing more than a piece of salt pork. They weigh from a few ounces to three pounds.

We were detained the whole of the 28th, at the foot of Pemadumcook by a high wind, which would not admit of a batteau crossing the lake.

On the 29th, we continued across the Pemadumcook, and passed through Ambejijis, and came to a portage above. After carrying our boat, &c., about eighty rods, we again put in, and soon arrived at another lake or pond called Katepskenegan. This is a long strip of water, through which the river runs a little east of south. On its western side is a high hill of granite, covered with immense loose blocks of the same rock, piled one upon another almost perpendicularly. On the other sides the land is generally low, but rising to hills at a distance from the water.

A little above this pond, there is another portage, where the river falls over loose granite rocks for some distance. We crossed this on the 30th, and two miles above, we were obliged to carry by again on the western side. The opposite bank is formed of granite, of a beautiful variety, lying in the best position and form for working. It is in large parallel blocks, extending in a N. W. and S. E. direction. These split naturally to a very smooth surface, presenting a face in which the materials appear finely disseminated ; the mica in small black scales, the felspar perfectly white and pure, and the quartz in small vitreous particles. Though worn for ages by the current, and subjected to continual moisture, the rock shows no symptoms of decay or disintegration, as it inevitably would, if it contained the least iron or other foreign matter.

Not far above this, we arrived at a fifth portage, which is called the Pauquakamus. Here we encamped, and the next day, the first of July, carried across about 40 rods. These Falls are also formed by the river being almost choked up by loose granite rocks. At the head of this portage, the bank is a smooth ledge of granite. The country around is more hilly and mountainous. It is evident that we have arrived at the great centre of elevation of the State; the upheaving of which has left its visible effects in the general inclination of the strata.

We soon passed the two streams, called Aboljocknagesic, that come in from Ktaadn. Being supplied from the mountain springs, they are cool and clear; the lower one particularly, even retaining its purity of color for some distance after its discharge into the main river. We then came to Gibson's clearing of 80 acres on the eastern side. The banks are from 10 to 15 feet high, and the soil, judging from the fine growth of grass which then covered the open intervale, is very good. The place is not inhabited. Among the loose pieces of granite, slate, &c. on the shores, I found specimens of grauwacke, containing distinct impressions of terebratulæ. These are important, as indicating somewhere above rocks belonging to the anthracite coal formation.

On the western bank are ledges of granite similar to, though not so good as, that found at Katepskenegan below.

A little above this clearing, on the eastern side, comes in the Sowadnehunk, so named by the aborigines from its running between mountains. It is a rough, rocky river, known only to a few Indians and whites, who have hunted or explored in its vicinity. Its last fall of a few feet over a granite ledge, is but a rod or two above its entrance into the Penobscot. The main river, a little above the mouth of the Sowadnehunk, has also a fall of 10 or 15 feet. Over this we were obliged to haul our boat and baggage. A violent tempest, which is not uncommon in the midst of these mountains, permitted us to proceed but but a few miles farther up the river, before we encamped.

The next day (Sunday 2d) I spent in visiting a rocky mountain which rises directly from the northeastern shore. A fire had formerly run over it and stripped it entirely of trees. Their trunks, half burned, lay scattered among the loose blocks of granite, which covered its sides. Among these I found numerous specimens of grauwacke, containing terebratulæ and turritellæ, greenstone trap, and a coarse conglomerate or grauwacke. Near the top of the hill I came to high granite precipices, from the summit of which the fine prospect amply repaid the labor of ascending. Ktaadn still retaining a little snow in its northern valley, seemed directly above, and Double-capped Mt., or Outop, as if one might step across to its summit, though between lay hills and vallies, among which I could trace the first meanderings of the Sowadnehunk and other streams, not yet explored nor named. On the other side, the Penobscot was distinctly visible for a long distance above and below, sometimes, however, lost among the hills, through which it wound its way, and then widening out into large lakes. Of these Chesuncook was remarkable by its apparently high level. On every side rose hills behind hills, most of them covered with forests, and washed at their base by some river or stream.

On the 3d, we continued up the river, passing by a rough country. Twice we were compelled to carry our boat over portages, one of which was 100 rods long, where no path was cut out. The hills are all composed of granite, and most of them burned over. The granite often lies in regular sheets, running N. W. and S. E. In the afternoon we arrived at the foot of the Rippogenus portage, known as the most difficult on the Penobscot river. It is three miles in length, by a long series of rapids, the path is not cut out, and is almost impassable by reason of rocks, burnt trees and bushes. We carried one load half a mile in the midst of a hard rain, and encamped in an old deserted log hut.

The 4th and 5th of July were spent in carrying our provisions, &c., across this portage. The men succeeded by great risk and exertion in getting the batteau up by water to the foot of an island near Rippogenus Lake. On the sixth they cut a path across the island, half a mile, carried over the boat, and we proceeded nearly a mile up the lake to a clearing, where we found a log hut and two men. They were living here to raise hay and supplies for the lumbermen who might log on the river during the coming winter.

On the 7th, I visited the island above mentioned, and the falls, to examine the rocks more particularly. Rippogenus Lake is about two miles long, at its lower extremity nearly barred by high hills. Through these the river has made its way, rushing among them for two or three miles in one almost continued fall. A little below the lake, the current is divided by the island, on each side of which, compressed to a few feet in width, it rushes impetuously, sometimes under perpendicular banks of slate 60 feet high, and, on the southern side of the island, over surfaces of trap ledges, worn into hills like rolling waves. The slate on the island dips S.S.W. At the lower part of the island, and on the main shore opposite, the slate contains beds of grey limestone. Some of this is changed by the action of the trap into a good hydraulic limestone; and some huge masses apparently raised up by trap-rocks, are filled with madrepores or corallines, which being worn distinct by the action of the current, give to the rock a curious honey-combed appearance. Some of the limestone is formed into a curious breccia. This is the locality called in Greenleaf's description of Maine, "a quarry of fine statuary marble!" At the foot of the lake, on the north side, rises a rocky bluff 70 feet perpendicularly, extending back to a great height. At its base the compact siliceous rock runs E.S.E. and W.N.W., and dips 28° N.N.E. Directly over it the same rock runs in the same direction, and is nearly vertical. Upon the hills back are ledges of slate, much of which is of the kind called novaculite, suitable for whetstones.

At the rapids between Rippogenus and Chesuncook lakes, are ledges of quartz rock; strata contorted, general dip 70° E.S.E. Beyond are banks 20 feet high, formed of a green slate. It covers the country back from the river, which is completely burned over and destitute of soil. The strata are much contorted, and the slate crumbling—its general direction is N.E., S.W., dip 60° S.E. At the foot of Chesuncook are ledges of porphyritic greenstone, and quartz rock, dipping 80° S.E. by S.

Chesuncook lake is a fine sheet of water, extending N.E. and S. W. 18 miles, and about 2 miles in width. There are no islands in it; the country around is low and flat, and the banks formed of sand and gravel, seldom exceeding six feet in height. Among the loose stones, I found specimens of coarse grau-wacke, slate, quartz rock, and a few large boulders of good limestone. At the upper extremity of the lake are ledges of siliceous slate dipping 75° N.W., and argillaceous slate dipping from 40° to 80° N.W. These last come out in slabs like grave-stones, and are scattered in every direction over the shores.

The west branch of the Penobscot and the Umbazookskus come into the lake very near each other; the one flowing from the west, and the other from the north. A clearing has been made at the head of the lake, on land belonging to the State, and some timber cut. There is not, however, much good timber in the immediate vicinity.

Having determined to visit Moosehead Lake, before proceeding to the St. John waters, I continued up the west branch to the lower carry into that lake. The river, for a few miles above Chesuncook, is sluggish, and the country around scarcely rises above its level. It is covered with a thick growth of cedar, spruce, birch and fir, to which its black, muddy soil seems well adapted. We soon, however, leave this, and come to banks of a fine blue clay, from ten to fifteen feet high. Near by are rapids, where the river runs violently over the ledges of slate, which form its bed. These run E.N.E., W.S.W., and dip 60° N.N.W. Banks of clay and loam then prevail, with occasional ledges of slate, which dip from N. to N.N.W. 70°. For 12 miles below the lower portage, there is not a ledge of rock. The boulders in the river are principally of slate and quartz rock.

Fine forests of hard wood border the river, and on the hills is much good pine timber intermixed. The soil is excellent, and the country in every respect well adapted for settling. Tracks of moose, resembling those of oxen, were very abundant in the banks ; many apparently just made by the animal coming down into the water. The river varies much in depth and rapidity; running rapidly over the gravel beds, where it is always shoal; and being comparatively still and tranquil in deep water.

The upper carry is about eight miles above the lower, and between them are rapids and falls. At the lower one, where we stopped, the river is about 2½ miles from the head of the lake, and the country between is so low, that in freshets the water from the lake, which is somewhat higher than the river, is said to find its way across, and flow into the Penobscot. As this portage is much used by people passing to Madawaska, a road has been cut by the State, for their benefit, and for the convenience of supplying exploring parties. It is now out of repair, muddy, and encumbered by fallen trees and bushes.

On the 12th of July we brought our boat, provisions and utensils over, and paddled half way to the foot of Moosehead Lake. The wind blew strong against us both this day and the next, and it was only by running great risk of filling our boat, and by hard labor, that we were able to reach Gower's, at the foot of the lake, on the night of the 13th. Here I remained three days, expecting farther instructions from Dr. Jackson. I spent the time in examining around the lake. Its whole extent from N. to S. is about 40 miles, and varies in width from 1 to 6 or 8 miles. It is very irregular in shape, owing to its deep coves, bays, and islands, which in some parts almost fill the lake. Many of these are mere ledges of slate, covered with a scanty growth of cedar and fir, rising perpendicularly from the surface of the water, which falls suddenly to a great depth, by their sides. Others are large islands of many acres, well wooded, and bordered by beaches of sand, as well as by ledges of rock. On the eastern side, a few miles from the foot of the lake, rises a high rocky point, called Burnt Jacket. It is composed of gneiss, curiously crossed in every direction by veins of quartz. Its sides are covered with huge blocks of gneiss, which have fallen from the top, forming long dens and passages between them. One of these blocks was coated with a layer of quartz and feldspar, in which I discovered distinct, though poor crystals of black tourmaline and andalusite. At the foot of the hill, immediately over the water, is a decomposing vein of a coarser kind of gneiss, which contains some pretty good crystals of the black tourmaline, feldspar and mica.

Not far from this locality, on the eastern point of Deer Island, occurs siliceous slate, containing beds of quartz. The strata run E. and W. and dip 65° N. A few rods to the north the same slate dips as many degrees to the south.

On a small, low island N.W. from Moose Island, I found the beach almost covered with fine black ferruginous sand. It is the common black sand used in writing. It lies upon, and in strata with the yellow beach sand, and may be collected in great abundance. Such sand is commonly sold when put up in pound papers, at six cents each. To obtain large quantities it might be scooped up with shovels, and afterwards separated from the yellow sand by powerful magnets. Very near the shore are boggy holes filled with water, which is coated with a film of iron. There are also ledges of slate on this island.

On the main land to the N.W., occurs calciferous slate in strata, running N.W. and S.E., and nearly vertical. It contains nests of madrepores or corallines, and evidently belongs to the grau-wacke formation. This calciferous or grau-wacke slate extends a mile along the lake, and its southern extremity gives place to micaceous slate. Squaw Mountain rises immediately in the rear of this locality, and had I then known the report that pieces of coal had been found on the mountain, I should have been much more unwilling to have left so important a region without further examination.

But my directions being, to continue immediately on the northward, in order to obtain a geological section of the country, I was under the necessity of returning to the head of the lake. Passing by Mt. Kenio, my attention being attracted by its singular appearance, I stopped to ascend and examine the mountain. It is the termination of a peninsula, which extends for some distance into the lake on the eastern side, opposite the mouth of Moose river. As we approached the mountain from the south-west, it had the appearance of a huge artificial wall of stone, rising directly out of the water. We paddled under its cliffs, which jutted out over our heads at a height of five or six hundred feet. Below they descended perpendicularly ninety feet. The northern and western sides are covered with trees, and slope, so that one can reach the top by a path along the edge of the precipice. From its summit is enjoyed a beautiful prospect of the lake with its islands, and of the adjoining country, forming a most picturesque landscape. The country to the northward and to the westward is generally low. Moose river is seen making its way through it, and finally emptying into the lake on the opposite side. To the eastward it is more hilly, until the view is lost among the mountains of the Ktaadn group.

On looking down from the edge of the precipice, we see the water directly beneath; and so steep and overhanging is the rock, that by a single leap, one might throw himself from almost the highest point, and strike the water six hundred feet below, and many feet distant from the base of the mountain.

Mt. Kenio receives its name from that of an old Indian, who formerly lived and hunted in its vicinity. It is a mountain composed entirely of a blueish hornstone, like flint, exceedingly hard and compact. After long exposure, the surface of the stone becomes white. At the base of the hill, it is said, there is another kind of rock, probably greenstone trap, but the water, being three feet higher than usual, concealed it.

On the 18th of July, we reached the portage at the head of the lake. The next day we carried over our boat and utensils, proceeded five or six miles down the river, and encamped on an island. The islands on the west branch are numerous ; most of them are covered with a good alluvial soil and a fine growth of hard wood, such as birch, maple, ash, &c. On the 20th, we continued down the river, but with great difficulty, owing to the shallowness of the water, which had fallen 18 inches in the course of the preceding week. We were enabled, however, to reach Chesuncook lake before night, and pass up to the union of the Caucomgomac and Umbazookskus, where we encamped. These two streams, at their union, run in opposite directions—the one east and the other west; so that they have the appearance of being but one river. The country is so low and flat, that their currents at this place are hardly perceptible. A few rods up the Caucomgomac the current is quicker, and there is a dyke of greenstone trap, with veins of carb. lime in the bank, which rises to the height of 15 or 20 feet. But the Umbazookskus continues sluggish and shallow, till within a few miles of the lake of the same name, from whence it flows. It is a smaller stream than the other, exceedingly crooked, only ten miles long, and almost overgrown with tall grass and lily-pads. Thick elder bushes cover its banks, through which it is almost impossible to penetrate; so that a part of the three last miles, where the stream was too low to float the boat, we were compelled to wade. A good portage has been cut out by the State to the distance of about fifty rods; but had the same time and labor been spent in clearing out the channel, it never would have been necessary to "take out" on this stream. The water is very seldom so low as when we passed up; and even then the men succeeded in wading up the stream with the batteau, and carried only the load by the portage.

Umbazookskus is a shallow lake, with sandy bottom. We crossed the south-east corner of it to the portage, which passes over to Ponguongamook or Mud lake, the head waters of the Allagash river. These two lakes are only $1\frac{3}{4}$ miles apart; the country between and around is low, and covered with the greatest abundance of pine. The timber, however, is small, as is generally the case where it occurs so plentifully; but it is, nevertheless, very valuable. We spent the night of the 21st on this portage; the next day passed over it, and across Mud lake, and the portage of 80 rods at its foot, the outlet being too shallow to float the batteau. Mud lake, as its name indicates, is low and muddy. Its level has been found to be fourteen feet above that of the Umbazookskus. A canal might be cut, with little expense to the State, across to some part of Umbazookskus pond or stream, which would increase that branch of the Penobscot, and furnish a means of getting down some of the timber which lies between Mud lake and lake Pelos, and around the upper Allagash lakes, which region comprises the best timber land in the State. This is the only way by which this timber can be brought to market, for the Allagash lakes are too long and dead to allow of its being carried to Madawaska. But this has already been proposed by others.

The outlet of Mud pond, down which we passed on the 23d, is very small and shallow for the first mile; almost filled with rounded boulders of siliceous and argillaceous slates. Its banks abound with juniper and hackmetack, and rise to the height of small hills. For the last mile above Chamberlin lake, the stream is deeper and easily navigated. This lake, called also Baamchenungamook and Appmoojeenegamook, or Great Cross lake, is the largest of the Allagash lakes. It is erroneously represented on the charts, for it extends in a N.N.E., S.S.W. direction about 12 miles. The shores are low, covered with gravel and small boulders of slate and quartz rock, and the country around is level, with some good scattering pines. The outlet is three or four miles from the inlet, across a part of the lake. On the banks of the outlet, close by the lake, I observed a ledge of clay slate, strata running E. and W. and dipping to the S. A few rods below is an island composed of greenstone trap; the same rock also forms the bed of the stream. This is wide and quick, but shallow. At the island there is a good opportunity for building a dam across the stream, and erecting a saw mill. At night we reached the long string of lakes, called Umsaskis, or Sausage lakes, and were detained the whole of the 24th by rain storms.

The rain continued on the 25th, but we succeeded in going down about 20 miles to the foot of Chase's or Long Falls. Excepting these falls, our route was through dead water, mostly lakes. The country continues low, and scarcely any hills are to be seen. Pine timber is abundant and large, mixed with spruce, fir, maple, &c. On the western side of lake Pongokwahem, is a ledge of coarse conglomerate, or grau-wacke. It is cut through by a dyke of greenstone trap, which runs N.E., S.W. At point of contact of the two rocks, the trap is amygdaloidal, and the cavities filled with calcareous spar and chlorite. Two miles to the north of this locality, occurs greenstone trap again. These are the only rocks in place which we found on the lakes. We encamped at night in a good log hut, built the last year for the accommodation of the surveyors who run the line for the Quebec and St. Andrews Railroad.

Immediately below Chase's falls are ledges of argillaceous alternating with siliceous slate. The former is sound, though it shows traces of iron; sheets 3 feet long, 1½ wide, and not more than ¼ inch thick, are readily split out. It contains beds of milky quartz. The strata dip 62° N.N.W. It appears along the river for six rods.

The stream for several miles below is filled with large boulders of granite, trap, and a slate altered by trap.

At the Lower Umsaskis lake occur micaceous and siliceous slate. But for the next 25 miles there is not a ledge of rock visible. Hills appear around, on the sides of which pines are scattered in abundance; the shores, however, are low, composed of clay, gravel, and alluvial soil.

On the 28th, four miles above the Grand Falls on the Allagash, we met with argillaceous slate, running N.E. b. N., S. W. b. S. This is succeeded by banks of clay and gravel, until a little above the falls we find micaceous and argillaceous slate; and at the falls the latter rock, forming the entire bed and shores of the stream. It dips 75° S.S.E., is of poor quality, and gullied full of deep pot-holes. At the falls the river is divided by a small island, on each side of which it pitches over the rough slate rocks 25 feet, nearly perpendicularly. The banks just below are precipitous, and of about the same height. The country in the vicinity has been burnt over, and the rough ledges of slate appear every where above the soil. Through these the portage extends about 25 rods on the southern side. Below, the slate dips 70° S. E. From the falls to the mouth of the Allagash, the water is shallow and quick; the immediate shores continue low, and are formed of gravel. Before we reach the mouth, the river makes a large bend or 'ox-bow,' after passing which we find it expands into a wide bay, at its confluence with the Walloostook. This bay is filled with small islands, and their banks are covered with a luxuriant growth of grass.

On the 29th, we continued down the St. John, which is formed by the confluence of the Walloostook and Allagash. It is a broad deep river, running quick, often with rapids dangerous to small boats, by their swell, and is bordered by high banks of sand and gravel, sometimes ferruginous, which frequently contain beds of blue and yellow clay. Through these argillaceous slate occasionally appears, running from N.E. S.W.

to E.N.E. S.S.W. 1½ miles down the St. John, dipping to the S.E.; a little below 75° N.N.W. On the shores are boulders of quartz, slate, and red sandstone, and grau-wacke in small pieces. The first settlement is nearly opposite the mouth of the St. Francois, 16 miles from the mouth of the Allagash. Four miles farther down is a rich island, inhabited by a former citizen of Kennebec county. Another, below, supports a family from the western part of the State; while two other "Yankees" live on the southern bank of the river near by. These, with Mr. John Baker, who lives at the mouth of the Meriumpticook, are the only Americans on the river.

The numerous islands are composed of a rich alluvial soil, which yields heavy crops of grain, particularly wheat, and supports a fine growth of hard wood, such as elm, maple, ash and bass. Most of these islands are taken possession of, and are cultivated by settlers. The intervales in the upper settlements are high, and the country behind rolls back in swells, forming high ranges of hills. These abound in the sugar or rock maple tree, birch and pine. The former is of great importance to the inhabitants, as they derive from it all their sugar and molasses. At night we reached Baker's, 36 miles from the mouth of the Allagash.

After leaving Baker's I passed down to the mouth of the Madawaska river; thence up that stream to Temiscouata lake, across the Grand Portage to a little village on the St. Lawrence, called the Riviere du Loup, and returned down the St. Francois to the St. John again.

On the St. Francois our boat was overturned, and I lost, together with our provisions and a part of our baggage, most of my notes for the preceding fortnight. I have restored them as well as I was able from memory.

From the mouth of the Meriumpticook to the Madawaska river is 12 miles. The banks are generally high, composed of gravel and clay, and the same kind of slate so common above. The stream is swift, and the country around hilly; there are, however, fine intervales on the borders. These are taken up by French settlers, many of whom have already become wealthy in this country.

Excepting the fall near the mouth, we found the Madawaska a fine stream to navigate, the water being rather high, and running with a gentle current. The country on the western side is hilly, but the banks seldom exceed twelve feet in height. They are generally not more than eight feet high, and composed of loam and sand.

On the eastern side the country often extends back into rich intervales. Ledges of rock occur only in three places below the lake, and are argillaceous slate, running N.E. S.W., and nearly vertical. The forests are entirely of the 'black growth;' hard wood is scarce, and pine not abundant. There are about fifteen houses on the river which belong to the Canadian French.

We arrived at Temiscouata lake on Friday, August 4th. This is 24 miles N. from the St. John, and extends nearly N. about 24 miles farther. High hills, generally well wooded, surround the lake on all sides, but they do not abound in pines, although there are enough to employ, every winter, a lumbering party from Madawaska. The territory for six miles around the lake was granted by the French to Col. Frazier, who lived on the west side, near the foot of the Grand Portage. He died the last spring, and a part of it now belongs to citizens of Maine. At the foot of the lake is a ledge of argillaceous slate, running N.E. b. E., S.W. b. W., which contains a little graphite. Several other similar ledges occur on the western side of the lake, and one of a coarse conglomerate or grau-wacke. On the eastern side, opposite the foot of the portage, is a high precipitous hill, composed of grau-wacke slate, lying in a nearly vertical position, and having a N.E. and S.W. direction. At its base are ledges of grau-wacke, which are filled with madrepores. They are so numerous that the rock has been burned for lime, and plastering made from it, when all the lime was derived merely from the corallines. We have thus again arrived at the grau-wacke formation on the other side of the Ktaadn mountains, the centre of elevation.

Temiscouata lake and the Madawaska river are of the greatest importance to the State of Maine, and to Great Britain. By this route the most ready communication may be had from

Madawaska to the sea-coast. It is also the most direct route between New Brunswick and Lower Canada; their mail traverses it regularly. Nearly all the supplies for Madawaska come from the St. Lawrence; first across the Grand Portage, a road cut by the English from St. Andre to Temiscouata Lake, 40 miles; and thence by boats to the St. John. There is much more travelling here than is generally supposed. The day before we reached the Portage, there arrived 21 horses and carts, with supplies for the Great Falls on the St. John. Families of emigrants are also continually passing over; we met several on the road, with their loads of furniture, moving from Canada.

Having learned that there was a piroque or French log canoe on the St. Francois, which I could probably purchase, I left the batteau at the lake, with directions that it should be sent down to the mouth of the Madawaska, by some trustworthy traveller, and set out to cross the Portage on the 6th of August, our baggage in one of the French carts, which was returning; ourselves on foot. My object in going to a settlement was to obtain a new supply of provisions, which could not be procured in Madawaska.

For the first four or five miles the road passes through a tract of burnt lands; the growth is spruce, cedar, fir, &c.; the surface uneven with no high hills. The country then becomes more rough; the road passing over hills of considerable elevation, and through deep swamps. Many of the hills abound with fine sugar maple trees, and the country is adapted for settling; but the present inhabitants choose those spots which are not encumbered with hard wood, and are the most easily cleared. I noticed only one ledge of rock this day, which was slate, about six miles from the lake.

We reached the first house at night, having come sixteen miles. The inhabitants were uneducated French people, who knew little of what was passing, excepting on the Grand Portage. They expressed much surprise when I told them the ground they lived upon was in dispute between Great Britain and "the States."

The next day we continued our journey; but owing to the bad state of the road the horse could get along but slowly. I therefore left him and the men to make the best of their way, while I continued on. After travelling a little more than a mile, I came to ledges of red and green slate in alternating beds; their direction is N.N.E., S.S.W., dip 75° E.S.E. Five miles further on is the St. Francois; it is little more than a brook where the road crosses it. Beyond this for two or three miles in extent the surface is at intervals formed entirely of rounded boulders of quartz rock. Their average size is not far from 18 inches in diameter, and they lie one upon another, and exposed as if they once formed the bottom of mountain torrents or large streams.

Six miles west from the St. Francois, the road crosses a considerable stream, running to the north, and emptying into the St. Lawrence. It is called the Riviere Verte. Its banks, at the portage, are 15 or 20 feet high, and composed entirely of red slate. The water is colored red, as are all the brooks which flow through this soil.

In this vicinity are the ranges of high lands which separate the waters running north from those running south. They form some high hills, which extend in a north and south direction, so that the road crosses them all. They are not difficult to cross, but have been considered of sufficient elevation to receive names, as La Fourche, Mt. La Verte, &c.

When within four miles of the St. Lawrence, I came out upon an extensive plain, covered with fields of grass and grain, houses and barns. It is a thickly settled spot for more than a mile. The inhabitants are poor, living on the coarsest fare. Every one, however, owns one or two good Canadian horses and cows. I stopped at one of the houses to obtain something to eat. A large tin pan of "bonny clabber" and a huge crust of sour brown bread were set before me; these were all the house afforded, and nearly all that the inhabitants require. Walking without food for eight hours enabled me to do ample justice even to this. I hired the man of the house to take me on to the Riviere du Loup, in his cart. The distance was 9 miles, and it would be necessary for him to return late in the evening; for this he charged 80 cents.

When we first came in sight of the St. Lawrence, from the top of a high hill, the view was most striking, and much more interesting to me from having been shut up in the woods for the two previous months. Directly below us lays the broad river, extending across 9 or 10 miles, its surface broken by a few islands and reefs; and two ships riding at anchor near the shore. Beyond, extended ranges of uncultivated hills, parallel with the river. The sun was just going down behind them, and gilding the whole scene with its parting rays. St. Andre is the name of the first parish; it contains few houses. Riviere du Loup, the parish six miles below, is much larger; it contains about a hundred houses, and a catholic church. We passed the river of the same name, a broad shallow stream, a mile or two back from the St. Lawrence, thence over several hills to the St. Lawrence, and along its side, a part of the way under a precipitous bank of grau-wacke on our right, twenty or more feet high. This rock forms curious ridges, running parallel with the river, and at considerable distances from each other. The stratification is irregular, as if it had been once disturbed. The principal street is through the plateau between two of these ridges. Directly above it the rock lies in large tabular masses, the seams of stratification inclining in different directions. These lie in the second ridge from the river.

I was detained here three days, the 8th, 9th and 10th of August. The two last days it rained almost incessantly. I I was treated with great hospitality and kindness by Mr. Davidson, who has charge of the saw-mills at the falls of the Riv. du Loup, and of all the business of supplying the English ships with deal from this place. These falls are a mile back from the St. Lawrence; in this distance the river descends at least 150 feet; about 70 feet at the second pitch, above which there is a mill. The view is very striking and romantic—the river falling with a continued roar over this high precipice, and afterwards rushing between higher banks of slate, through which it has excavated for itself a narrow passage, and which now rise perpendicularly above it from 60 to 100 feet. The slate is of the red and greenish kinds noticed above; it easily crumbles, and is worn away by the current. The saw-mill is supplied with timber from the head of the Riviere du Loup, where it is in great abundance, as it is around the head of the Riviere Verte.

After it is cut into deal, or thick plank, it is conveyed to near the mouth of the river in a sluice, which is a mile and a quarter long, in fourteen minutes. It is thence carried in large batteaux to the ships in the stream. Lumber is exported from the provinces in the form of deal, partly on account of the convenience of stowage, but principally to avoid the high duties on boards, clapboards and shingles. After the deal has arrived in Europe, it is most of it sawed again, each piece into five boards.

The land on the St. Lawrence is good, and pretty well cultivated. Along the river are fine meadows, which yield abundant crops of grain, and both salt and English hay. This vicinity is not so subject to frost as the country back. The large plain I passed over, nine miles from the St. Lawrence, produced the heaviest crops of grass I have ever seen; but their grain is almost sure to be cut off.

On the 11th we returned as far as the St. Francois—21 miles. The rains had flooded the country, and the last 9 miles were almost impassable. I found on the road the owner of the piroque, which I purchased, and at night we encamped on the St. Francois.

This river, where it is crossed by the Grand Portage, is a small stream, but being now flowed by the rains, may be ten or twelve feet across. In descending we find it often very narrow and shoal, hardly able to float our canoe; and overgrown for miles with elder bushes, and obstructed by jams of trees, and full of crooks and turns, through all which the current would hurry us much swifter than was at all consistent with safety. The country around is low and flat, producing only spruce, juniper, fir, cedar, and some birch. About 12 miles below the portage appear two ledges of quartz rock, running

N.E. and S.W., very compact and hard. As we came rapidly round a sharp turn, not far from 17 miles below the Grand Portage, our canoe was suddenly brought up by two fir trees, lying across the stream. Their thick branches prevented her going through; she came round, filled and rolled under. We remained in the trees. That night and the next morning we collected what we could find of our provisions and baggage, and as there was not a day's allowance of the former, we were compelled to hurry through to Madawaska, as fast as possible. We passed down 12 miles with the current, as rapid as it was above, more crooked, and much obstructed by jams. We then came to a large lake about eight miles long and one wide. It was surrounded by hills, on which pine grew abundantly, but of small size. The shores were hid by the water, which extended up among the trees. We passed through this lake, about eight miles below, and encamped. Pine continued plenty all the way from the lake, and balm of gilead and ash abound on the banks.

On the 14th, we crossed another lake about four miles long, soon after three in a string, like the Umaskis or Sausage lakes, and at night another, five miles long, and encamped at the foot. We were obliged to make one portage of a quarter of a mile by a jam. The country through which we passed is poor for settling, but rich in pine timber. The banks vary much in height, being for two miles on the western side of the river 15 to 30 feet high, while the opposite shore is little above the water. They are composed of sand and gravel and a little clay. Argillaceous slate occurs in one place, which is at least 40 miles below the last ledge we passed. The strata run N.E. b E., S.W. b W., and are nearly vertical.

The next day we arrived early at the mouth of the St. Francois, which is six miles below the last lake. Soon after we reached Mr. Hunnewell's on Sugar Isle, where we were liberally supplied with every thing we required. We then continued down to Mr. Baker's.

The distance from the Grand Portage to the St. John, following the course of the St. Francois, cannot be far from 85 miles; in a direct line not much more than half this distance. It is, upon the whole, a good pine country, and there are some excellent water privileges at the outlets of the lakes; the best of these I noticed was taken possession of by the usual way of felling trees around. But the poor soil, and difficult navigation of the waters are great objections to this region. On the lower lake, there has already been some timber cut. I find the inhabitants every where are not scrupulous in cutting timber on the public lands.

About 14 miles up the Meriumpticook occur argillaceous slates; which according to Mr. Baker's account may be obtained in large thin sheets.

On the 17th we continued down the St. John. At the mouth of the Madawaska we again took our batteau, which had been sent down from Temiscouata Lake. The next day we arrived at the Great Falls. In the clay bank near Grand Isle, examined last year, I discovered at this time the trunk of a large brown ash tree. It lay nearly horizontally ten feet below the surface and as many feet above the water. It was somewhat decomposed, but I succeeded in getting out some large pieces of it. Near it were spruce buds, imperfectly preserved, and sticks of various shapes.

The night of the 18th we spent at the Great Falls of the St. John. The next day we procured some provisions of Mr. Coffin, agent and mill-wright of Sir John Caldwell, who assisted us in every way, and then passed down the river as far as the mouth of the Tobique. Having been directed to ascend this river, in order to gain some correct information as to the sandstone and plaster rock said to occur on its banks, we left the St. John on the morning of the 20th, and at night encamped about fifteen miles up the Tobique.

In coming into the Tobique water from the St. John, one is struck with its clear appearance, it being very transparent and distinct from that of the main river. The banks at its mouth are from 6 to 25 feet high. The Indian village which is on the northern bank, contains only about twenty huts. A few rods above this we meet with argillaceous slate, similar to that so common on the St. John. A mile and a half above, it occurs again, for near half a mile, forming steep banks of 80 feet or more high. Between these the river has worn out a narrow passage, which is called the Narrows, and which in spring, when the water is high, is exceedingly dangerous to navigate. At present the water is very shoal; but still runs quick, and the river abounding in "gravel beds," makes it difficult to ascend. The slate runs N.E. and S.W.; it frequently contains small beds of white carbonate of lime, which, however are not of sufficient extent to make them of any importance. The strata appear perpendicular. A mile further up they dip 60° S.E. In continuing up the river I noticed successively ledges of the following description. Quartz rock dipping 70° N.W. b W. Compact siliceous rock dipping 20° N.W., and crossed by seams, resting unconformably upon argillaceous slate, which dips 80° S.S.E. Above this by a saw-mill, which is six miles from the mouth of the Tobique, siliceous slate, dipping 60° N.W. b N.; very near this the same rock dipping 60° S.E.; then quartz rock. A mile above the last we came to a dam, which is just made across the river by Mr. Lombard, of Augusta: Here are to be erected saw-mills, for which there is a fine privilege. The banks are 10 or 15 feet high, formed entirely of new red sandstone. It lies in strata nearly horizontal, and where exposed to the current and to the weather is unsound and crumbling. No large pieces can be got out. This is called fourteen miles from the mouth. A mile above we encamped. The next day, (21st August,) we continued up the river—noticed coarse conglomerate or sandstone overlaying the new red sandstone, strata apparently horizontal. To the mouth of the Wapskenheagan, banks of red sandstone, and red sand derived from the decomposition of the rock, continually occur, sometimes rising 60 feet above the river. A few rods up this stream are high cliffs of red gypsum, filled with veins of white fibrous selenite, which vary from half an inch to two inches in thickness. The same rock appears on the Tobique, two miles above, and the cliff there, which rises nearly 100 feet perpendicularly from the river, is probably a continuation of that on the Wapskenhegan. On the face of the cliff are seen these veins of white gypsum, and also beds of green gypsum. The rock is crumbling, and at the base of the precipice are heaps of loose pieces which have fallen from its sides.

The rock appears to dip 20° E. N. E. A little below on the western side, it dips 20° E.

Though the plaster rock is here of poor quality, it will answer as well as the best for fertilizing the soil; and it now lies in heaps ready to be thrown into boats, which in the early part of the season could navigate this river without much difficulty. We spent a part of the next day in searching for a salt spring, which is said to exist somewhere in this vicinity. We were, however, unable to find it. There is little doubt but that there is such a spring near by.

Though it would have been pleasant to have made further examinations in this interesting and important section, I did not feel authorized to spend more time out of the limits of the State, and therefore returned immediately.

The islands in the Tobique, of which there are many, are low, and covered with a fine growth of hard wood, particularly elm; and groves of these trees are frequent on the shores of the Tobique. Hemlock is also abundant—a tree we have not seen any where else, excepting on the Penobscot waters. Of pine there are said to be large quantities about the river. This will soon become an important section to the inhabitants of Maine; not only for lumbering, but for obtaining plaster, and the sandstone for linings for furnaces. Here is the formation where bituminous coal is expected to be found, there being every indication of its existing in the vicinity.

JAMES T. HODGE, *Assistant for Massachusetts.*

AGRICULTURAL GEOLOGY.

GEOLOGICAL ORIGIN, DISTRIBUTION, CHEMICAL COMPOSITION AND CAPABILITIES OF SOILS.

Considering the vital importance of a correct knowledge of the science and art of agriculture, upon which man depends for his daily bread, we shall willingly avail ourselves of any information that may throw light upon the principles by which we are to be guided in practical operations.

It cannot be concealed, that agriculture in this country is far below the standard attained in Europe, and that by their more scientific methods, the French, German and Italian farmers are enabled to raise larger crops, so as to supply us with many articles of agricultural produce, at a lower rate than we have been able to grow them upon our own soil, and this too has been effected by people whose soil costs vastly more than ours.

It is well known, that for several years past large quantities of wheat, barley, Indian corn and beans, have been imported into this country from France, Germany, Venitian Lombardy, Tuscany and Egypt, while, at the same time, orders have been sent out from France for the purchase of our refuse bones, and the bone black of our sugar refineries—substances used in that country for improving the soil. Thus, strange as it may seem, the French farmers send out to this country for manure, and supply us with bread, while many remain ignorant of the value of those very substances so eagerly sought for by our foreign brethren!

European science has been brought to bear upon the art of agriculture, and hence the improvements are rapidly progressing there; while we have as yet done but little towards the developement of this most important of arts.

I know that many intelligent farmers decry "book farming" as useless, and their remarks are certainly worthy of our attention, and we may perhaps remove their objections. Good books on this subject record the experience of many excellent practical farmers, and concentrate all the information that is scattered in various parts of the world; while at the same time they give general rules by which we are to be guided in practice. Where then is the objection that has been raised against such knowledge? It will be found, that there are few such books in existence, although there are materials enough on record to furnish a good treatise, and those books that have appeared are deficient in some of the most essential particulars, or they are so technical that those who are unacquainted with the elements of science cannot understand them. There are also imperfections in the certificates and rules, owing to no analysis having been made of the soils in question.

So also our own farmers are unacquainted with the composition of their own soils. Hence we account for the uncertainty of the results obtained by those who make trials of new methods in farming, and we ought not to be surprised at their frequent failures.

If, however, all the conditions of the problem were understood by both parties, farmers would readily join hands with their scientific co-laborers, and the art of agriculture would soon become as certain as any other art, while, by the application of scientific principles, the business would become of a more exalted character, and assume its true rank in the consideration of all men.

In order to make rational experiments in farming, it is essential that the composition of the soil should be known, and then we can act understandingly in our operations. In order to amend a soil, that knowledge is absolutely necessary, otherwise we might destroy its fertility, by the processes intended for its amelioration, and thus be subjected to disappointment and chagrin.

Mineralogy, geology and chemistry come to our aid, and serve to indicate the nature of various soils, while sure indications are readily discoverable for the amendment of those which are sterile.

Agriculture is of so great importance to the community, that we should not allow our knowledge of it to rest upon mere empyricism. It ought to be exalted to the rank of a true science, and then it will become one of the most honorable, as it is one of the most useful of arts, and even the most highly educated men will then be proud to rank as scientific farmers.

Let us now examine the subject more in detail, and ascertain how much light we may obtain from the science of geology, that may serve to guide us in our researches.

We have first to consider the geological origin of soils.

Every attentive person must have observed, that solid rocks, exposed to the combined action of air, water, and different degrees of temperature, undergo decomposition and disintegration, so that they crumble into powder, and that some rocks decay more rapidly than others, owing to their structure, or mineralogical composition. If a rock is porous, or stratified in its structure, water infiltrates into it, and on freezing, expands with such power, as to tear the surface of the rock to pieces, so that it readily crumbles. When fire runs through the forests, it heats the surface of the rocks, and by the irregular expansion produced, they are shivered into fragments.

The action of running water and friction of stones, also serve to grind the rocks into powder, by attrition of their surfaces, and the detritus is borne along by the streams, and deposited in low lands, or along their borders.

When a rock contains iron pyrites, or sulphuret of iron, that mineral, by the action of air and water, decomposes, and forms copperas, or sulphate of iron, and the sulphuric acid of that substance acts powerfully on some of the ingredients of the rock, and causes its rapid decomposition. Any person, who has been on Iron Mine Hill, in Gardiner, will fully understand how rapid is this operation, and may there see its results. The oxidizing power of the atmosphere, also, acts powerfully upon the surface of those rocks, which have for one of their components, the prot-oxides of the metals, iron and manganese, and as those oxides take up another portion of oxygen, they increase in bulk, become brown or black, and the stone falls into fragments.

These are a few of the causes now in action, which modify the solid crust of the globe, and it appears that their effects are far more important, than we might at first imagine. Whoever looks upon the muddy waters of the Mississippi, Ganges, Po, the Rhine, and the Rhone, or reads the calculations respecting the enormous quantity of matter brought down from the mountains by those rivers, will at once appreciate the modifying influence of those causes which are continually wearing down the solid matter that forms the mass of our mountains.

Geology teaches us, that such causes were formerly in more powerful operation, and that the ancient world was, from its infancy, subject to violent catastrophes, accompanied by powerful inroads of the sea ; oceanic currents and tumultuous waves having for many successive periods rushed over the land, and beaten the loftiest craigs of the highest mountains. We should then naturally expect, that the earth would present ample testimony of the action of these powerful causes of disintegration of the rocks, and we do observe that a large portion of the loose materials upon the surface, bears proofs of aqueous action and mechanical abrasion. By those ancient convulsions, the detritus of the solid rocks was prepared, and forming the various soils, which we observe, the earth was rendered capable of yielding its rich stores of vegetation, on which a large proportion of the animated creatures depend for their food. From the foundation of the everlasting hills, the CREATOR began to prepare the world for the habitation of his noblest creature, man, and converted a portion of the solid rocks into soils, which were given as the field of human labor, and to the progenitor of our race it was commanded that he should till the soil.

If we take up a handful of earth, and examine it attentively, we shall readily discover such mineral ingredients, as denote the rocks from which it originated. Thus we discover in a soil numerous spangles of mica, grains of quartz, and white or brown earthy looking particles, which are felspar ; besides which, we remark a considerable portion of fine brown powder, which being examined with a microscope is found to be composed of the same minerals, more finely pulverized, and mixed with the brown oxide of iron. It will be at once understood, that such a soil arises from the disintegration and decomposition of granite rocks, and that the oxide of iron was derived from the pyrites, or the prot-oxide of iron, contained in that rock.

A soil arising from the decomposition of gneiss, possesses similar characters, only the mica is more abundant.

Soils from mica slate are made up of a large proportion of mica mixed with grains of quartz.

Sienite, and hornblende rock produce a dark brown soil, in which there is but little quartz, and a great deal of felspar, and decomposed hornblende.

Greenstone trap-rocks form, by their decomposition, a brown soil, which contains pieces of the undecomposed rock, but the component minerals in the soil itself, are rarely so distinct as to be discoverable. This soil is a warm kind of loam, soft and spongy, easily compressed into smaller dimensions by the pressure of the hand, but not adhesive like clay. It is peculiarly adapted to the growth of potatoes, and is a luxuriant soil for most of our ordinary produce.

Slate-rocks form a soil of a blue color, in which numerous undecomposed fragments of the rock may be discovered. When transported by water, it is deposited in a state of tough blue clay.

Limestone forms various colored soils, according to the nature of the impurities it contains. They are generally of a light yellowish brown color, from admixture of a certain proportion of oxide of iron. This is especially the case with those soils derived from the argillo-ferruginous limestone.

Calcareous soils, if they are rich in carbonate of lime, may be distinguished by their effervesence with acids, and the quantity of this substance may be estimated by the loss of weight which indicates the proportion of carbonic acid, that has been expelled, and since the carbonic acid always occurs in the ratio of nearly 44 per cent. to 56 per cent. of lime, it is easy, by a proportional calculation, to ascertain the quantity of that mineral in the soil.

It more frequently happens, that there is so minute a quantity of carbonate of lime in the soil, as to require a minute chemical analysis for its detection, and few farmers have either leisure or means for such an operation. Examples of such analyses will be presently laid before you.

Talcose slate rocks, when decomposed, form a light brown soil, in which particles of the rock are discoverable, and, on analysis, a considerable quantity of the silicate of magnesia is found, which is one of the chief components of talc.

Red sandstone, on disintegration, forms soil composed almost entirely of grains of quartz, with oxide of iron and clay, with a few spangles of undecomposed mica.

Grau-wacke, or conglomerate, when disintegrated, produces a light grey soil, full of smooth rounded pebbles, which originate from the undecomposed components of the rock.

Red porphyry is very slow of decomposition, and forms a bright red fine powder, filled with angular fragments of the rock.

I have thus distinguished and described the appearances which characterize those soils that arise immediately from the decay of solid rocks, and various characteristic specimens of each variety may be seen in the cabinet arranged for the use of the State.

Let us next consider how soils are distributed on the earth's surface, and see how their qualities depend upon their situation.

In various sections of this report may be seen recorded the proofs of diluvial transportation of rocks, far from their parent beds, and we have every reason to believe, that this removal was effected by a tremendous current of water, that swept over the State from the N. 15° W., to the S. 15° E., and we have adduced in testimony, that such was the direction of that current, numerous grooves, furrows, or scratches upon the surface of the solid rocks, in place, and have shown conclusively, that the rocks which we find thus transported, proved to be portions of ledges situated to the north of the localities where their scattered fragments are found.

It is a matter of surprise, that such enormous masses of rock should have been moved so far by an aqueous current; but, when it is remembered, that a rock does not weigh but half so much when immersed in water, as it does when weighed in air, owing to the support given it by the water around; and when we reflect on the fact, that a rock is still more powerfully supported under the pressure of deep water, it may be conceived, that, if a flood of water did once rush over the land it might have removed large and weighty masses of rock, such as we find to have been the case.

From the observations made upon Mount Ktaadn, it is proved, that the current did rush over the summit of that lofty mountain, and consequently, the diluvial waters rose to the height of more than 5000 feet. Hence we are enabled to prove, that the ancient ocean, which rushed over the surface of the State, was at least a mile in depth, and its transporting power must have been greatly increased by its enormous pressure.

It will be readily conceived, that if solid rocks were moved from their native beds, and carried forward several miles, the finer particles of soil should have been transported to a still greater distance, so we find that the whole mass of loose materials on the surface has been removed southwardly, and the soil resting upon the surface of rocks, in place, is rarely, if ever, such as results from the decomposition of those rocks, but was evidently derived from those ledges which occur to the northward.

If an attentive observer examines the soil in the city of Portland, he will discover, at once, that it is made up from the detritus of granite and gneiss rocks, while the ledges in that city are wholly composed of the argillaceous, talcose, and mica slate-rocks, and granite and gneiss occur in great abundance, to the northward.

All the markings on the surface of the rocks, and the scattered boulders of granite and gneiss, which abound in that soil, indicate its origin to have been in the N. 15° or 20° W. I merely quote the above locality, on account of its being a spot where most persons will have occasion to examine the facts stated. The various sections of the State present ample illustration of the same fact, and every one who will take the trouble, may convince himself of its reality.

The tertiary deposits of clay, sand and marine shells, were evidently produced in tranquil water, since their strata indicate by their situation, structure and beds of shells, that the clay was gradually and slowly deposited, allowing time for the propagation and growth of the various shell fish in its several layers. Not so was the diluvial matter deposited, for we find it to bear marks of sudden and violent transportation and deposition, the various pebbles, boulders and erratic blocks of stone being mixed in great confusion. I have formerly mentioned a locality in Bangor, near the court-house, where, it would seem, there are proofs of a gradual subsidence of the diluvial current, the various particles becoming smaller, as we ascend the embankment, until we come to fine clay, which must have subsided from tranquil water.

We observe, then, that the tertiary deposits were cut thro' by the diluvial waters, which have excavated deep vallies, and heaped up long ridges, called horsebacks, and the general direction of these valleys and ridges, coincides with the direction formerly indicated, as the course in which the current swept.

Although we are informed in the scriptures, that the deluge was ordained for the punishment of wicked men, it is certain, that there was mercy mingled with this dispensation, for the soils were comminuted, transported, and mixed in such a manner, that their qualities were improved, and rendered more suitable for the growth of plants, so that new and more fertile soils were prepared for coming generations, who literally reap advantage from the deluge.

Besides the ancient aqueous current, we see every day the action of water modifying the surface of the globe, transporting fine particles from the mountain side, and depositing them in the valleys and along the margin of running streams. Especially during freshets, when the rivers burst their narrow confines, and spread out over the intervales, do we see rich deposites formed of alluvial soil.

Such currents, arising amid decomposing vegetable matters, transport an infinity of fine particles of such matter, and deposit it with the various earthy ingredients, which form our richest meadows, and luxuriant intervale soils. Thus are formed many of those bottom lands, which occur along the river courses of the Western States, and the banks of rivers in Maine, under similar circumstances, are found to be composed of like soils.

A river, coursing its way amid various rocks, carries down and deposites fine particles of every kind, which it meets with in its way.

If the rocks above are limestone, we shall have calcareous soil brought down and deposited by the river. So on the banks of the Aroostook, we find a rich alluvial soil, equaling in fertility the famed regions of the Western States, and capable, even under a less genial clime, of producing crops of wheat and other grain, fully equal in abundance with any soils of which we have any records.

That river, with its wide and fertile intervales, is destined to become the granary of the North, and whenever the policy of the State shall complete the roads, and offer facilities for settlement, we shall turn the tide of emigration, populate a fertile district, and I trust forever place that portion of Maine beyond the power of foreign aggression.

Soils are powerfully modified by the circumstances under which they are placed, and it will be useful to consider, how this may be affected by their order of super-position.

I have had occasion to examine two portions of a field, in the town of Saco, where the superficial soil was uniformly composed of a light brown sandy loam, and in one part of that field, the Indian corn growing upon it, was tall and luxuriant, while on the other, it was short and feeble. The several parts of this field were treated with the same kind of manure, and planted with the same grain, in the same manner, so that their circumstances were apparently alike. On searching into the cause of this difference of fertility, it was discovered, that in the luxuriant part of the field, there was a deposit of clay, from one to two feet from the surface, while, in the other, it was four feet below. Hence it would appear, that, in the first instance, the clay served as a retainer of moisture and manure, while in the other, these indispensable requisites for healthy vegetation, sank beyond the reach of the corn. The remedy was at once apparent, for it was only necessary to mix clay with the barren soil, to make it retentive.

It frequently happens, also, that we observe a farmer toiling upon a tough clayey soil, which it is in vain for him to attempt to keep loose, for with the first rain, the clay is washed down into a slimy paste, which by the ardent sun-beams, is soon baked into an impermeable mass, which prevents the free germination and growth of the seed. Now, hard by, occurs a hill of sand, that nature seems kindly to have placed at his disposal, and he is only required, after ploughing his clay soil, to cart a quantity of sand into the furrows, and harrow it in, in order to produce a soil of good texture, which may then be manured as required, and will produce well. In such cases, the sand may be added every year, until there is a sufficiency. Such soils are highly retentive of manure, and are worth the labor of reclaiming, and I should denote the neighborhood of Bangor, as a suitable field for such improvements ; and I doubt not, that the market of that city would, by its demand, amply repay the labor and money expended.

CHEMICAL COMPOSITION OF SOILS.

From the mineral ingredients we may form some idea of the chemical nature of the soils, but since there may be many-matters mingled, in the state of fine powder, not capable of discrimination by the eye, and those very substances may be the cause of its peculiar properties, it becomes necessary to resort to the aid of chemical science, and analytical art for their detection.

It is a strange and almost unaccountable fact, that while we have the most minute and delicate analysis of rare and curious minerals, chemists have either neglected to ascertain the compositions of soils, or have satisfied themselves with the most crude and careless examinations, that do not answer the purpose intended.

The late illustrious chemist, Sir Humphrey Davy, was called upon by the British Agricultural Board, to give a course of lectures upon the chemical composition of soils, and the modes of amending those which were sterile, and his lectures contain nearly all the information attainable by the farmer respecting the composition of soils. Although Davy's Agricultural Chemistry is as good an essay as we had a right to expect when the art of chemical analysis was in its infancy, and a vast deal of valuable information is contained in it, still the analyses are so imperfect, that they neither serve to distinguish one kind of soil from another, possessing altogether different properties, nor serve to indicate such ameliorations as are required. When Davy acknowledges that his errors in the analyses amount to 5 or 10 per cent. we must feel convinced that either sufficient care was not taken, or that the instruments of analysis which he used were not sufficiently exact. We shall see in the analyses that I shall present, that an error of even one or two per cent. would cause an utter failure in respect to the information desired, and shall at once perceive the importance of the most scrupulous exactness in the operation.

Chaptal has also given us some chemical essays upon agriculture, but the analyses of soils are generally borrowed from the work of Davy. It contains, however, much valuable information respecting several different departments of the art, and a special treatise upon the cultivation of beets and making of sugar. This essay has been translated into English, and is worthy of the farmer's attention.

The chemical analysis of soils is one of the most difficult and tedious operations the chemist is called upon to perform, and it seldom happens that the processes are completed within three weeks from the time they were commenced. Hence the necessity of my carrying on a number of analyses at a time, in order to be able to present them in season for this Report. By operating on three or four specimens at a time, the chemist is kept continually employed, and an extensive supply of apparatus is put in requisition, since the processes multiply with astonishing rapidity, and soon every vessel in the laboratory finds occupation, and it is necessary to label each glass, funnel or filter as he proceeds. Attempts have been made to render the art of chemical analysis easy, so that farmers might be able to do them for themselves, but such attempts have been entirely abortive, for it would pre-suppose a knowledge of chemical science and manipulation rarely if ever in possession of any but professed chemists, and it would be idle to put instruments and re-agents into the hands of those who do not know how to use them. It would certainly be very useful to the community, if our agricultural brethren would establish a college or institute, devoted exclusively to those arts appertaining to agriculture, and such institutions will ere long be founded in each of the states, for we begin to see and feel the importance of a good scientific education among the farmers throughout our country, and our young men ought to possess advantages so desirable and important for their welfare and prosperity. It is evident that small schools will do no good, since they would not be sufficiently well endowed to command the services of scientific teachers, and hence if the attempt is made, let there be one large and well endowed agricultural college in each State, connected, if found practicable, with the usual classical institutions, and forming a branch of each university. Many, who do not desire to spend years in the study of Latin and Greek authors, are still anxious to learn the elements of those sciences which appertain to their professions, and I have not the least doubt, that a well ordered and scientific agricultural institute would prove one of the most popular and useful schools in the country. In such a college, mathematics, drawing, surveying, mechanics, architecture, chemistry, mineralogy, geology, zoology and the practical arts, each in their several departments, might be taught by study and lecture, while every practical operation should be learned by actual practice.

MECHANICAL AND CHEMICAL ANALYSIS OF SOILS FROM MAINE.

Much information may be obtained by mechanical separation of the various particles of soil, and such I have made one of the preliminary steps in the operations of analysis.

Three different kinds of sieves were selected, the first of which has meshes 1-12 of an inch, or one line in diameter, and is made of copper wire. The second is a sieve of nearly double the fineness of the above, having openings of the meshes 1-20 of an inch. The third is a very fine gauze sieve, with openings not more than the 1-50 of an inch.

By sifting the soil, we can then obtain four different divisions of the particles, which I divide into different grades, beginning with the coarse matter left on the sieve No. 1, and so on.

After these operations, the next is to be effected by agitating the finest soil which passed the fourth sieve with a quantity of water, and then pouring off the suspended matter from that left at the bottom, after ½ minute's repose. This gives us two other degrees of fineness, or the fifth and sixth divisions.

One thousand grains of each specimen was taken for each analysis, and each proportion of divided matter was weighed in the balance. For example, let us take a specimen of a soil from Major Stone's farm, in Waterford, taken from his luxuriant wheat-field, six inches from the surface.

This soil is of a yellow loam of mellow texture, and remarkably fertile, having on it a crop of wheat, which will probably measure more than thirty bushels to the acre. This soil had been limed four casks to the acre, and was also manured from the barnyard to a small extent. One thousand grains divided as follows :—

No. 1—does not pass the coarse sieve, and consists of gravel derived from granite rocks, sticks and roots. No. 1, = 175 grains.

Does not pass 2d sieve—fine sand and vegetable fibres. No. 2 = 240 grains.

Does not pass the third sieve—No. 3 = 20 grains.

Fine powder which came through the gauze sieve. No. 4, = 565 grains.

No. 1 =	175	
2 =	240	
3 =	20	
4 =	565	1000.

This fine powder, agitated with a pint of water, and turned off in 30 seconds, left fine sand. No. 5 = 249, matter not suspensible. Matter suspended, No. 6 = 316.

This will give an idea of a mechanical analysis of soils. These operations show the texture and relative fineness of the materials, which throws great light upon their peculiar properties.

Chemical analysis of soil from Major Stone's farm, Waterford.—One hundred grains of the finest powder, analyzed, gave the following results :—

Water,	05.0
Vegetable matter,	14.0
Silica,	65.0
Alumina,	10.0
Oxide of Iron,	2.0
Oxide of Manganese,	1.5
Phosphate of Lime,	1.0
Carb. Lime,	1.5
	100.0

This soil is remarkably productive, and is in a high state of cultivation.

Analysis of soil from the farm of Moses Emery, Esq., of Saco.—This soil yields 40 bushels of corn to the acre. It is a yellow, sandy loam, and was evidently derived from granite rocks. One thousand grains, by mechanical analysis, give the degrees of composition as per method above described—

1st, sticks and roots,	5
2d, coarse gravel,	13
3d, fine gravel,	40
4th, fine sand,	17
5th, fine powder, &c.	856
	1000

Of this fine powder there are—

Matters suspensible in water,	122
Matter not suspensible,	780
Vegetable matter which floats on the	

surface of water,	23
	925

Alluvial Soil, Hooper's farm, Aroostook river. It is a fine yellow loam, very luxuriant, and productive, of wheat, potatoes, &c.

Mechanical analysis—

1st degree,	0
2d, vegetable fibres and coarse sand,	4
3d, " " fine sand,	9
4th, very fine loam,	987
	1000

Chemical analysis gives the following results—

Water,	4.9
Vegetable matter,	4.0
Silica,	76.0
Alumina,	5.0
Per ox. iron and alumina,	10.9
	100.9

In 100 grains there are—

Insoluble matter,	77
Soluble "	23
	100

Soil of Phipsburg Basin, Dea. Hutchins' Farm. Mechanical analysis on 1000 grains—

1st deg. of fineness, veg. fibres and pebbles,	50
2d " "	90
3d " "	40
4th " "	920
	1000

Chemical analysis of 100 grains—

Water,	6.5
Vegetable matter,	11.5

Silica,	60.0
Manganese,	4.0
Alumina,	11.0
Ox. Iron,	2.0
Lime,	1.0
Potash,	1.0
Magnesia,	3.0
	100.0

Analysis of Soil from Dodge's Mountain, Thomaston.— Dark red brown color; growth, black oaks, grass, rye—luxuriant. Rocks around, manganesian mica slate.

Mechanical analysis—

1st, particles of slate, pebbles, and little pieces of manganesian slate,	206
2d, silicious gravel,	175
3d, fine sand,	10
4th, very fine powder,	609
	1000

Chemical analysis on 100 grains of the fine powder—

Water,	6
Vegetable matter,	13
Silica,	51
Alumina and Magnesia,	15
Ox. Iron,	12
Manganese,	6
	101
Gain from moisture,	1
	100

Wiscasset. Soil remarkable for the excellence of its potatoes.

Mechanical analysis of 1000 grains—

1st deg. of fineness, veg. fibres and sticks, 10

2d deg. of fineness, veg. fibres and sticks,		10
3d "	"	20
4th, "	" fine mould,	960
		1000

Chemical analysis on 100 grains of the fine powder—

Water,	4.0
Vegetable matter,	10.0
Silica,	58.0
Alumina,	14.0
Magnesia,	12.0
Ox. Iron,	2.0
	100.0

Chemical analysis of fine alluvial soil, of an ash-grey color, from the Oxbow of the Aroostook river, not cultivated—

Water,	8
Vegetable matter,	5
Oxide Iron,	3
Alumina,	20
Silica,	61
Carb. Lime,	2
	99
Loss,	1
	100

Analysis of soil from Fairbanks's farm, Presq' Isle river, near the Aroostook: yellow loam, mellow, not adhesive ; no stones in it ; produces 35 bushels wheat the acre.

Water,	4.0
Vegetable matter,	4.5
Ox. Iron,	4.5
Silica,	76.0
Alumina,	10.0

Carb. Lime,	1.0
	99.5
Loss,	.5
	100.0

The black vegetable mould upon the surface of this soil contains 26 per cent. of vegetable matter, and the remainder is yellow soil like that above reported. This vegetable matter, when treated with boiling water, gives 5 grains of vegetable extract which possesses the properties of *ulmine*.

Soil from Peter Bull's Estate, on the Aroostook River.

Mechanical analysis of 1000 grains—

1st, pebbles,	525
2d, fine sand,	330
3d, "	25
4th, fine powder,	130
	1000

CAPABILITIES OF SOILS—VEGETABLE PHYSIOLOGY.

It is evident that plants are not endowed with creative powers, and consequently are unable to produce any new elementary substances; hence the various substances which enter into their composition, must be derived from the air, water or earth. All the saline and earthy matters which they contain are readily traced to their origin in the soil; while the carbon, hydrogen, oxigen and nitrogen that exist in them, are elements which they draw from air, water, and the animal and vegetable substances used as manures.

The atmosphere is composed chiefly of the two gases, nitrogen and oxigen, mixed together in aeriform solution, in the proportion of four-fifths nitrogen and one-fifth oxigen; besides which gases there is always a certain proportion of carbonic acid gas, amounting to $\frac{1}{10,000}$ part, and variable proportions of aqueous vapor.

From the carbonic acid gas of the atmosphere, plants derive a large share of their carbon, which is the basis of all vegetable matter. Some of it is also furnished by the fermentation of vegetable and animal substances, which decompose in the soil, and this gas is either decomposed by the leaves of vegetables, or is carried into their roots by aqueous solution and absorption. All fresh growing plants decompose the carbonic acid of the air, take up its carbon, and exhale oxigen gas, and this operation goes on more rapidly while the sun shines upon them. In darkness, plants give out carbonic acid, but the quantity is relatively small, when compared with that which they absorb during the day. So that if a plant is grown under a bell glass, containing air mixed with this gas, the carbonic acid is soon removed, and replaced by pure oxigen.

Thus vegetation is continually removing a substance deleterious to man and all animals, and replacing it by pure vital air—a gas absolutely necessary for their respiration. This beautiful law of nature should never be lost sight of by the farmer, nor should he ever forget the relation which the green woods and fields bear to the healthfulness of the country.

Seed will not germinate, without the joint action of air, water, light, and heat. Without these essential conditions, the germ remains, as it were, asleep for an unknown length of time. Seeds, taken from the tombs of ancient Thebes, in Egypt, where they had remained in a dry, dark, and sequestered spot for more than three thousand years, were found still to possess their vital properties, and when planted in a botanical garden in London, sprang forth, to flourish in the present age. How long a seed, thus immured in darkness, shut out from all the causes which would produce germination or decay, would remain alive, is wholly unknown; but from the known facts respecting spontaneous rotation of crops and of forest trees, it would seem that the seed remain buried in the soil for enormous lengths of time, before the circumstances necessary for their putting forth, arrive. Dead leaves of the forest shut out light, and preclude, in some measure, the influence of the atmosphere, while the sombre foliage hangs over the soil, and serves, by its shade, as an additional cause preventing germination. Thus, I suppose, the seed, buried in the forests, remain dormant until the removal of the shade trees, or the burning of the leaves, gives free access to the causes requisite for germination and growth of the hidden plants ; and we consequently perceive a new growth almost invariably follows the removal of the primeval forests. According to Decandole, plants exude from their rootlets certain substances, which have the property of eventually eradicating their own species, while they are not preventive of the growth of other plants ; hence he accounts for natural rotation. It is probable, also, that one kind of vegetables may exhaust their proper nutriment, and thus render the soil incapable of supporting their kind, while there are other principles left suitable for the support of different species. This subject is, however, the most obscure department of vegetable physiology, and one which demands the labor of modern chemists and botanists. Thus much we know, that the conditions above stated are essential requisites to healthy vegetation, and that the soil must furnish certain substances not attainable alone from air and water. When we analyze a plant, we always find a certain quantity of silex, alumina, lime, and potash, forming a large proportion of the ashes which is left on burning the plant. All these matters are contained in the soil, in greater or less proportions, and some of them are essential to the growth of the plants. The coating of wheat, rye, and barley straw is silex, and gives the necessary strength and hardness to the stalk.

The analysis of the grain of wheat gives a large proportion of the carbonate and phosphate of lime, and we know that this grain only thrives upon a soil containing calcareous matter. It was long ago observed in Massachusetts, and is also seen in certain districts in Maine, that wheat straw grows very well, but the grain does not fill and present a plump and solid appearance, but looks wilted, and is not heavy. This was formerly supposed to be owing to the climate, but on more careful examination it is found to arise from the want of lime in the soil. Many animal manures contain a little of this substance, and it accordingly appears, that where a farm is well manured, wheat will grow well upon it, but a large annual expenditure is required for the purpose. It is observed, that all the grain regions of the country have soils more or less calcareous, and we find, that, by adding lime to the soil, we may produce by art the material wanting; and it appears by the analyses here presented, and by the results of certain experiments which have been made in France, and repeated here, that a very minute proportion of lime is amply sufficient for the purpose. Thus one or two per cent. of carbonate of lime will answer the purpose, and this small quantity costs so little, that any farmer can well afford to apply it to the soil. Indeed, I do not see how he can afford to do otherwise, since he will be a loser, and his more skilful neighbors will be enabled to supply the market, while he will not be able to to recover his seed.

It is a great mistake to suppose, that wheat will grow in any soil; for I know, that in many instances, the crop raised the past season, which has certainly been very propitious, did not equal in value the seed sown; and these instances all occurred where the soil was destitute of lime, and was not largely manured.

Unless you wish to waste your labor upon barren and unproductive fields, attend carefully to the nature of your soil, and supply those elements which are wanting, in order to render it fruitful.

When lime is moistened with water, it becomes hot, swells, and falls into a bulky white powder, called by chemists the hydrate of lime, it being composed of water combined with that substance in a solid state. This powder, if the lime is of good quality, will amount to nearly three times as much as before it was slaked, so that one cask of lime will fill three casks with the hydrate, or water-slaked lime. If, on the other hand, the lime is exposed to the action of the air, it will attract carbonic acid gas, and become air-slaked, which operation re-converts it into its original chemical state. The hydrate also attracts carbonic acid from the air, and is likewise converted into the carbonate, which will weigh nearly twice as much as the quick lime, from which it is made.

I mention these evident facts, in order to assure the farmer, that when he buys a cask of lime, it will make about three of the article which he uses as a manure, and consequently, that it is not so expensive as he might imagine, since it increases in bulk, and will cover a considerable surface. Moreover, by a skilful management, the farmer may, by the use of lime, form a vast number of valuable composts, and may destroy, or not, as he pleases, the seeds and insects in his compost or barn manure. It also has the power of decomposing animal and vegetable substances, the extent of which operations, a skilful hand can regulate at will, and a great variety of valuable saline compounds, the most active of manures, may be formed. There are many cases, also, where the combining power of this substance can be taken advantage of, in the neutralization or removal of deleterious matters, and by judicious management, those very principles may be converted into valuable manures.

The following table shows the relative strength of several different kinds of limestone found in Maine during the past season; 100 grains being the weight of each stone analysed.

LOCALITY.	KIND OF ROCK FORMATION.	INSOLUBLE MATTER, PER CENT.	CARB. LIME PER CENT.	QUANTITY PURE LIME PER CENT.
Buckfield,	Beds in gneiss resting on granite rocks.	49.	51.	28.71
Winthrop, Mr. Boll's farm,	" "	43.	57.	31.94
Hallowell,	" "	42.	58.	32.60
Newfield, impure kind,	" "	26.	74.	41.10
" purer, Davis' farm,	" "	19.	81.	45.41
Norway,	" "	38.	62.	34.80
Bluehill,	" "	31.	69.	38.70
Paris,	" "	18.	82.	46.12
Whitefield,	" "	5.	95.	53.50
Union,	" "			

It is a common practice among farmers to make use of peat, pond mud, or muck, as they call it, and I have observed instances in which it was evident that the soil was greatly injured by its application. In one instance, I observed in Waterford, that a portion of the field on which this substance was placed, presented a dwarfish and sickly yellow crop of Indian corn, while that part of the field not treated by it, was covered with a most luxuriant and healthy growth of the same corn. The operation was tried experimentally, in order to ascertain the value of peat alone as manure.

If it had first been made into a compost, with animal manure and lime, it would have presented very different results. Lime alone on peat merely renders its acid properties inert, and then it answers pretty well as a manure. But if laid down in layers with barn-yard manure, night soil, dead fish, or any other animal matter, and then each layer is strewed with lime, a most powerful fermentation will take place, and a vast quantity of ammonia will be disengaged, which combining with the ulmic acid of peat, will form ulmate of ammonia, a most powerful manure. Carbonate of ammonia, and many other salts, will also result, which convert the whole mass into the very richest kind of manure, forming what may be properly called a universal compost.

If the farmer is desirous of destroying the seeds and insects in barn yard manure, let him heap it up in alternate layers, with fresh quicklime, and the heat generated will effectually destroy them. This operation produces a number of soluble salts, and therefore it should only be done where the manure is soon to be used, for the rain would remove them in solution.

If a soil is charged with sulphate of iron, it is best to use quicklime in powder sprinkled on the surface of the soil, for its action is the more rapid and powerful. Generally, however, it is proper to slake the lime with water, and then to expose it freely to the air, in case it is to be sown broad-cast, so that it may become carbonated, which renders it more permanent, it being less soluble in water.

In general, it may be stated, that about four casks of lime are required for each acre of land, and according to the experience of M. Puvis, this quantity, in many cases, was found amply sufficient. If the soil is loose and sandy, without any clay bottom near the surface, it is evident that annual renewals will be required, until the desirable quantity is obtained.

The following tables shew the amelioration of soils in France, where liming has been very successful; and where it has been found that 3 per cent. of lime in the soil was amply sufficient to render it extremely luxuriant. It will also be remarked, that the beneficial effects of this treatment were even more strongly marked on the rye crops than on those of wheat. It is found, also, that lime succeeds best when used in a compost of animal and vegetable matter, and where this method is pursued the soil becomes annually richer, instead of being exhausted.

Years.	Table of Product of the Domain of La Croisette. Rye. Seed.	Rye. Product.	Wheat. Seed.	Wheat. Product.	Table of Product of the Domain of La Barronne. Rye. Seed.	Rye. Product.	Wheat. Seed.	Wheat. Product.
1822	110	600	24	146	110	505	22	180
1823	110	764	24	136	110	643	22	138
1824	110	744	24	156	110	662	24	149
1825	107	406	27	251	102	398	32	252
1826	106	576	28	210	110	612	32	187
1827	100	504	30	249	107	546	34	204
1828	90	634	36	391	98	696	38	243
1829	82	538	48	309	84	608	40	268
1830	60	3[illegible]7	60	459	91	389	59	374
1831	78	350	40	417	92	411	40	295
1832	55	478	68	816	70	512	80	649
1833	61	529	52	545	75	511	51	471

Marl may be used in the same manner as air-slaked lime, and it is found to possess similar properties. Sea shells may be used when broken to pieces by the action of fire, or by frost, and great benefit is gained by such a dressing. Shells owe their fertilizing properties to the carbonate of lime, of which they are chiefly composed, but their compact texture requires to be broken down in the manner alluded to.

Burnt bones contain a small quantity of carbonate, mixed with a large proportion of the phosphate of lime, and may be advantageously used. Bones ground to powder have also a very powerful and desirable influence, forming one of the most valuable top-dressings with which we are acquainted. The refuse bone black, from sugar refineries, is also extremely powerful, and is one of the warmest and strongest manures known. It is highly prized in France, and I have formerly mentioned the fact that orders were even sent to this country for this article. It may be made into a compost with other matters, since it is too strong to be used alone.

Gypsum is said to operate well as a stimulant to vegetation, and acts powerfully where the soils are calcareous. In Pennsylvania, it is sown broad-cast upon their limestone soils, and operates powerfully, favoring the growth of grain and grasses. In Maine, it is the general opinion of farmers, that this mineral does not succeed upon the sea-coast, while it answers a good purpose in the interior of the State. I am not yet prepared, however, to report upon the subject, since I have not been able to gather the requisite number of facts.

I will venture to say, however, that gypsum will prove an advantageous dressing to the soils near Houlton, New Limerick, and along the whole course of the Aroostook, while, if it should be required, the Tobique river, opposite the mouth of the Aroostook, contains upon its banks an inexhaustible supply. It will, however, seldom be necessary for many years to apply any manures to the Aroostook soils, for the farmers there only complained that the soil was too rich at first, and when reduced by several years' cultivation, was more easily managed. I have no doubt of the truth of this observation, for upon Mr. Fairbanks's farm, on that river, I observed gigantic wheat stubble, one straw of which measured 1⅓ inch in circumference, and Mr. F. remarked, that new crops were frequently *laid* by their weight, before they were ready to reap.

I have no doubt, that in the course of time, it will be found advantageous to burn the Aroostook limestone, for the treatment of the soils, where they are devoid of it, and every advantage is there presented for this purpose.

The limestone of Newfield, Norway, Paris, and Buckfield may be advantageously used for manure, and can be burned by means of peat or wood. On the sea-coast it will be more economical to purchase Thomaston and Camden lime, unless it should be found, that lime-burning can be carried on on a large scale by means of peat or hard coal.

There are so many localities of peat in Maine, that I hardly have thought it necessary to describe them, but I would, however, point out the localities.

1st. On the rail-road route in Bangor.

2d. At Bluehill.

3d. Near the Marsh quarry in Thomaston.

4th. In the town of Limerick, in York County.

5th. In the town of Waterford, in Oxford County, on the Coolidge farm.

These localities are among the most abundant, and may be most advantageously wrought for fuel, which may be used for the burning of lime and for domestic use, besides which it may be converted into a powerful manure, adapted admirably for loosening and enriching clayey soils.

Artificial meadows formed upon the surface of a peat bog, are always exempt from drought, and they are remarkably fertile. They may be made by carting soil upon them, and will amply repay the labor. Any person who is desirous of seeing a fine example of an artificial meadow of the kind I have mentioned, is referred to the rich farm of Benj. Bussey, Esq., Jamaica Plain, Roxbury, Mass., where that enterprizing agriculturist has formed an almost evergreen meadow, of the kind alluded to above.

I may remark in general, that all the soils between Bangor and the mouth of the Kennebec, evidently need liming to greater or less extent; and the vicinity of Richmond, Gardiner, Vasssalborough, Unity and Dixmont, evidently would be highly improved by its judicious application.

When we have learned by chemical analysis the composition of the most remarkable soils of the State, we may be enabled to give specific directions for their amelioration. Much light may be gained respecting their relative fertility by the agricultural returns made under the orders of the Legislature, and if due attention is paid to the filling of the blanks sent out to the treasurers of the various towns, we shall have an admirable statistical view of the relative value of the various soils in different parts of the State.

It will be useful to send out printed blanks for other kinds of produce besides wheat, so that we may learn what are the present agricultural capabilities of the State, and in another year we can furnish more extended and accurate information on this very important subject.

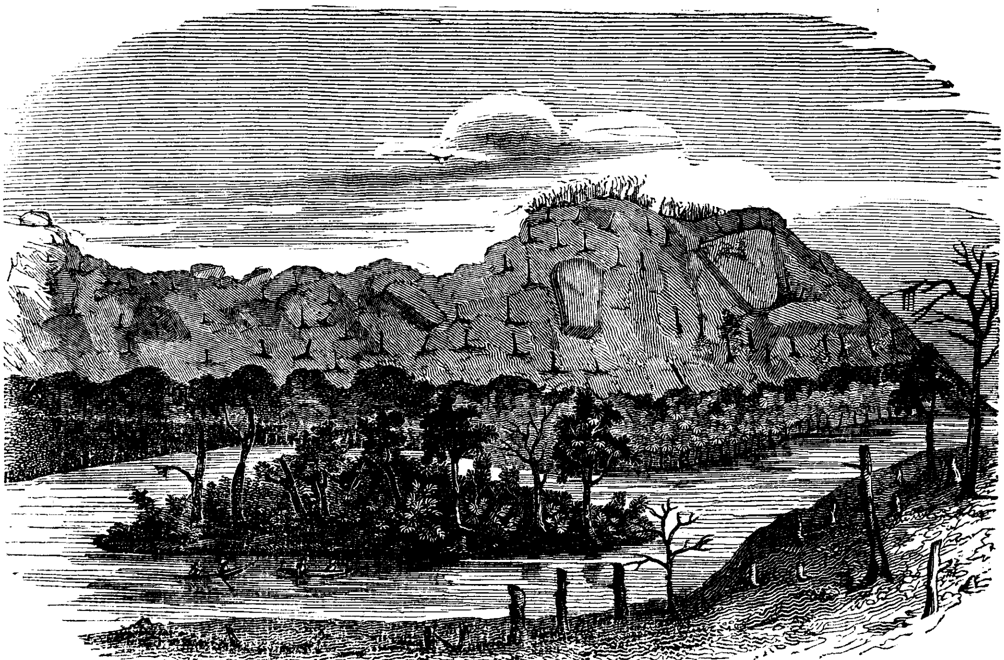
Geology and chemistry are capable of furnishing powerful aid to the farmers, and if we are allowed sufficient means to accomplish the work in a satisfactory manner, immense benefits will necessarily accrue to the citizens of Maine.

Respectfully submitted,

By your obedient servant,

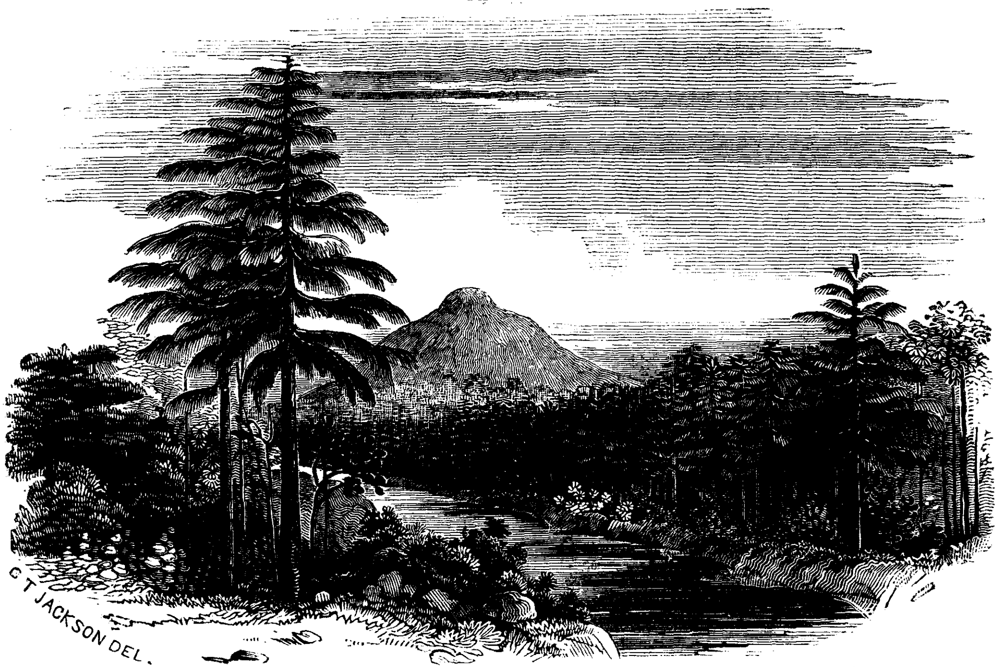
C. T. JACKSON.

PLATE 1.



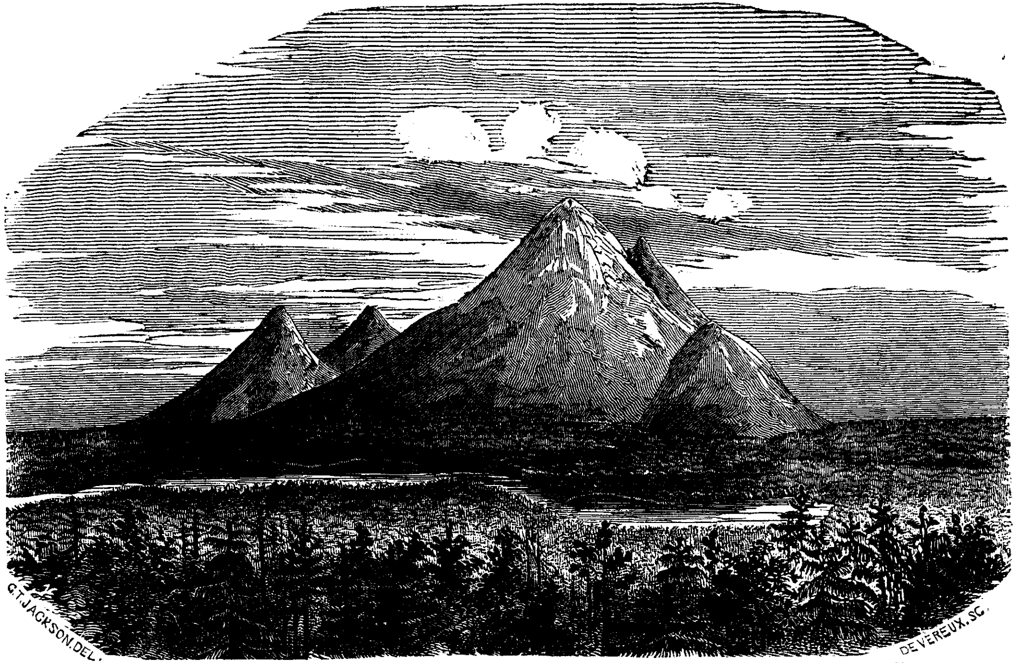
View of the Eagle's Nest, (Sow-on-ga-was) or "Peaked Mountain," bearing N.N.W. from east side of Seboois River. Mountain 660 feet high from river at base. Rocks coarse conglomerate or grau-wacke, greenstone trap, &c. Slope 36°. Strata dip S.E. 80°.

PLATE 2.



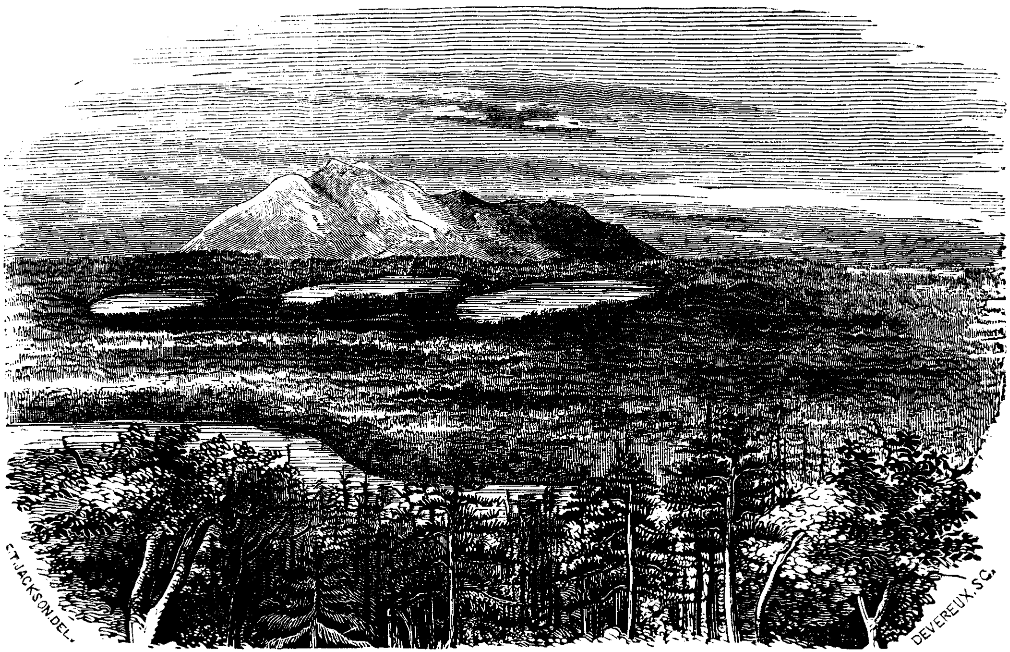
View of Sugar-loaf Mt. from the Seboois river. Rocks grau-wacke, slate and greenstone-trap, with beds of jasper.

PLATE 3.



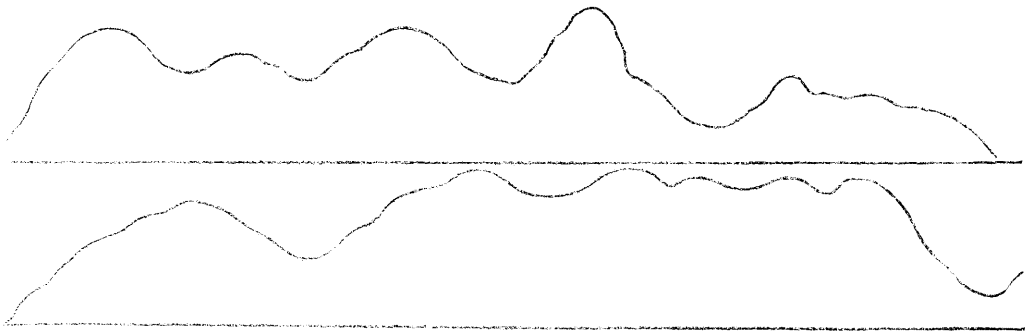
View of Chase's Mountain from the summit of Sugar-loaf, bearing S. 75° E.

PLATE 4.



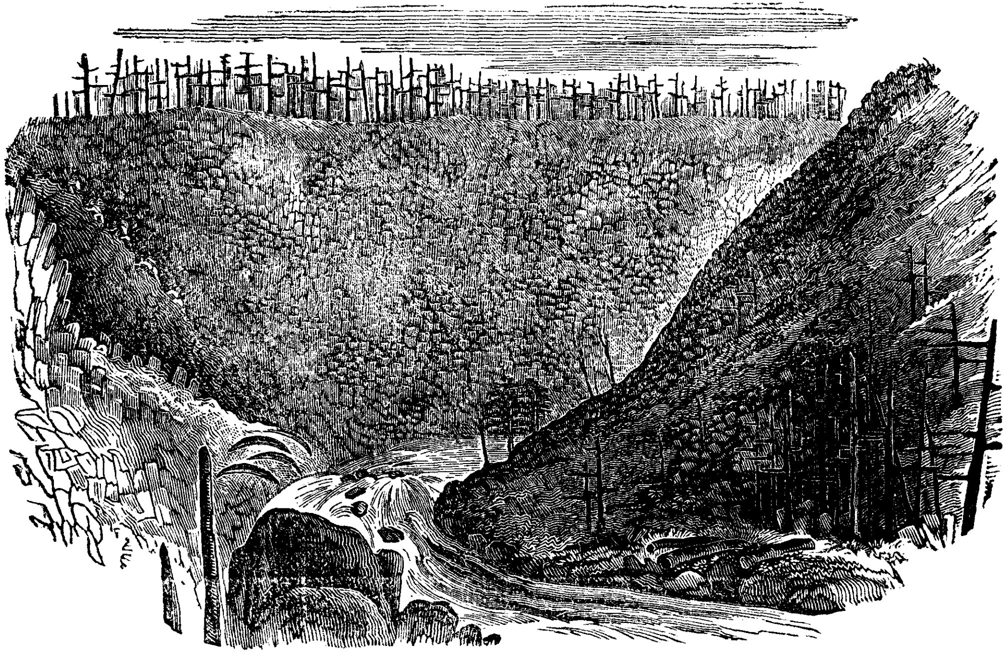
View of Mt. Ktaadn from the summit of Sugar-loaf Mt., bearing S. 6° W. Granite.

PLATE 5.



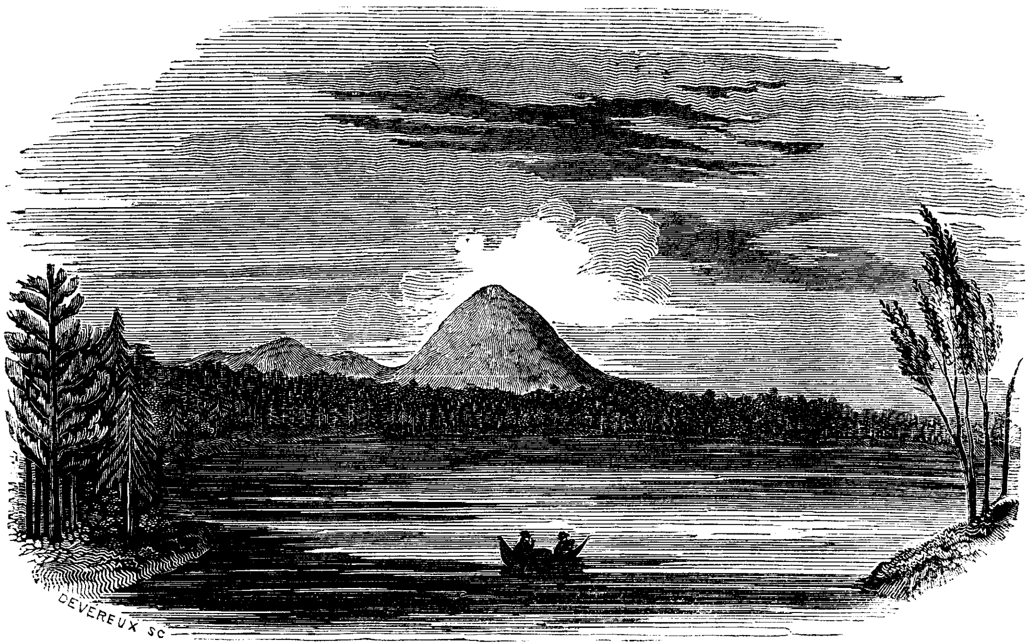
Outlines of a range of unknown mountains, bearing between N. 40° and 50° W. from Peaked Mountain, on Seboois River.

PLATE 6.



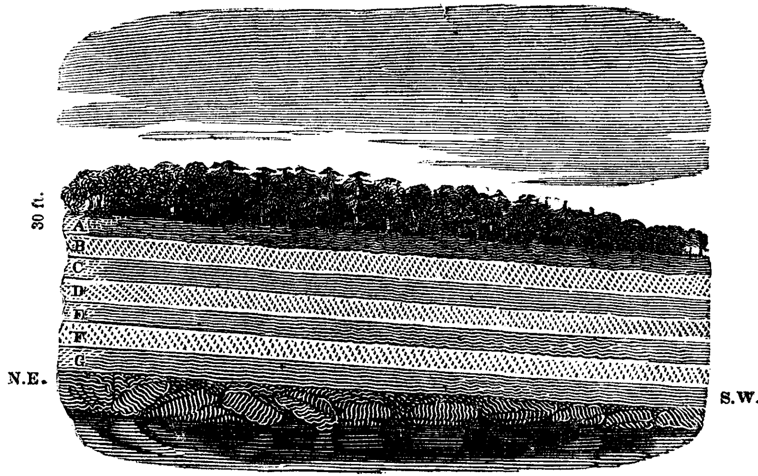
Godfrey's Falls, and the carryin; place over the ledge of slate rocks. Slope 45°.

PLATE 7.



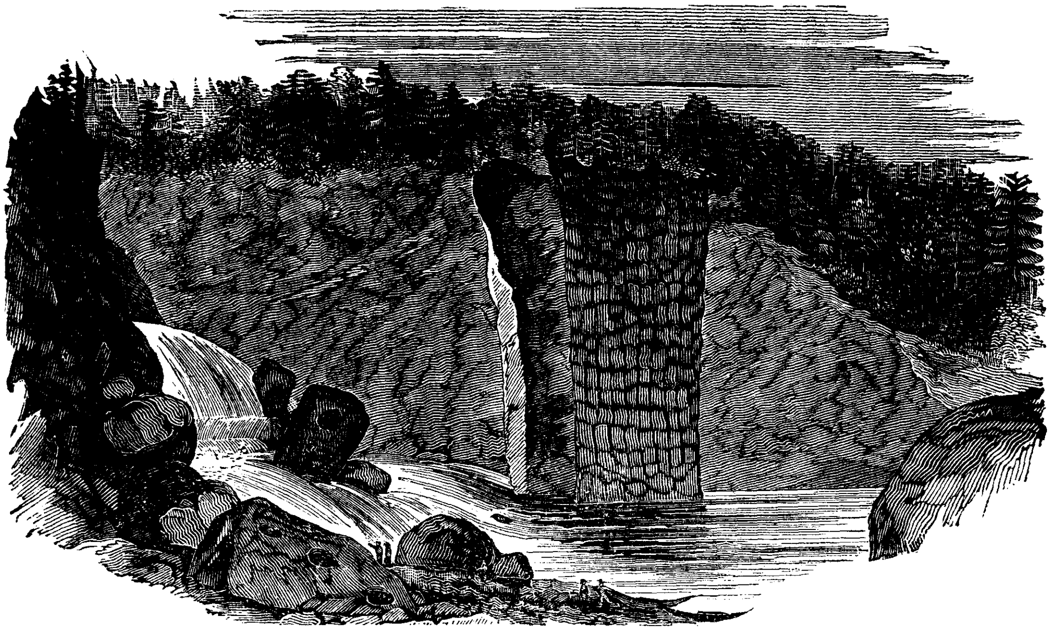
View of Aroostook Mountain from Upper Seboois Lake.

PLATE 8.



Disposition of strata on Aroostook River, near Dalton's. Dip S. W.
A C E G—Grey and blue limestone.
B D F—Fine grauwacke and grauwacke slate, with remains of Favosites Caryophyllites, Terebratulae Spiriferae and Fuci. The grauwacke slate is glazed with carbon.

PLATE 9.



View of Aroostook Falls from below. Rocks argillaceous slate, limestone and trap dykes.

APPENDIX.

REMARKS ON THE BAROMETRICAL TABLES,

WITH DIRECTIONS FOR USING THEM.

The following tables have been drawn up during the summer of 1837, and contain an account of the height of the mercurial column in the Barometers at stations in various parts of the State, together with records of the temperature of the instruments and of the air, at the time of each observation. Many interesting meteorological remarks are also appended to several of the tables.

All persons conversant with Barometry, will at once understand the importance of arranging a line of stations for the observations, in such a manner as to give the height of the mercurial column in different places on a sectional line running across the State; and will perceive that our stations were so arranged as to guard against errors, which might arise from local atmospherical changes.

It is with great pleasure that I am able to acknowledge the valuable services of those gentlemen, who have aided us in obtaining these important records, and I beg leave to present them my thanks for the services which they have freely rendered to me and to the State.

The first step in making Barometrical measurements, in an accurate manner, is to obtain such instruments as are perfectly free from atmospheric air, and it is essential that the mercury should be boiled in the tubes, so as to expel every bubble of air from them. When this is done, on inclining the Barometer suddenly, the mercury will *strike the top of the tube with an audible metallic click*, and *no space* will be discovered which is not entirely filled by the mercury.

The next object is, to provide against any loss of mercury from the cistern, and to have the means of confining it so that it cannot move while the instrument is carried. If Sir H. Engleford's Barometer is used, it is requisite to *cover* the *leather bag* with a very thin layer of blown *sheet india rubber*, which is impermeable and elastic, so that no rupture can take place on pressing with the thumb-screw.

The thermometers must also be perfectly true, and ought to be carefully compared with a correct standard instrument, throughout the scale.

After attending to the above circumstances, the Barometers and thermometers must be compared with those left at the several stations, and their differences must be noted, and corrections are to be made accordingly—by adding or subtracting the difference, as the case may require.

It is obvious that when due precautions are taken, that no error of any magnitude can arise in Barometrical levelling, and that such measurements are sufficiently accurate for the construction of Geological profiles, and for the measurement of the altitudes of mountains, by which we can form a correct idea of the true relief of the country. The height of each of the stations recorded, may be readily calculated, by means of OLTMAN'S TABLES, which may be found in the Geological Manual by Henry De La Beche, and in the French *Annuaire du Bureau des Longitudes*, or those who prefer the Logarithmic method, will find the requisite rules in Rees' Cyclopedia, and in various other works which treat upon the subject of Barometry.

OLTMAN'S tables are now generally preferred in Europe, and they are extremely convenient, and easy of calculation, insomuch that any person may calculate the height of a mountain from the Barometrical height, in a few minutes, after collecting the data.

In the Geological Reports, which I have had the honor to present, may be found the results of several of the most important observations, and the remainder will be calculated as occasion requires. They will serve as the basis of the Geological profiles, which we shall have occasion to draw, in the regular progress of the survey, and will be presented to the Government, with a Geological map, when that part of the work is completed.

1st. The first station Barometer belongs to Rev. Solomon Adams, of Portland, and is placed at the height of 121 feet above high water mark, in Portland. This sum then must be constantly added to each of the heights, calculated from that station.

My Barometer placed beside his, June 14th, stood at

	Inches.
	30.05 T. = 64° F.
Mr. Adams',	30.00 T. = 64° F.
	00.05 difference;

which sum is to be *added to his* observations, or *subtracted from mine*, constantly.

2d. At Brunswick, in Professor Cleaveland's study, June 15th, 11 A. M.

	Inches.
My Barometer stood at	30.02 T. = 62° F.
Prof. Cleaveland's,	29.77 T. = 62° F.
	00.25 difference,

additive to his observations, or *deductive from mine*, in calculating from that station.

3d. At Gardiner, 16th June, at noon, Mr. R. H. Gardiner's Barometer and mine compared at his house.

	Inches.
Mine stood,	29.85 T. = 65° F.
Mr. Gardiner's,	29.82 T. = 65° F.
	00.03 difference,

additive to his or *deductive from my observations*, in calculating from that station.

The slight differences in the instruments above noted, arise from the difference in the height of the mercury in the cisterns, and their general agreement is a proof that all the Barometers were in good order.

At Bangor, one of my Barometers was left at the Land Office, and was observed by Oliver Frost, Esq., and the difference of the instruments was 00.10 inch—*to be added to Mr. Frost's observations*, in calculating the height of my stations above the Land Office.

Now suppose we wish to know the height of any of the stations where the observations were made, we have but to compare the Barometrical heights and temperatures on the day and hour given, and take out the figures corresponding in Oltman's tables, and make the calculation with due corrections as therein stated. Then, if we calculate from Mr. Adams' observations, we must add 121 feet, the height of his instrument above the sea level to have the height above the tide waters at Portland.

The elevation of each of the stations, where a *series of observations* were made, may be very exactly ascertained by taking the *mean* of a number of them, which will give a more certain result, than any single set of observations. By running the eye over all the tables on a given day and hour, any local atmospheric changes may be noted, and their value appreciated.

TABLE I.

BAROMETRICAL AND THERMOMETRICAL OBSERVATIONS.

Made at various points in the State of Maine, during the Geological Survey in 1837. Intended to serve for calculating a profile of heights for geological sections; also for the calculation of the heights of remarkable mountains.

BY C. T. JACKSON.

Date.	Hour.	Where the observations made.	Barometer.	Tem. Inst.
June 14	10 A.M.	Portland, S. Adams' house,	30.050	66°
15	11 A.M.	Brunswick, Prof. Cleaveland's	30.020	62
16	7 A.M.	Augusta, Barker's Hotel,	30.000	62
16	10½ A.M.	Gardiner, level of river,	30.060	78
16	10½ A.M.	Top of clay bank, near bridge,	29.980	74
16	12 M.	Gardiner's house, Gardiner,	30.000	66
16	5½ P.M.	Merrick's house, Hallowell,	29.836	64
17	9 A.M.	Vassalboro' Hotel,	29.980	60
17	10½ A.M.	China Hotel,	29.880	62
17	1 P.M.	Unity Hotel,	29.870	64
17	3½ P.M.	Dixmont Hotel,	29.580	58
17	5¼ P.M.	Hampden,	29.824	62
18	7½ A.M.	Bangor, Franklin House,	30.050	60
18	9 A.M.	Bangor, " "	30.014	60
18	1 P.M.	Bangor, " "	29.950	62
19	7 A.M.	Bangor, " "	29.920	64
20	7 A.M.	Bangor, " "	30.000	64
22	7 A.M.	Bangor,	29.650	64
22	2 P.M.	Bangor,	29.600	66
23	7 A.M.	Bangor,	30.050	67
23	1 P.M.	Bangor,	30.100	76
24	7 A.M.	Bangor,	30.100	74
24	10 A.M.	Bangor,	30.090	68
24	2 P.M.	Bangor,	30.020	67
24	5 P.M.	Bangor,	29.970	66
24	10 P.M.	Bangor,	29.970	67
25	7 A.M.	Bangor,	29.870	68
25	9 A.M.	Bangor,	29.900	69
26	7 A.M.	Bangor,	30.000	68

June	26	9 A.M.	Level of Kenduskeag at mouth,	30.070	60°
	26	9½ A.M.	Land Office,	30.000	67
	26	10 A.M.	Level Penobscot river opposite Exchange Hotel,	30.114	63
	26	7½ P.M.	Marsh Bay, Frankfort, Sawtell's tavern,	30.058	64
	27	7 A.M.	Marsh riv. 25 ft above tide level	30.180	62
	27	9½ A.M.	Mt. Waldo, D. Walden's house	29.650	68
	27	10 A.M.	Mt. Waldo, summit,	29.080	64
	27	1 P.M.	Marsh river, Waldren's tavern,	30.122	66
	27	3¾ P.M.	South branch Marsh river, high water level,	30.100	66
	27	4¾ P.M.	Mosquito Mt. summit,	29.450	62
	27	5½ P.M.	Mosquito Mt. summit,	29.430	59
	27	8½ P.M.	Bucksport,	29.850	64
	28	7 A.M.	Bucksport,	29.900	66
	28	8 A.M.	Level high water, Bucksport,	29.980	66
	28	1½ P.M.	Level high water, Castine,	30.040	68
	29	8½ A.M.	Castine, Little's Hotel,	30.150	62
	29	10 A.M.	Level high water, Castine,	30.230	64
	29	4 P.M.	Level high water, Prospect,	30.160	64
	31	7 A.M.	Bangor,	29.790	75
July	3	1 P.M.	Bangor,	29.980	70
	4	6½ P.M.	Belfast, Pierce Hotel, 3d story	29.650	64
	5	10 A.M.	Belfast, top of hill,	29.522	66
	5	10 A.M.	Belfast, sea level, high water,	29.776	65
	5	4 P.M.	Northport, level of sea,	29.850	68
	5	5 P.M.	Northport, sea level,	29.830	67
	5	5 P.M.	Northport, top of Mt.	29.306	67
	6	7 A.M.	Belfast Hotel,	29.750	66
	8	8¾ A.M.	Bluehill bay, level high water,	30.012	69
	8	11 A.M.	Summit Bluehill mountain,	29.018	70
	8	1½ P.M.	Bluehill bay, level high water,	29.950	82
	20	10 A.M.	Thomaston, level high water,	30.000	74
	20	11½ A.M.	Thomaston, sum't Dodge's Mt.	29.370	75
Aug.	9	1 P.M.	Portland, Cumberland House,	29.880	71
	9	5 P.M.	Portland, " "	29.780	70
	9	11 P.M.	Portland, " "	29.600	70
	10	7 A.M.	Portland, " "	29.650	70
	10	12 M.	Portland, " "	29.750	69
	10	7 P.M.	Saco, Stage House,	29.966	67
	11	7 A.M.	Saco, " "	30.150	66
	11	7 P.M.	Kennebunk, U. S. quarry,	30.170	66
	11	8 P.M.	Kennebunk-port Hotel,	30.200	62

Aug. 11	8 P.M.	Kennebunk, level high water,	30.250	60°
12	3 P.M.	Kennebunk tavern,	30.216	63
13	7 A.M.	Kennebunk tavern,	30.250	65
14	7 A.M.	Kennebunk tavern,	30.250	63
14	12 M.	Kennebunk, Mr. D. Sewall's,	30.272	65
15	7 A.M.	York village tavern,	30.250	62
16	7 A.M.	York village tavern,	30.300	62
16	$10\frac{3}{4}$ A.M.	Cape Neddock Pond,	30.150	64
16	11 A.M.	Near Agamenticus, S. Lewis's	29.920	70
16	12 M.	Summit Agamenticus Mt. No.1	29.567	67
16	4 P.M.	Summit of 2d Mt.	29.636	62
	6 P.M.	York, level of sea,	30.212	62
17	7 A.M.	York, at tavern,	30.210	62
18	$9\frac{1}{3}$ A.M.	Portsmouth hotel,	30.170	68
18	1 P.M.	S. Berwick tavern,	30.120	78
18	$7\frac{1}{2}$ P.M.	Lebanon table land,	29.600	68
19	$7\frac{1}{2}$ A.M.	Lebanon " "	29.570	68
19	12 M.	Acton, Mr. Hubbard's house,	29.626	94
		Acton corner, E.P. Remmicks'	29.440	77
20	12 M.	Newfield, Drew's tavern,	29.670	72
21	7 A.M.	Newfield, " "	29.440	64
21	8 P.M.	Newfield, " "	29.300	68
22	7 A.M.	Newfield, " "	29.200	86
23	7 A.M.	Limerick, Mr. Adams' house,	29.350	$58\frac{1}{2}$
23	10 A.M.	Road to Parsonsfield near a lake	29.050	60
23	1 P.M.	Parsonsfield, Dr. Sweet's house	29.250	62
23	3 P.M.	Parsonsfield, " "	29.250	62
23	$8\frac{1}{2}$ P.M.	Cornish, O'Brien's hotel,	29.626	58
24	7 A.M.	Cornish, " "	29.626	56
24	$10\frac{3}{4}$ A.M.	Denmark corner,	29.530	62
24	12 M.	Denmark village,	29.514	64
24	$1\frac{1}{2}$ P.M.	Bridgton tavern,	29.580	69
24	5 P.M.	Waterford, Coolidge's house,	29.300	68
25	7 A.M.	Waterford, " "	29.250	60
25	$12\frac{3}{4}$ M.	Road near Norway,	29.600	68
25	1 P.M.	Norway, Pinnesawasset Pond,	29.800	68
25	$1\frac{1}{2}$ P.M.	Norway, Purrington's hotel,	29.820	70
26	7 A.M.	Paris Hill,	29.418	59
26	1 P.M.	Paris hotel,	29.418	64
26	$2\frac{1}{2}$ P.M.	Paris, Mr. King's house,	29.150	69
26	3 P.M.	Streaked Mountain summit.	28.378	63
26	4 P.M.	" " "	28.350	60
26	9 P.M.	Paris, at hotel,	29.320	60
27	7 A.M.	Paris, "	29.150	60

Aug. 27	10 A.M.	Paris, at hotel,	29.100	63°
30	7 A.M.	Paris, "	28.850	59
30	1 P.M.	Buckfield, Bridgham's tavern,	29.280	62
31	7 A.M.	Buckfield, " "	29.570	55
31	9½ A.M.	Hill on road between Buckfield and Turner,	29.350	68
31	11¾ A.M.	Turner, 1 mile from bridge,	29.677	74
	2 P.M.	Little Androscoggin Pond,	29.670	66
		Kent's Hill, Readfield, Mr. Larrabee's house,	29.500	56
Sept. 1	7 A.M.	Kent's Hill, Readfield,	29.540	53
	2½ P.M.	Winthrop hotel,	29.870	68
		Augusta, hill on Winthrop road	29.750	66
		Augusta, Mansion House,	29.990	66
2	1½ P.M.	Hallowell Hotel,	30.120	66
	2½ P.M.	Redington's U.S. quarry Hall.	29.780	60
	5 P.M.	" " "	29.680	60
	6 P.M.	Hallowell Granite Co's quarry,	29.676	62
3	7 A.M.	Augusta, Mansion House,	29.950	56
4	9 A.M.	Brunswick, stage house,	30.300	58
	1 P.M.	" " "	30.300	58
4	5½	Gardiner, R. H. Gardiner's,	30.450	64
	11 A.M.	Bowdoinham,	30.270	82
6	7½ P.M.	Brunswick basin,	30.500	68
8	7 A.M.	Portland, Deering's bridge,	30.324	68
8	8 A.M.	Westbrook, brickyard,	30.280	70
8	11 A.M.	Slide, Presumpscot summit,	30.250	80
8	1 P.M.	Summit of slide,	30.200	70
8	1 P.M.	Level Presumpscot river,	30.276	70
10	7 A.M.	Bangor, Franklin House,	30.330	70
10	6 P.M.	" " "	30.330	76
11	2½ P.M.	" Land Office,	30.200	73
11		Level Pen. river, high water,	30.200	70
	3½ P.M.	Bangor, Thomas's Hill,	29.870	74
12	7 P.M.	" Franklin House,	30.280	62
13	12 M.	Oldtown, level railroad depot,	30.450	54
14	8 P.M.	Sunkhaze, bank of river,	29.870	52
15	11 A.M.	Mouth of Piscataquis,	29.930	70
16	6½ A.M.	Na-ma-ka-mock Island,	29.840	44
	12 M.	Natham's Island,	29.850	56
17	7 A.M.	Mattawamkeag Point,	29.580	54
	1 P.M.	Salmon river,	29.550	68
	6 P.M.	Camp house,	29.420	68
18	7 A.M.	Camp house,	29.370	58

Sept. 18	5½ P.M.	Millinocket stream,	29.270	62°
19	7 A.M.	Camp on Millinocket stream,	29.220	58
19	2 P.M.	Camp on Millinocket lake,	29.060	59
	6½ P.M.	Millinocket carry,	29.170	50
20	7 A.M.	" camp, level of lake,	29.270	44
20	8 A.M.	Level of Ambejijis Lake,	29.280	45
	12 M.	" " "	29.370	60
	1 P.M.	" " "	29.400	58
	5 P.M.	Katepskonegan Lake,	29.440	60
22	9 A.M.	Island near Aboljocknagesic st.	29.490	44
	10½ A.M.	Approaching Ktaadn, 2d hill,	29.240	59
	1 P.M.	Aboljocknagesic brook,	28.820	60
	4 P.M.	Foot of slide, Ktaadn,	28.270	57
	5½ P.M.	Camp half way up slide, Ktaadn	27.770	50
23	6 A.M.	" " " "	25.550	36
	11¾ A.M.	Central peak of Ktaadn,	24.820	30

TABLE II.

BAROMETRICAL REGISTER,

Kept by Rev. Solomon Adams, Portland, Me. Height of the barometrical reservoir, 121.84 *feet above high water mark in Portland Harbor. Hours of observation,* 7 *A.M.*, 1 *and* 6 *P.M.*

Date—1837.	Hour.	Barom.	Tem. baro.	Tem. of air	Wind.	REMARKS.
June 19	7	29.95	64°	64°	NW	Clear.
	1	29.95	73	71	SW	Light clouds.
	6	29.95	72	71	SW	Hazy.
20	7	29.95	62	63	S	Cloudy.
	1	29.89	70	56	SE	Rainy.
	6	29.77	70	53	SE	Rainy.
21	7	29.60	63	57	SW	Clear.
	1	29.68	73	73	W	Light clouds.
	6	29.73	74	64	S	Cloudy.
22	7	29.59	66	56	NE	Rain.
	1	29.67	70	64	NW	Showers.
	6	29.93	72	68	NW	Clear.
23	7	30.10	68	64	SW	Clear.
	1	30.10	75	82	W	Hazy.
	6	30.10	76	78	SSW	Hazy.

June 24	7	30.11	72°	61°	SW	Cloudy.
	1	30.01	74	65	S	Cloudy.
	6	29.95	72	63	SW	Light clouds.
25	7	29.89	68	62	S	Foggy.
	1	29.83	72	80	NW	Clear.
	6	29.89	72	72	W	Smoky.
26	7	30.07	70	60	N	Clear.
	1	30.07	72	74	NW	Smoky.
	6	30.07	73	77	W	Smoky.
27	7	30.12	68	60	W	Smoky.
	1	30.09	74	74	SE	Smoky.
	6	29.98	73	77	S	Gentle rain.
28	7	29.97	70	64	W	Smoky.
	1	30.07	72	68	NW	Clear.
	6	30.13	72	70	NW	Smoky.
29	7	30.22	70	61	NW	Smoky.
	1	30.15	72	76	SSW	Cloudy.
	6	30.10	72	72	SSW	Cloudy.
30	7	29.89	71	66	W	Clouds.
	1	29.86	74	79	SW	Clear.
	6	29.86	76		S	Clear.
July 1	7	29.86	71	68	SW	Clear.
	1	29.82	78	79	SSW	Clear.
	6	29.76	76	71	SSW	Clear.
2	7	29.91	76	74	N	Clear.
	1	29.99	74	73	NNW	Clear.
	6	30.02	76	76	NNW	Clear.
3	7	30.10	72	63	NE	Clear.
	1	29.99	70	70	S	Cloudy.
	6	29.90	79	61	S	Showers.
4	7	29.76	70	60	NW	Showers.
	1	29.78	70	70	NW	Clear.
	6	29.75	71	68	NW	Clear.
5	7	29.80	68	63	NW	Clear.
	1	29.76	70	74	NW	Clear.
	6	29.74	71	73	S	Clear.
6	7	29.79	69	60	NE	Clear.
	1	29.82	68	69	SE	Cloudy.
	6	29.79	67	67	SSW	Cloudy.
7	7	29.87	63	63	NW	Cloudy.
	1	29.90	73	73	NW	Cloudy.
	6	29.90	72	72	SW	Clear.
8	7	29.90	67	65	NW	Clear.
	1	29.88	72	78	SW	Clear.

July	8	6	29.88	72°	71°	SE	Clear.
	9	7	30.00	67	59	NW	Clear.
		1	30.01	65	68	NW	Clear—fresh breeze.
		6	30.02	70	70	NW	Clear—moderate breeze.
	10	7	30.07	66	61	NW	Clear. Ther. 56 at sunrise.
		1	30.00	66	70	NW	Clear.
		6	30.00	72	72	NW	Clear.
	11	7	30.00	64	63	NW	Clear.
		1	30.00	70	75	SE	Clear.
		6	29.97	71	66	SW	Clear.
	12	7	30.09	62	60	NE	Clear.
		1	30.19	64	68	E	Clear.
		6	30.23	66	66	SE	Clear.
	13	7	30.23	62	58	SSW	Foggy.
		1	30.20	65	65	S	Clear.
		6	30.07	65	63	S	Clear.
	14	7	29.94	66	66	W	Clear.
		1	29.89	72	82	SSW	Clear.
		6	29.78	74	76	SW	Cloudy.
	15	7	29.74	72	76	W	Clear.
		1	29.72	77	88	S	Cloudy.
		6	29.66	72	70	SW	Cloudy—showers at 2 & 4.
	16	7	29.89	70	62	WSW	Clear.
		1	29.97	72	76	ESE	Clear.
		6	30.03	75	75	NW	Clear.
	17	7	30.25	69	60	NW	Clear.
		1	30.28	71	79	NW	Clear.
		6	30.28	71	72	SSW	Clear.
	18	7	30.29	63	61	NW	Clear.
		1	30.27	72	80	SW	Clear.
		6	30.20	72	74	SW	Clear.
	19	7	30.10	66	66	SW	Clear.
		1	30.04	73	79	S	Clear—strong wind.
		6	29.94	70	70	SW	Cloudy, " "
	20	7	29.91	71	70	NW	Clear.
		1	29.94	76	88	SE	Clear—calm.
		6	29.94	80	76	W	Clear.
	21	7	30.08	67	70	NW	Clear.
		1	30.08	70	75	NW	Light clouds.
		6	30.06	72	71	S	Cloudy.
	22	7	30.09	67	58	NW	Clear.
		1	30.09	67	74	S	Clear.
		6	30.06	68	66	S	Clear.
	23	7	30.06	66	66	NW	Clear.

July 23	1	30.06	69°	71°	SE	Clear.
	6	29.98	70	70	SE	Cloudy.
24	7	29.88	69	64	SE	Foggy—showers in night.
	1	29.81	69	66	SE	Fog and gentle rain.
	6	29.74	68	66	S	Rainy.
25	7	29.65	68	66	NW	Clear.
	1	29.65	70	78	SE	Cloudy.
	6	29.70	72	69	NW	Clear.
26	7	29.73	66	65	N	Clear.
	1	29.73	66	65	S	Cloudy.
	6	29.73	70	64	SW	Clear.
27	7	29.73	66	65	NW	Clear—showers P. M.
	1	29.74	70	70	SE	Clear, " "
	6	29.80	70	66	E	Cloudy, " "
28	7	29.91	67	64	NW	Cloudy.
	1	29.96	68	69	SE	Clear.
	6	29.95	68	68	S	Cloudy—showers in night.
29	7	29.97	65	60	NE	Cloudy, " "
	1	30.05	66	66	E	Clear.
	6	30.10	70	60	SE	Clear.
30	7	30.10	66	62	NW	Cloudy.
	1	30.14	68	70	S	Cloudy.
	6	30.08	68	63	S	Cloudy.
31	7	29.98	66	58	S	Cloudy.
	1	29.98	66	62	S	Cloudy—with showers.
	6	29.94	66	65	SW	Cloudy.
Aug. 1	7	30.01	66	59	S	Foggy—fog bow at ½ past 6
	1	30.01	69	70	ESE	Clear.
	6	29.98	72	70	SW	Clear.
2	7	29.95	66	68	NW	Clear.
	1	29.97	76	79	S	Clear.
	6	29.89	78	76	SW	Cloudy.
3	7	29.73	73	70	SW	Slight showers.
	1	29.73	80	79	SW	Indication of showers.
	6	29.68	76	76	W	Clear—no showers.
4	7	29.78	65	65	NW	Clear—Ther. 56 at ½ past 5
	1	29.83	69	71	NW	Clear.
	6	29.90	69	68	NW	Clear.
5	7	30.09	62	62	N	Clear.
	1	30.14	63	67	N	Clear.
	6	30.22	68	67	N	Clear.
6	7	30.44	67	67	NW	Clear.
	1	30.44	68	70	S	Clear.
	6	30.44	70	65	S	Clear.

Aug. 7	7	30.35	67°	62°	SW	Clear.
	1	30.29	70	70	W	Cloudy.
	6	30.20	68	64	SW	Clear.
8	7	30.20	64	67	W	Clear.
	1	30.17	72	74	SE	Clear.
	6	30.15	73	64	SW	Hazy.
9	7	30.05	70	64	S	Rain in showers.
	1	29.91	70	64	SE	Gentle rain.
	6	29.76	70	62	SE	Copious rain P. M.
10	7	29.76	65	65	N	Cloudy.
	1	29.86	66	70	N	Cloudy.
	6	29.97	66	65	NE	Cloudy.
11	7	30.10	65	62	NE	Clear—(50° at 5, A. M.)
	1	30.11	64	64	NE	Clear.
	6	30.15	66	63	S	Cloudy.
12	7	30.24	63	61	NE	Cloudy.
	1	30.24	62	64	SE	Clear.
	6	30.24	64	58	E	Cloudy.
13	7	30.20	58	58	NE	Mist.
	1	30.24	63	64	E	Mist.
	6	30.24	65	65	E	Cloudy.
14	7	30.27	65	65	N	Clouds dispersing.
	1	30.27	66	68	SE	Cloudy.
	6	30.24	66	63	SE	Cloudy.
15	7	30.24	64	60	SE	Foggy.
	1	30.24	66	66	SE	Cloudy.
	6	30.21	68	63	S	Clear.
16	7	30.21	66	62	S	Cloudy.
	1	30.21	66	68	S	Cloudy.
	6	30.16	66	61	SE	Cloudy.
17	7	30.12	66	66	NW	Clear.
	1	30.12	68	70	S	Clear.
	6	30.12	67	64	SW	Clear.
18	7	30.12	66	64	NW	Clear.
	1	30.10	70	72	S	Clear.
	6	30.09	70	66	S	Foggy.
19	7	30.09	68	68	W	Fog dispersing.
	1	30.09	72	76	SE	Clear.
	6	30.09	72	71	SW	Clear.
20	7	30.13	58	60	NE	Clear.
	1	30.16	66	66	SE	Clear.
	6	30.12	70	60	SE	Clear.
21	7	29.92	65	60	N	Clear.
	1	29.88	64	64	SE	Foggy.

Aug. 21	6	29.72	60°	60°	SE	Foggy.
22	7	29.71	64	59	SE	Foggy, } Copious show-
	1	29.67	65	69	S	Cloudy, } ers during A.M.
	6	29.65	66	65	NW	Clear.
23	7	29.76	63	55	NW	Clear.
	1	29.79	63	66	NW	Passing clouds.
	6	29.85	65	62	NW	Clear.
24	7	29.98	62	52	NW	Clear.
	1	29.99	64	65	SW	Passing clouds.
	6	29.99	64	60	S	Cloudy—gentle showers.
25	7	30.03	63	56	NW	Cloudy, with rain in do.
	1	30.08	61	61	SE	Cloudy, with showers.
	6	30.09	62	59	SE	Passing clouds——aurora brilliant this eve, with a clear sky, 10 P. M., a bright bow.
26	7	30.19	60	52	SE	Foggy.
	1	30.19	61	64	S	Fog dispersing.
	6	30.12	63	59	S	Cloudy.
27	7	29.94	64	59	SE	Foggy, heavy rain in night.
	1	29.80	66	75	SW	Clear, cumulo stratus.
	6	29.75	69	67	NE	" smart showers at 4 P. M.
28	7	29.79	66	63	NW	Clear, aurora quite bright last eve.
	1	29.80	65	67	N	Clear, high wind.
	6	29.82	66	63	NW	" "
29	7	29.87	64	62	NW	" T.A. 56° at 5 A.M.
	1	29.88	66	71	NW	" high wind.
	6	29.84	69	69	NW	" calm, little hazy.
30	7	29.65	67	59	SW	Cloudy, with fog.
	1	29.60	65	60	NE	" rainy.
	6	29.61	65	59	NE	" stratus and cirro-stratus.
31	7	29.85	63	55	NW	Passing clouds, windy.
	1	29.88	64	65	NW	Clear.
	6	29.89	63	57	SE	Clear.
Sept. 1	7	29.99	60	51	NW	Clear, 'on dit,' light frost.
	1	30.00	61	60	NW	Clear.
	6	30.03	63	61	NW	Clear.
2	7	30.13	60	51	NW	Clear, fine cirri, T. A. at 5 A.M. 47°, frost.
	1	30.12	61	63	SE	Passing clouds, cir.-strat.

Sept. 2	6	30.06	62	57	SE	Passing clouds and hazy.
3	7	30.00	59	54	NW	" cirro cumuli.
	1	30.08	60	67	W	Clear.
	6	30.15	62	61	NW	Clear, shower at 3 P. M.
4	7	30.38	60	51	NW	Clear.
	1	30.40	60	64	W	Clear.
	6	30.39	61	58	S	Clear.
5	7	30.44	59	52	NW	Clear.
	1	30.45	61	68	S	Clear, smoky.
	6	30.41	63	61	S	Clear.
6	7	30.44	62	56	W	Clear.
	1	30.44	65	70	SW	Clear.
	6	30.40	67	61	S	Clear.
7	7	30.35	64	60	SW	Clear.
	1	30.30	66	65	S	Cloudy, with fog.
	6	30.23	67	61	S	Clear.
8	7	30.23	65	59	S	Dense fog.
	1	30.17	67	68	SW	Clear.
	6	30.17	67	62	S	Clear.
9	7	30.13	65	59	W	Clear, morning fog.
	1	30.13	70	73	SW	Clear.
	6	30.13	69	66	SW	Clear.
10	7	30.13	68	61	W	Clear.
	1	30.01	71	80	W	Clear, fresh breeze.
	6	29.98	73	68	SW	Clear.
11	7	29.93	70	63	S	Foggy.
	1	29.85	73	74	S	Clear.
	6	29.76	70	65	S	Cloudy, indic. of rain.
12	7	29.67	68	58	NW	Cloudy, little rain in night.
	1	29.73	66	63	NW	Cloudy.
	6	29.75	66	58	NW	Cloudy.
13	7	29.89	61	49	NW	Clear. } Strong wind—a
	1	29.97	60	61	NW	Clear. } large mars red me-
	6	30.02	61	57	N	Clear. } teor at $7\frac{1}{2}$ in the W.
14	7	30.20	57	47	NW	Clear.
	1	30.20	59	63	SE	Clear.
	6	30.21	60	54	S	Clear.
15	7	30.30	57	48	SE	Foggy, T A 47° 2 A.M.
	1	30.36	57	61	E	Clear.
	6	30.34	59	54	SE	Clear.
16	7	30.34	56	46	NE	Cloudy.
	1	30.33	57	60	SE	Passing clouds.
	6	30.28	59	53	SE	Clear.
17	7	30.20	58	52	NW	Cloudy.

Sept. 17	1	30.11	60°	67°	S	Clear, cirri.
	6	30.05	62	58	SW	Clear.
18	7	29.98	62	59	S	Cloudy, with fog.
	1	29.89	65	71	S	Clear.
	6	29.85	66	64	SE	Foggy.
19	7	29.89	66	62	NW	Clear.
	1	29.91	65	69	W	Clear.
	6	29.94	65	61	NW	Cloudy.
20	7	30.18	61	49	NW	Clear.
	1	30.24	59	59	NW	Clear.
	6	30.31	60	56	NW	Clear.
21	7	30.49	56	46	N	Clear.
	1	30.51	56	57	SE	Clear.
	6	30.49	58	50	SE	Clear.
22	7	30.40	54	48	SE	Sun obscured, cirro cum.
	1	30.27	55	57	SE	Clear.
	6	30.18	56	51	SE	Clear.
23	7	29.90	56	50	NW	Cloudy, sl't rain in night.
	1	29.96	56	54	NW	" high wind.
	6	30.10	57	55	NW	Clear.
24	7	30.40	54	47	NW	Clear.
	1	30.41	55	60	N	Clear.
	6	30.40	56	50	SW	Clear.
25	7	30.37	53	41	W	Foggy.
	1	30.29	55	62	S	Clear, cirri.
	6	30.22	59	57	S	" cirro stratu.
26	7	30.07	58	55	SW	Cloudy, } Variable wind and weather.
	1	30.07	58	66	W	Cloudy,
	6	30.07	60	63	SW	Cloudy,
27	7	30.34	58	46	N	Clear.
	1	30.36	55	53	E	Clear.
	6	30.36	58	52	SW	Clear.
28	7	30.28	56	49	S	Cloudy.
	1	30.22	55	52	S	Rain.
	6	30.10	56	52	S	Rain.
29	7	30.10	56	52	NE	Cloudy.
	1	30.19	56	57	E	Clear.
	6	30.28	57	53	S	Clear.
30	7	30.29	54	45	SE	Clear.
	1	30.22	54	52	SE	Cloudy.
	6	30.15	55	49	SE	Rain.
Oct. 1	7	29.89	54	50	NE	Rain.
	1	29.81	57	66	W	Clear.
	6	29.82	60	61	W	Clear.

Oct.	2	7	29.99	58°	53°	W	Clear.
		1	29.90	61	68	W	Clear.
		6	29.84	61	57	S	Cloudy, heavy showers, clear at 9 P. M.
	3	7	30.06	58	44	NW	Clear.
		1	30.07	54	51	NW	Clear.
		6	30.10	54	42	N	Clear.
	4	7	30.16	48	33	N	Clear.
		1	30.17	46	41	NW	Clear, strong wind.
		6	30.21	47	39	NW	Clear.
	5	7	30.35	44	34	NW	Clear.
		1	30.27	45	44	S	Cloudy.
		6	30.12	46	45	SE	Cloudy, rain in night.
	6	7	29.85	49	44	W	Clear.
		1	29.87	52	60	W	Clear.
		6	29.87	53	54	NW	Clear.
	7	7	30.02	50	36	NW	Clear.
		1	29.99	50	54	NW	Clear.
		6	29.99	58	47	W	Clear.
	8	7	30.13	50	39	NW	Clear.
		1	30.24	51	45	NW	Clear.
		6	30.38	48	30	NW	Clear.
	9	7	30.60	43	31	N	Clear.
		1	30.64	42	42	SE	Clear.
		6	30.63	45	35	SE	Clear, T A 31° at 9 P.M.
	10	7	30.49	42	34	W	Clear.
		1	30.34	45	55	S	Cloudy.
		6	30.21	50	50	SW	Rain, T A 51° and clear at 10 P.M.
	11	7	30.12	51	49	W	Clear.
		1	30.10	57	68	W	Clear.
		6	30.17	58	59	W	Clear.
	12	7	30.20	55	48	SE	Cloudy.
		1	30.00	54	51	W	Rain since 9 A. M.
		6	29.97	56	53	W	Cloudy.
	13	7	29.99	53	33	N	Rain all night, snow squall.
		1	30.06	49	37	NW	Clear, strong wind.
		6	30.20	47	31	NW	Clear.
	14	7	30.45	42	28	NW	Clear.
		1	30.48	42	40	S	Clear.
		6	30.44	44	34	SW	Clear.
	15	7	30.30	42	43	SW	Clear.
		1	30.27	44	50	NW	Cloudy.
		6	30.26	46	46	W	Cloudy.

Oct.	16	7	30.24	48°	44°	NW	Cloudy, rain in night.
		1	30.24	51	57	NW	Clear.
		6	30.32	53	50	N	Clear.
	17	7	30.47	50	40	NW	Clear.
		1	30.44	50	55	S	Clear.
		6	30.39	51	46	S	Clear.
	18	7	30.01	51	46	S	Clear.
		1	29.80	53	65	SW	Clear.
		6	29.68	56	60	S	Clear.
	19	7	30.07	58	47	W	Clear.
		1	30.20	55	57	SE	Clear.
		6	30.27	53	38	SE	Clear.
	20	7	30.14	50	44	SE	Cloudy.
		1	29.90	49	46	SE	Heavy rain since 9 A. M.
		6	29.74	50	48	SW	Cloudy, rain till 5 P.M.
	21	7	29.91	49	41	NW	Clear.
		1	29.98	48	48	N	Clear.
		6	30.13	49	39	NW	Clear.
	22	7	30.21	45	37	NW	Overcast, cirro cumuli.
		1	30.14	45	45	SE	Clear.
		6	30.10	48	41	S	Clear.
	23	7	30.09	48	41	W	Clear.
		1	30.08	51	52	SE	Clear.
		6	30.08	51	47	SE	Clear.
	24	7	30.08	52	50	SE	Dense fog.
		1	30.09	55	58	S	Cloudy.
		6	30.17	57	56	S	Cloudy.
	25	7	30.20	57	50	SE	Foggy, with rain.
		1	30.20	52	44	SE	Rain.
		6	30.22	53	43	NE	Foggy.
	26	7	30.31	52	45	SE	Rain.
		1	30.30	51	46	SE	Foggy, with fine rain.
		6	30.14	50	44	SE	Rain.
	27	7	30.30	51	44	E	Rain.
		1	30.08	50	48	SE	Fine rain.
		5	30.08	50	47	SE	Rain.
	28	7	30.07	50	37	N	Clear.
		1	30.07	46	43	N	Clear.
		6	30.18	46	35	NW	Clear.
	29	7	30.28	41	28	N	Clear.
		1	30.28	40	34	NE	Clear.
		6	30.25	40	32	NE	Clear.
	30	7	30.05	39	30	N	Cloudy.

KENNEBUNK, Jan. 27, 1838.

CHARLES T. JACKSON, ESQ.

Dear Sir:—I received your letter from Boston of the 20th inst. I here enclose my observations of the weather from 1st June to 30th November last. The tabular form is not however agreeable to the one you prescribed. The register of the Thermometer which I kept was on a scale numbered above and below the freezing point, but they are here reduced to Farenheit's scale. I did not keep a register of the Thermometer attached to the Barometer till after you suggested it to me, supposing that the small difference between the temperature where the Barometer was placed, and that of the open air, could have no material effect on the Barometer. I have supposed that my Barometer ranged *too high* by about one-tenth of an inch, as the mean of observations for a year have generally been about thirty inches, and I suppose the place of observation is about 100 feet above the level of the sea. I have seen two Barometers in possession of Mr. Pollock, in Boston, (who used to repair Barometers, &c.) that varied more than one-tenth of an inch.

Professor Sewall, late of Cambridge, kept a register of the variation of the magnetic needle for a considerable time, and he observed that when there was a northern light, the centre of it was not in the true North, but in the *Magnetic North.* But much the greatest part of those that I have observed for twenty years past, the centre has been *East of the true North*, although the magnetic needle has pointed about nine degrees *West of true North.* Some few I have observed, however, when the centre was West of true North.

It has also been supposed that when these lights are seen to shoot up in all directions, and terminate *in a point* not far from the zenith, that this point is in the direction of the *dipping needle.* Bnt I am inclined to think that is not the case, though I have not made accurate observations of that kind.

The mention of northern lights brings to my mind a remarkable *Comet* that appeared in 1769; of which no mention has been made in the American Almanac, (that I have seen, although mention is made of one that appeared in 1770, which was scarcely visible to the naked eye.) This Comet appeared about the 20th of August, in the East, the latter part of the night; and when I first saw it, its tail was about ten degrees long; it increased very rapidly; its apparent motion was toward the sun; and about the 11th of September it had increased to about eighty degrees! It put me in mind of those lines in the paraphrase of part of the Book of Job;—

> "Who drew the *Comet* out to such a size,
> "And pour'd its flaming train o'er half the skies?"

The Comet approaching near the sun, suddenly disappeared, but again appeared a setting Comet in the West the latter part of October, when the apparent length of its tail was about one degree.

The account of this Comet was published in the Boston newspapers, and I should think they could be found somewhere in Boston.

I sent the observations you requested some time past, by Mr. Lord, our Representative, directed to you at Augusta.

With respect and esteem,

Yours truly,

DANIEL SEWALL.

TABLE III.

METEOROLOGICAL OBSERVATIONS,

At Kennebunk, Me, by Daniel Sewall, Esq.

Date—1837.	THERMOMETER.			BAROMETER.			Wind.	Weather, &c.
	Sunrise	1 P. M.	Sunset.	Sun rise.	1 P. M.	Sun set.		
June 1	49°	60°	56°	30.22	30.24	30.18	S	Thunder shower, overcast, foggy, fair.
2	50	68	55	18	19	17	E	Cloudy, fair, thunder shower.
3	50	62	59	17	02	29.88	E S	Foggy, rainy, fair, thunder and lightning.
4	56	77	74	29.62	29.62	60	NW W	Fair.
5	58	75	64	65	65	72	N Calm	Cloudy, fair, cloudy.
6	56	78	69	80	84	84	N S	Fair.
7	51	76	62	83	82	80	E	Fair.
8	56	70	62	84	92	94	NE S	Overcast, misty.
9	61	70	59	30.08	30.15	30.20	NE E	Overcast, small rain, fair.
10	49	56	51	27	26	26	NE	Overcast.
11	39	64	53	23	18	13	NE S	Fair.
12	42	73	63	10	05	01	W S	Cloudy, fair.
13	60	74	59	00	05	07	S	Overcast, shower.
14	48	64	55	06	08	00	S	Foggy, fair, cloudy.
15	58	66	52	00	29.98	29.98	E	Overcast, sunshine and clouds.
16	41	63	53	29.99	30.00	30.04	E	Fair, foggy, cloudy, thunder.
17	48	49	46	30.05	07	05	NE	Rainstorm.
18	42	62	58	05	05	00	NE S	Fair.

	19	45°	85°	64°	00	00	00	W S	Fair.
	20	54	56	54	00	29.90	29.69	S SE	Rainstorm.
	21	52	72	62	29.65	74	73	SW	Foggy, fair, cloudy, fair, rainstorm at night
	22	54	68	68	67	74	92	N W	Overcast, rain, fair.
	23	64	86	59	30.15	30.22	30.20	W SW	Fair.
	24	57	64	61	20	12	04	S	Cloudy, sprinkly, rain.
	25	56	84	69	29.95	29.94	29.97	S SW	Foggy, hazy, fair.
	26	56	72	65	30.10	30.15	30.16	W	Fair, hazy.
	27	47	77	65	19	18	03	S	Fair, hazy, rain.
	28	61	78	69	00	14	19	NW Fresh	Fair.
	29	46	74	62	24	24	13	NW S	Fair, small rain.
	30	60	84	70	29.96	29.96	29.94	SW E	Fair.
July	1	57	80	72	29.95	29.90	29.85	S	Fair, thunder shower in the evening.
	2	67	77	67	97	30.08	30.15	NE	Fair.
	3	50	68	60	30.15	30.06	29.95	NE SE	Fair, lowery, overcast, rain.
	4	59	77	67	29.82	29.85	85	NW	Fair.
	5	50	78	68	85	84	84	NW S	Fair.
	6	53	68	62	83	90	88	S	Fair, cloudy.
	7	56	78	70	90	97	98	W	Fair.
	8	55	79	67	98	98	97	S	Fair.
	9	55	72	66	30.08	30.10	30.12	NW	Fair.
	10	54	77	64	13	13	10	NW	Fair.
	11	50	80	64	10	10	10	NW NE	Fair.
	12	54	66	57	11	28	31	NE	Fair.
	13	43	68	59	32	30	18	S	Fair.

16

14	60°	94°	73°	03	29.93	29.87	SW	Fair.
15	65	88	70	29.83	80	77	SW	Fair, small showers with thunder.
16	56	81	70	93	30.06	30.12	W NW	Fair.
17	52	78	57	30.31	37	37	NW S	Fair.
18	50	82	68	35	35	28	S	Fair.
19	50	78	66	19	10	02	S	Fair.
20	62	88	75	00	02	02	SW	Fair.
21	50	76	64	13	15	13	S	Fair.
22	48	77	69	13	15	12	W NW	Fair, dry and dusty.
23	48	80	67	12	12	03	S SE	Fair.
24	62	66	63	29.96	29.90	29.79	SE	Foggy, showery, thunder.
25	58	76	67	74	74	80	W SE	Fair.
26	52	72	65	81	80	78	NW S	Fair.
27	50	74	67	78	82	89		Fair.
28	50	76	64	96	30.01	30.02	NE S	Cloudy, fair, cloudy, small rain.
29	56	69	60	30.12	13	18	NE	Overcast, fair.
30	48	70	61	19	20	17	E S	Overcast, fair.
31	58	63	68	09	09	06	S	Overcast, small rain.
Aug. 1	56	81	68	30.08	30.10	30.10	SW	Fair, clear.
2	57	90	83	06	.06	00	SW S	Fair.
3	74	88	73	29.86	29.83	29.80	SW	Fair, cloudy.
4	55	75	65	87	93	30.02	W	Fair, clear, N. Light.
5	41	73	59	30.15	30.25	32	N E S	" "
6	42	74	62	50	54	52	S	Fair.
7	52	74	64	47	43	32	S	Fair.

8	54°	82°	66°	28	28	23	S	Fair, sprinkling rain.
9	60	66	64	12	00	29.74	S	Foggy, considerable rain.
10	58	72	64	29.80	29.93	30.05	N	Overcast.
11	51	76	60	30.18	30.24	30.22	NE E	Fair, lowery.
12	53	67	58	30.27	32	32	NE E	Cloudy, fair.
13	55	65	63	30	30	31	NE E	Overcast, misty.
14	59	72	62	33	35	34	NE	Foggy, overcast.
15	59	74	63	33	34	30	S	Overcast, fair afternoon.
16	58	69	62	30	30	24	SE	Overcast.
17	58	72	64	23	23	30	S	Fair.
18	50	78	65	18	18	18	S	Fair, cloudy, fair.
19	60	85	71	17	19	19	NE E S	Fair.
20	52	72	60	24	26	20	NE S	Fair.
21	44	76	60	05	00	29.90	E S	Fair.
22	58	74	64	29.80	29.78	79	S W	Foggy, rain, cloudy, fair.
23	43	65	61	96	93	96	W	Fair.
24	40	68	59	30.05	30.11	30.10	S	Fair, shower.
25	50	60	59	11	19	19	S	Shower, overcast, shower, fair, N. light.
26	41	68	59	28	28	22	S	Fair.
27	58	82	69	06	29.94	29.92	S	Overcast, fair, N. light.
28	54	73	63	29.90	92	95	NW N NW	Fair, “
29	49	76	70	97	30.00	98	W	Fair.
30	57	64	60	75	29.68	72	W N	Overcast, sprinkling rain.
31	52	70	69	90	30.00	30.00	W S	Fair.
Sept. 1	38	68	60	30.07	30,12	30.15	WNW	Fair.

2	37°	68°	57°	21	25	20	E S	Fair, lowery.
3	39	68	60	13	18	23	NW S	Fair, small showers.
4	38	69	60	45	52	51	NW S	Fair.
5	36	72	62	54	56	54	S	Fair.
6	43	74	62	55	57	52	S	Foggy, fair.
7	44	66	60	49	45	34	S	Fair, cloudy.
8	55	70	63	30	30	24	S	Foggy, cloudy, fair.
9	49	78	66	22	22	18	S	Foggy, fair.
19	54	88	80	19	14	14	SW	Fair.
11	58	81	65	05	03	29.88	S	Foggy, cloudy.
12	54	62	56	29.77	29.84	86	N	Cloudy, overcast.
13	39	64	56	97	30.10	30.14	NW	Fair.
14	34	68	56	30.28	32	32	S	Fair, frost.
15	34	69	56	39	49	49	NW S	Fair.
16	42	68	57	47	46	40	N S.	Overcast, fair.
17	46	60	58	28	25	29	S	Fair.
18	56	76	66	11	05	29.95	S	Foggy, fair, foggy, no dew.
19	59	68	60	29.96	02	30.07	W	Fair, cloudy.
20	36	66	56	30.25	39	40	NW	Fair, faint N. light.
21	37	67	54	58	65	62	NW S	Fair, N. Light.
22	42	64	51	51	40	28	S	Cloudy, fair.
23	50	60	57	03	08	23	NW hard.	Fair, N. Light.
24	31	68	53	50	56	54	NW S	" "
25	28	70	58	48	40	34	NW S	Fair.
26	54	70	70	19	14	13	S	Overcast.

27	40°	62°	49°	43	50	46	S	Fair.
28	46	52	54	40	30	20	S	Overcast, small rain afternoon.
29	52	64	54	18	33	34	N	Cloudy, fair.
30	42	56	50	40	32	24	E	Overcast, rain toward night, N. light.

TABLE III.—*Continued.*

Date. 1837.	Spirit Thermometer, in open air.			Merc. Thermom. attached to Baro.			Barometer.			Wind.	Weather, &c.
	Sun rise.	1 PM	Sun set.	Sun rise.	1 PM	Sun set.	Sun rise.	1 P. M.	Sun set.		
Oct. 1	50°	69°	63°	53°	61°	61°	29.96	29.94	29.94	NW	Cloudy, fair, N. light.
2	47	74	62	65	66	64	30.18	30.20	96	W S	Fair.
3	40	68	46	54	61	56	15	20	30.21	W	Fair.
4	29	48	42	48	53	50	27	30	31	NW	Fair.
5	24	46	25	42	47	48	46	40	24	NE SE	Lowery, overcast, small rain evening.
6	39	62	52	47	54	54	00	00	00	W NW	Fair, N. light.
7	27	59	52	45	55	53	10	15	13	NW	" "
8	32	52	41	46	53	49	20	39	48	NW	Fair.
9	23	50	38	39	49	46	60	78	78	N S	Fair.
10	44	59	52	38	49	49	50	45	34	S	Fair, lowery.
11	44	75	64	49	63	59	22	25	25	W	Fair, cloudy.
12	42	57	59	52	54	55	30	10	05	S	Rain, overcast.
13	35	43	35	53	53	49	09	20	30	NE N	Rain and some snow.
14	16	44	38	39	50	46	54	62	55	NW S	Fair.
15	36	54	51	42	48	48	44	40	34	SW	Fair, lowery, sprinkling rain.
16	42	67	56	46	58	55	30	40	40	W	Fair.
17	24	60	50	46	57	53	57	60	50	S	Fair.
18	45	69	70	49	57	60	18	29.95	29.82	S SW	Fair.
19	56	54	41	56	60	54	30.17	30.33	30.39	N NE	Fair, N. light.
20	43	49	50	48	49	50	24	00	29.88	S	Rain storm.

	21	36°	55°	44°	47°	57°	53°	00	14	30.17	Calm. S	Fair.
	22	26	50	44	43	56	49	30	3°	20	S	Fair, N. light.
	23	33	64	50	45	62	55	19	22	22	Calm. S	Fair.
	24	47	67	61	51	56	55	20	20	20	Calm.	Foggy, overcast, fair, cloudy.
	25	52	50	44	54	54	53	29	30	31	NE	Moderate storm.
	26	46	57	46	50	51	51	40	40	40	NE	" "
	27	44	49	48	49	51	51	29	14	10	NE	"
	28	30	51	41	47	57	51	13	21	21	NE	Fair.
	29	27	50	33	41	44	42	36	40	35	N NE	Fair, hazy, cloudy.
	30	30	47	46	37	48	43	11	10	09	N	Cloudy, fair.
	31	34	41	39	40	42	42	38	38	39	NE N	Lowery, overcast, snow in night 3 in.
Nov.	1	31	46	42	40	45	44	30.10	29.95	29.90	N NW	Cloudy, fair.
	2	30	48	43	40	49	45	29.89	90	90	NW W	Fair.
	3	22	48	44	39	51	46	30.21	30.18	30.16	NW	Fair.
	4	28	38	39	41	41	42	16	10	07	W	Overcast.
	5	38	44	41	42	43	43	29.90	29.60	29.56	NE	Moderate rain—N. light.
	6	36	49	43	43	52	48	50	68	75	W	Fair.
	7	36	40	36	43	45	44	73	73	87	Calm. W	Rain and snow, cloudy, fair.
	8	24	34	30	36	46	40	30.24	30.35	30.35	NW	Fair.
	9	14	35	32	32	38	37	53	53	42	NW S	Overcast, hazy, overcast, sprinkling rain.
	10	37	54	41	38	52	46	02	09	18	W NW	Fair.
	11	16	41	38	36	44	42	42	40	28	S	Fair, lowery, rain.
	12	46	45	49	43	45	47	29.84	29.65	29.69	N NW	Rain storm, cleared off pleasant.
	13	24	44	36	40	52	46	30.05	30.18	30.16	NW N S	Fair, pleasant.
	14	24	20	20	38	35	34	16	02	29.90	NE N	Snow storm.

15	21°	34°	29°	32°	43°	37°	29.92	10	30.15	NW	Fair.
16	17	44	35	30	43	39	30.39	48	45	NW S	Fair.
17	26	47	36	34	45	41	52	56	53	NW S	Fair.
18	32	46	44	37	44	42	40	39	37	SW S	Fair, cloudy.
19	48	58	51	43	54	49	14	20	24	W	Shower, morning fair.
20	29	47	50	43	45	46	35	15	10	S	Overcast, small rain.
21	37	46	41	44	45	46	10	10	03	Calm.	Overcast, foggy.
22	39	45	43	44	45	45	29.88	29.65	29.50	NE	Overcast, foggy, misty, rain.
23	46	39	35	46	47	45	28.97	09	15	SW W	Fair, flying clouds.
24	23	42	35	37	45	41	29.40	67	76	E	Hazy, fair, lowery.
25	20	26	24	35	35	34	77	58	58	NE N	Snow storm.
26	11	31	24	31	37	35	30.04	30.14	30.14	NW	Fair, cloudy.
27	3	40	30	27	40	36	37	52	50	NW	Fair.
28	4	39	34	26	39	34	59	64	60	NW S	Fair.
29	34	46	42	38	36	37	43	30	20	SW	Overcast, cloudy.
30	39	50	45	39	48	47	14	16	30	NW	Fair, cloudy.

On the 4th of June, Thermometer highest in the afternoon, 83°
16th " " " " forenoon, 67
22d " " " " afternoon, 76
23d " " " " " 89
27th " " " " " 81
8th of July, " " " " 82
8th of August, " " " " 84
17th " " " " " 75

On the 23d of August, Thermometer highest in the afternoon, 68°
25th " " " " " 70
7th of September, " " " " 70
8th " " " " " 72
13th " " " " " 68
2d of October, " " " " 76
18th " " " " " 76
13th of November, " " " " 46

TABLE IV.

BAROMETRICAL REGISTER

KEPT BY PROF. P. CLEAVELAND, AT BRUNSWICK.

Record of Thermometer and Barometer, at Brunswick, Me.

1837.		Ther. 10 AM	Ther. 4 PM	Barometer. 10 AM	Barometer. 4 PM	1837.		Ther. 10 AM	Ther. 4 PM	Barometer. 10 AM	Barometer. 4 PM
June	16	62°	62°	29.81	29.81	July	17	67°	67°	30.11	30.11
	17	57	57	29.88	29.88		18	69	68	30.11	30.11
	18	60	61	29.80	29.89		19	73	71	29.94	29.91
	19	64	66	29.89	29.89		20	70	74	29.91	29.91
	20	61	61	29.90	29.66		21	76	76	29.94	29.94
	21	63	63	29.50	29.50		22	71	64	29.94	29.90
	22	62	65	29.47	29.61		23	68	69	29.90	29.84
	23	72	71	29.50	29.60		24	68	69	29.67	29.50
	24	64	64	29.53	29.50		25	64	64	29.50	29.50
	25	67	70	29.72	29.71		26	68	67	29.58	29.58
	26	66	66	29.91	29.91		27	68	66	29.61	29.68
	27	68	67	29.92	29.87		28	66	68	29.71	29.71
	28	67	67	29.95	29.95		29	64	66	29.88	29.88
	29	68	68	29.91	29.94		30	62	66	29.91	29.91
	30	70	74½	29.94	29.93		31	66	66	29.82	29.82
July	1	73	79	29.71	29.71	Aug.	1	67	66	29.96	29.96
	2	70	71	29.81	29.81		2	75	70	29.96	29.87
	3	64	64	29.81	29.81		3	76	76	29.58	29.61
	4	65	66	29.81	29.85		4	66	68	29.70	29.70
	5	64	66	29.65	29.65		5	64	66	30.00	30.10
	6	66	68	29.64	29.70		6	68	69	30.48	30.30
	7	68	70	29.70	29.72		7	67	73	30.30	30.24
	8	70	71	29.72	29.75		8	70	76	30.24	30.24
	9	65	64	29.84	29.84		9	67	64	29.78	29.85
	10	64	68	29.90	29.90		10	62	67	29.95	30.00
	11	68	68	29.90	29.90		11	66	72	30.00	30.00
	12	68	68	30.06	30.06		12	62	69	30.07	30.07
	13	62	64	30.10	30.10		13	66	69	30.07	30.07
	14	73	70	29.74	29.74		14	66	69	30.10	30.10
	15	72	72	29.75	29.75		15	66	72	30.10	30.10
	16	72	70	29.78	29.78		16	64	60	30.08	30.03

Aug. 17	65°	66°	30.00	29.96	Sept. 9	70°	69°	29.98	29.98
18	68	67	29.96	29.96	10	66	70	29.93	29.93
19	70	72	29.96	30.00	11	68	70	29.72	29.69
20	60	69	29.96	29.96	12	65	69	29.55	29.64
21	62	70	29.90	29.74	13	69	70	29.75	29.81
22	70	70	29.60	29.60	14	58	64	30.07	30.10
23	58	64	29.83	29.83	15	68	69	30.22	30.22
24	62	70	29.91	29.91	16	58	62	30.25	30.25
25	64	69	29.91	29.91	17	60	64	30.23	30.00
26	66	66	30.00	29.95	18	58	64	29.98	29.98
27	66	69	29.80	29.80	19	60	70	29.78	29.82
28	60	64	29.90	29.90	20	58	59	30.07	30.20
29	61	62	29.72	29.77	21	58	57	30.37	30.30
30	64	67	29.80	29.80	22	54	57	30.21	30.04
31	60	64	29.75	29.80	23	51	54	29.77	29.88
Sept. 1	68	72	29.87	29.87	24	51	53	30.30	30.30
2	59	62	30.01	30.01	25	62	58	30.30	30.00
3	62	67	30.04	30.20	26	55	56	29.91	30.00
4	64	69	30.30	30.30	27	59	57	30.34	30.24
5	67	72	30.28	30.28	28	56	52	30.16	30.16
6	60	63	30.30	30.30	29	59	57	30.01	30.00
7	69	71	30.28	30.28	30	56	58	30.00	30.00
8	62	69	30.20	30.10					

TABLE V.

BAROMETRICAL OBSERVATIONS

AT THE LAND OFFICE, BANGOR, BY O. FROST, ESQ.

1837.	10 A. M.		1 P. M.		4 P. M.	
	T.	H.	T.	H.	T.	H.
June 24	68°	30.171	67°	30.119	67°	30.11
25	66	29.95	70	29.878	70	29.866
26	68	30.10	69	30.10	70	30.086
27	69	30.20	71	30.154	70	30.114
28	70	30.014	71	30.060	70	30.078
29	70	30.250	72	30.220	72	30.164
30	72	29.962	76	29.905	76	29.905
July 1	77	29.905	81	29.905	78	29.852
2	78	30.	75	30.030		
3	71	30.116	72	30.10	68	30.
4	66	29.856	68	29.85	67	29.71
5	66	29.878	67	29.808	67	29.808
6	68	29.85	70	29.85	70	29.85
7	70	29.904	74	29.920	74	29.920
8	73	29.930	73	29.910	71	29.910
9	72	30.				
10	69	30.040	70	30.040		
11	70	30.068	72	30.068	72	30.050
12	70	30.250	72	30.250	71	30.250
13	69	30.320	71	30.250	70	29.914
14	73	29.960	77	29.880	75	29.852
15	74	29.766	77	29.766	75	29.712
16			77	30.		
17	73	30.230	76	30.259		
18	73	30.352	77	30.308	76	30.250
19	74	30.152	78	30.150	75	30.150
20	74	30.	79	30.	80	30.
21	80	30.116			75	30.080
22	71	30.116	74	30.116	73	30.066
23			76	30.10		
24	70	29.972	70	29.918	69	29.90
25	69	29.718	69	29.718	69	29.718
26	69	29.760				
27	69	29.80	69	29.80		
28	67	30.010	69	30.010	69	30.010
29	69	30.158	69	30.158	68	30.158

July	30			71°	30.172		
Aug.	1	72°	30.070	76	30.050		
	2	75	30.012	80	30.		
	3	74	29.75	77	29.702		
	4			76	29.818		
	5	71	30.120	72	30.150		
	6	73	30.500	75	30.500		
	7	72	30.404	77	30.308	75°	30.292
	8	77	30.252	80	30.218	79	30.202
	9	70	30.072	72	30.072	71	30.012
	10	70	29.80	70	29.932	68	29.970
	11			70	30.176	70	30.200
	12	69	30.312	71	30.312	70	30.312
	13	68	30.318	67	30.318	66	30.318
	14	66	30.212	68	30.200	68	30.206
	15	66	30.206	70	30.200		
	16	69	30.264	73	30.222	70	30.222
	17	71	30.202				
	18	72	30.178	78	30.150		
	20	74	30.250	77	30.250		
	21			74	30.	73	29.928
	22	70	29.758	70	29.758	70	29.758
	23	67	29.818	67	29.818		
	24	66	30.050	70	30.050	67	30.058
	25	68	30.158	65	30.158	65	30.174
	26	64	30.270	68	30.204		
	27					65	29.850
	28	67	29.802			66	29.802
	29	68	29.858	73	29.858	71	29.858
	30			66	29.70	66	29.70
Sept.	1	67	30.050	68	30.050	67	30.050
	2	66	30.204				
	3	67	30.116				
	4	65	30.450	68	30.450	67	30.450
	6	65	30.550	72	30.554	71	30.484
	7			73	30.418	70	30.350
	8	67	30.300	69	30.300	70	30.210
	9	70	30.200	76	30.200	75	30.154
	10	69	30.114				
	11	72	30.012				
	12	68*	29.75	73*	29.766	72*	29.766

*Cloudy.

		8	10	12	1	2	4
July 13	h—		29.962	Same.	30.	Same.	30.050
	t—		69°.		69°.		68°.

Forenoon cloudy and wet—P. M. clear.

TABLE VI.

BAROMETRICAL AND THERMOMETRICAL REGISTER,

KEPT AT GARDINER, BY R. H. GARDINER, ESQ.

From 1st of June to 1st November, 1837.

1837.	8 A. M.		3 P. M.		10 P. M.	
	Barom.	Ext. Ther.	Barom.	Ext. Ther.	Barom.	Ex. T.
June 1	30.05	59°	30.01	72°	30.02	52°
2	30.02	59	29.98	77	29.98	57
3	29.84	53	29.69	58½	29.54	57
4	29.44	66	29.44	75	29.48	59½
5	29.48	61	29.52	66	29.60	56
6	29.63	62	29.64	76	29.65	57½
7	29.61	66	29.62	78	29.63	63
8	29.69	65	29.74	68	29.82	65
9	29.92	67	29.94	72	30.03	52
10	30.09	52	30.09	56	30.08	45
11	30.02	55	29.94	70	29.93	47½
12	29.89	55	29.82	72½	29.82	57
13	29.82	61½	29.84	65	29.87	54½
14	29.87	56½	29.84	68	29.81	53
15	29.79	61	29.79	65	29.80	51
16	29.81	59	29.82	69	29.90	47½
17	29.89	47	29.90	56	29.90	47
18	29.88	44	29.82	66	29.80	52
19	29.79	65	29.78	77	29.83	51½
20	29.82	60	29.75	52	29.55	51
21	29.50	62	29.55	68½	59.62	58½
22	59.51	57½	29.55	71	29.80	59
23	29.93	63	29.95	80	29.97	61
24	29.96	60	29.85	62	29.81	57½
25	29.73	61½	29.76	77	29.78	59
26	29. 9	62	29.90	72	29.96	56
27	29.97	59	29.91	74	29.79	61½
28	29.82	64½	29.90	71	30.00	58½
29	30.04	62	30.02	71	29.96	60
30	29.89	65½	29.78	78	29.78	63

July	1	29.78	73°	29.70	80½	29.67	66½
	2	29.82	69½	29.87	72	29.95	53½
	3	29.95	63	29.86	72	29.74	55½
	4	29.66	61	29.64	70	79.67	57
	5	29.69	65	29.64	69	29.67	53½
	6	29.69	63	29.69	71	29.68	57
	7	29.74	68	29.76	76	29.78	60
	8	29.82	68	29.78	75	29.84	64
	9	29.89	61	29.90	69	29.94	56
	10	29.94	63	29.93	75	29.95	64
	11	29.95	66	29.95	77	29.92	63
	12	30.05	63	30.10	67½	30.14	50½
	13	30.13	58	30.05	.67½	29.95	58
	14	29.85	68	29.75	72	29.73	66½
	15	29.67	73	29.63	77	29.66	65
	16	29.80	67	29.87	76	30.02	62
	17	30.15	63	30.16	78	30.16	60
	18	30.18	65	30.12	81	30.08	61½
	19	30.	68	29.93	77½	29.86	65½
	20	29.83	72	29.83	83½	29.89	65
	21	29.97	67	29.95	76		
	22	29.99	60			29.95	58
	23	29.96	63	29.93	73½	29.91	62
	24	29.81	65	29.75	65½	29.68	63½
	25	29.61	67½	29.61	73	29.67	59
	26	29.65	65	29.66	76	29.64	58
	27	29.65	66	29.68	73½	29.78	62
	28	29.86	64	29.87	76	29.87	60½
	29	29.92	66	29.97	70	30.03	57
	30	30.03	61½	30.02	72	30.01	60
	31	29.91	57	29.99	64½	29.99	64
Aug.	1	29.94	71½	29.93	85	29.88	64
	2	29.89	69	29.85	81½	29.79	69
	3	29.64	70	29.60	81½	29.64	65
	4	29.70	64	29.76	77	29.87	56½
	5	29.98	57	30.05	71	30.18	57
	6	30.32	61	30.32	75	30.32	58
	7	30.26	64	30.18	74½	30.12	60½
	8	30.09	63½	30.06	83	30.06	51
	9	29.95	65	29.83	63	29.63	58½
	10	29.69	63	29.84	63½	29.95	58
	11	30.01	61	30.03	71	30.09	58½
	12	30.06	63	30.05	66½	30.16	59
	13	30.04	59	30.15	68½	30.15	62

Aug. 14	30.06	64°	30.05	68½	30.13	60°
15	30.11	64	30.09	73	30.08	57
16	30.07	62½	30.05	69	30.04	58½
17	30.02	64	30.	75	29.98	60
18	29.96	62	29.96	75½	29.95	64½
19	29.95	68	29.97	77½	29.99	63
20	30.04	61½	30.02	71	29.95	52½
21	29.84	57	29.77	75	29.70	56½
22	29.62	62½	29.58	69	29.61	57
23	29.66	57	29.71	65½	29.80	51½
24	29.56	57	29.87	66	29.90	58
25	29.94	59	30.	66	30.02	54
26	30.07	56	30.03	66	29.96	55
27	29.82	60	29.70	71	29.69	60
28	29.68	62½	29.69	71	29.75	56
29	29.75	61½	29.75	77	29.74	61
30	29.58	59½	29.54	61½	29.62	57
31	29.76	56	29.78	63	29.81	51
Sept. 1	29.86	55	29.90	63	29.98	48
2	30.02	51	29.98	64	29.96	48
3	29.91	53	29.97	65	30.11	52
4	30.26	52	30.28	66	30.29	51
5	30.34	53	30.32	72	30.32	52½
6	30.36	56	30.31	70	30.31	55
7	30.26	60	30.18	70	30.13	56
8	30.08	60	30.05	69	30.03	56
9	30.01	64	29.99	75	29.99	62
10	29.95	63	29.90	79	29.89	63½
11	29.84	67	29.75	75	29.66	66
12	29.61	60	29.64	62	29.69	53
13	29.78	51	29.89	60	30.02	45
14	30.08	47½	30.10	64	30.15	47
15	30.22	49	30.24	65	30.26	46
16	30.24	49	30.18	62	30.17	47
17	30.06	55	29.98	69	29.98	53½
18	29.92	59	29.81	71	29.74	64½
19	29.80	61	29.81	66½	29.90	54
20	30.06	50	30.14	59½	30.31	44
21	30.38	41½	30.41	52½	30.38	42½
22	30.31	49	30.16	59	30.03	43
23	29.83	50	29.91	49	30.13	50
24	30.29	48	30.31	58½	30.33	44
25	30.27	43	30.15	64½	30.06	54
26	29.95	55	29.95	68½	30.09	54½

Sept. 27	30.25	46°	30.24	58°	30.25	48°
28	30.17	50	30.05	63	29.98	53
29	30.06	52	30.12	60	30.22	45
30	30.21	48	30.12	53½	29.98	48
Oct. 1	29.80	52½	29.74	63	29.79	55
2	29.87	56	29.81	67	29.84	49
3	29.95	45	29.99	47	30.14	40
4	30.05	35	30.05	44	30.19	35
5	30.23	37	30.17	44	29.95	42½
6	29.81	45	29.81	60	29.89	39½
7	29.93	39	29.95	55	30.	41
8	30.06	40	30.19	39	30.38	38½
9	30.53	39½	30.56	47	30.52	28
10	30.36	35	30.21	54	30.11	52
11	30.03	47	30.03	66	30.15	45
12	30.09	40	29.90	50	29.39	47½
13	29.93	35½	30.03	39	30.23	28½
14	30.36	28½	30.38	43½	30.36	29½
15	30.21	43	30.17	51	30.16	42
16	30.16	46	30.16	59	30.31	39
17	30.36	36	30.32	56	30.19	45
18	29.92	49	29.69	61	29.62	62
19	30.03	47½	30.16	42	30.26	28½
20	30.04	41½	29.78	44	29.74	46½
21	29.86	42½	29.95	46½	30.09	35
22	30.12	37½	30.04	50	30.04	41
23	30.01	41	30.	62½	30.06	44½
24	30.03	51½	30.04	58	30.10	54½
25	30.17	49	30.18	51	30.23	45
26	30.26	44	30.24	46	30.20	43
27	30.06	46	29.95	48	29.94	43
28	29.98	38½	30.02	40	30.14	34
29	30.24	32	30.20	38	30.15	32
30	30.99	31½	29.94	46	30.06	32½
31	30.24	31½	30.23	42	30.16	37½