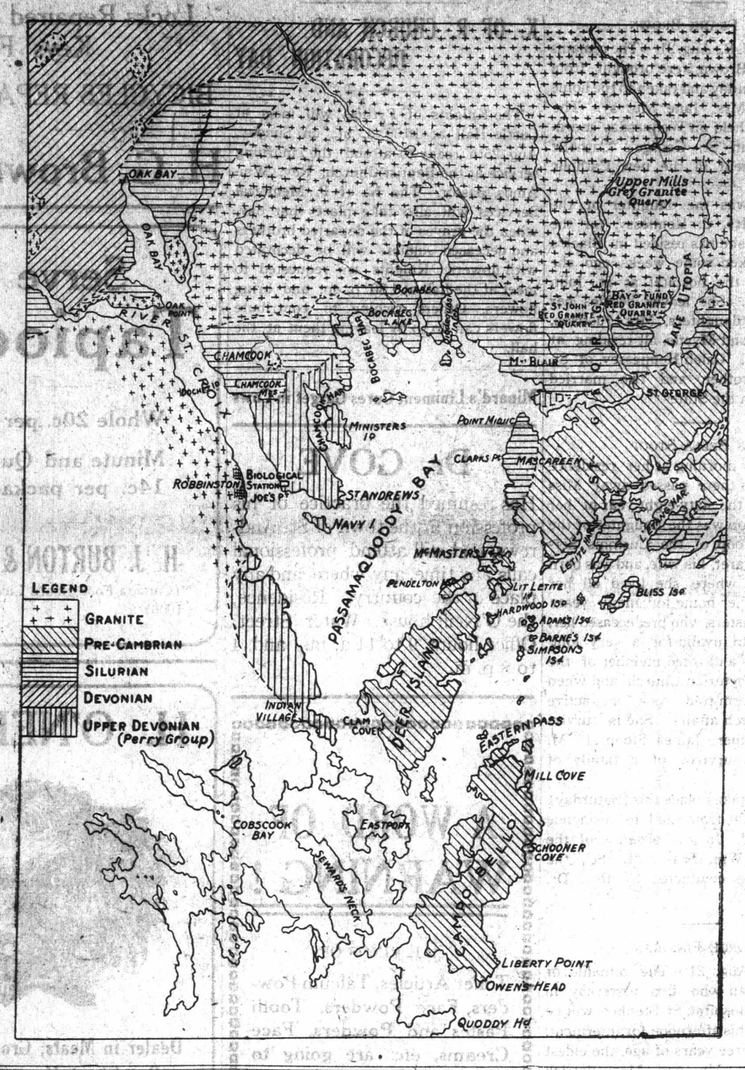
MAP OF ST. ANDREWS AND VICINITY



THE SURROUNDINGS OF ST. ANDREWS

FROM THE VIEW-POINT OF A GEOLOGIST

By L. W. Bailey

CAN it be wondered at that St. Andrews is just becoming, indeed that it has already become, a place of favorite summer resort?

Situated by the seaboard; almost surrounded by the water of Passamaquoddy Bay and but a few miles distant from those of the Bay of Fundy; with a temperature which is never very hot and an atmosphere which is made bracing by almost constant sea breezes; not too often beclouded with fog; with scenery combining in a most fascinating way the attractions of landscape and sea-scape; with beautiful drives and every opportunity for boating and yachting or for deep sea fishing; not large enough to have developed the noise and bustle of town or city life, but embracing, apart from its big hotel and summer cottages, many garden-enclosed residences, indicative of a time when the now sleepy little village enjoyed a considerable West Indian trade; easily reached by rail or water and having close by one of the experimental Stations of the Biological Board of Canada; St. Andrews certainly presents attractions which few places can surpass.

To look down upon St. Andrews from the piazzas of the big hotel, "The Algonquin," or, better, from the summit of Chamcook Mountain, which at no great distance rises to a height of some 600 feet or more, is to have laid out before one a picture of unusual beauty and interest. On two sides, to the north and east, the view embraces, as far as the eye can see, only an assemblage of rugged forest clad hills, among which, and almost at our feet, nestles the beautiful Chamcook Lake, a favorite resort of the angler and of picnic parties. Turning to the west the hill descends rapidly, and in places precipitously, to the valley of the St. Croix River, forming part of the boundary between Canada and the United States, on the western side of which is the pretty little village of Robbinston, while further up stream, but conspicuous in the distance, is the bold eminence known as the Devil's Head, and near by the rocky islet known as Doucett's or St. Croix Island, on which, attacked by scurvy and beset by Indians, Champlain and his associates spent their first winter in Canada. Finally to the south one looks over the peninsula and town of St. Andrews, dominated by the towers of the Algonquin, and the broad expanse of Passamaquoddy Bay, bounded on the further side by the picturesque chain of the Western Islands, separating this latter Bay from the Bay of Fundy. The picture is certainly a most enchanting one, especially towards evening, when the sun, descending behind the Devil's Head, lights up with its beams the bright red rocks of McMaster's Island.

But most pictures, especially landscapes if they are good ones, have an interest connected with them arising from other considerations than those of mere beauty. They suggest inquiries as to the history of the picture; how the features of the latter came to be just what they are; what possible events may have been connected with their origin; why mountain and valley, river and lake, bays and islands have had their positions and rotations determined; how and by what agents the special features of each have been brought into being; and especially whether the scene which they now present has always been what it is to-day.

Let us endeavor to answer some of these questions in the case of the picture which we have just described.

The first feature to which attention may be directed is that of the origin of the rocks which now constitute the shores of St. Andrews peninsula, and which are well exposed at low tide in the reefs near the Block House or in the bluffs near the Biological Station. These will be at once recognized as conglomerates or pebble beds. That is to say, they are mainly made up of rolled fragments or pebbles such as may be seen in process of accumulation along any shore exposed to the action of winds and waves and tidal currents. The occurrence of similar beds all around the shores of Passamaquoddy Bay as well as at Point Lepreau and elsewhere on the borders of the Bay of Fundy, shows clearly that they are not of fluviatile origin, but are the result of vast accumulations of rolled pebbles piled up, layer upon layer, by the action of the sea. They could not have been formed in the deep sea, for the floor of the latter is never composed of such materials, and the agents of their production are there wanting, but they are coastal deposits of shallow water origin, such as may be seen almost anywhere, where shores are being attacked and undermined by marine activities. This is further evident from the occasional occurrence of plants in the beds, terrestrial vegetation which must have been blown or drifted by winds or currents to their place of burial. The thickness of the whole series of beds is not definitely known, owing to the possible existence of unrecognizable faults, but is certainly very great, and as the earlier as well as the later beds must have alike been produced in shallow water, it follows that during the whole time of their accumulation there must have been a progressive subsidence of the coast, with a corresponding submergence of the adjacent land.

And this gives us a clue to the source of the material composing the beds. We have only to remove a few pebbles from the conglomerates and with them in hand go back to the hills, Chamcook and others which look down upon the Bay, to recognize the fact that it was from these that the pebbles came, and the aggregate mass of the conglomerates, now exposed along several miles of shore and with a thickness of at least a thousand feet, shows further how much these same hills must have lost by this process of removal.

Thus Passamaquoddy Bay must have been at some period of the history a vast subsiding trough, bordered by rocky shores, which shores were being subjected to powerful and long continued marine erosion, the materials thus set free being distributed over its beds by equally powerful marine currents.

But not oceanic action alone marked the era to which we refer. Among the deposits which constitute the St. Andrews peninsula and which are exposed on its shores, especially in the vicinity of the Biological Station, are others of very different origin. Instead of being red, like the conglomerates, they are black; they contain no rolled pebbles but are massive and crystalline, or are filled with numerous cavities, giving to them the aspect of the slags of a furnace; they are not bedded like the associated rocks, but either penetrate them in the form of dykes or lie between them in irregular lenticular sheets, forming what are known as "sills." All these features clearly show that they owe their origin to igneous action, that fire rather than water has been the agent concerned in their production. Being harder and more homogeneous than the rocks which they penetrate, they yield less readily to destructive agencies and have thus determined a marked influence upon the topography of the region. To their influence is to be ascribed the prominence of Joe's Point, as similarly, on the other side of the Peninsula, they doubtless helped to originate "the bar" now connecting Minister's Island with the mainland. The frequency of their occurrence, especially about the Biological Station, whose foundations rest upon and are built of them, and their somewhat wide distribution point clearly to the fact that at the time that the conglomerates were being picked up on their ancient shores, molten rock from deep seated sources, was welling up from below, sometimes reaching the surface and spreading over it, but at other times failing to lift or penetrate the overlying burden, merely separating the beds and forming irregular sheets or "laccoliths" between them. They are of course more recent than the rocks which they invade, but it is probable that they are to be referred to the latter part of the Devonian Age, a period which antedates our own by some millions of years.

But what about the hills from which, as has been stated, all the vast amount of water formed materials, conglomerates and sandstones, now constituting the peninsula of St. Andrews, have been derived? An excellent place to study them is to be found along the eastern side of the Chamcook lakes, where for a distance of several miles, the cuttings on the line of the C. P. R. afford an almost complete section of the rocks which form the high hills overlooking the latter. The rocks consist partly of dark sandstones and partly of reddish felspar porphyry or rhyolite, the latter of volcanic origin. This porphyry is very fine grained, of a color varying from salmon to chocolate, and susceptible of high polish, making one wonder that with the granite works of St. George so near, no attempt has yet been made to use it for ornamental purposes. On the opposite side of the lake the Chamcook hills are similarly constituted, the lower half of Chamcook mountain being composed mainly of dark sandstones, while the upper half is volcanic, its prominence being due to the fact of its greater hardness and consequent power of resisting erosion. On the steep western side of the second mountain is a place where the relations of the two may be well seen, the hard volcanics showing a projecting ledge over the softer beds, while the under side of the former is scored with glacial striæ, produced by the action of ice in a long subsequent period.

Strata similar to the above may be seen in the promontory between Chamcook and Bocabec, in hills, (such as Troak's mountain) between the latter and the mouth of the Magaguadavic, on the Mascarene shore, south of the river, on McMaster's Island, the conspicuous redness of the latter being due to the weathering of the felspar-porphyry of which it is composed, and finally on Moose Island, on which the town of Eastport rests. At several points, such as the Mascarene shore and Eastport (Broad Cove), the underlying sandstones and associated rocks are highly fossiliferous (containing lamp-shells, etc.), and showing that these beds belong to the Silurian age and that deposits containing them are of marine origin accumulated around the shores of an old depression, indicating even at that time, the beginning of what is now Passamaquoddy Bay; while the disposition of the porphyries and other volcanic rocks suggests that subsequent to their disposition, this same bay was a great focus of volcanic activity, surrounded by vents from which, from time to time, poured forth streams of molten lava, or became buried beneath the floods of volcanic ashes. What a contrast is that exhibited to the composition quiet of to-day, and what an opportunity is thus afforded to any one interested in such things, personally to study the facts from which the statements thus made have been derived!

It only remains to say that not only water and fire have been active agents in the evolution of the features which now constitute the surroundings of St. Andrews, but that ice also has played an important part in making these surroundings what they are. One reference to this has already been made in connexion with Chamcook Mountain, but we may now add that the St. Croix River and the Magaguadavic were probably, in part at least, at one time occupied by old glacial streams, being terminal portions or relics of the great continental ice-mass which at one time buried nearly all eastern America to a depth of many hundreds, perhaps thousands, of feet. The entire duration the great Ice Period has been estimated (1908) as at least 500,000 years, and its close 50,000 years distant from the present. At what time Man first began to occupy the region which we are now discussing we do not know, but evidence of his presence here at the time of the first European occupation of these shores may be found in the old shell heaps which mark the site of his former encampments. An interesting example of these may be found on the eastern side of the Bocabec river near its mouth, and another on the eastern shore of Oak Bay, near its head.

The oldest rocks about Passamaquoddy Bay are those of Letite and Deer Island. These are partly Silurian and partly, as is believed, much more ancient. If the latter, as thought probable, are of Archæan or Pre-Cambrian Age, they must date back at least 30,000,000 years.

CANADIAN CROP REPORT

Ottawa, August 14, 1918. The Dominion Bureau of Statistics issued to-day the usual crop report compiled from the returns of Crop Correspondents made on July 31, 1918.

YIELD OF FALL WHEAT AND OF HAY AND CLOVER

The preliminary estimate of the yield per acre of fall wheat for Canada is 15½ bushels as against 21½ bushels in 1917 and in 1916 and 23 bushels, the decennial average far 1908-1917. Upon the harvested area of 340,700 acres, this gives a total yield of 5,275,700 bushels as compared with 15,363,450 bushels in 1917 and 17,590,000 bushels in 1916. In Ontario, where the bulk of the fall wheat crop is grown, the estimated total yield for 1918 is 4,435,200 bushels from 277,200 acres, a yield per acre of 16 bushels, as compared with last year's estimate of 14,114,800 bushels from 656,500 acres, a rate per acre of 21½ bushels. The total yield of hay and clover for Canada is placed at 10,064,100 tons from 8,015,250 acres, representing a yield per acre of 1¼ ton. The corresponding figures of 1917 were 13,684,700 tons from 8,225,034 acres, or 1.66 ton per acre.

CONDITION OF SPRING-SOWN GRAINS

In the Prairie Provinces the drought remained unbroken until towards the end of July, and serious damage to wheat in the blossom stage was caused by heavy frosts which occurred from the 23rd to the 25th of the month. Conditions were improved by rains that fell during the last week of the month. For the whole of Canada the condition of crops on July 31 was worse than at the end of June. Spring wheat, measured against 100 as representing the average decennial yield, is 77, compared with 85 on June 30 and 93 on July 31, 1917; oats are 85 against 91 and 90; barley is 86 against 93 last month and 93 on July 31, 1917, and rye is 83 against 89 and 95. Peas and mixed grains are 101, or one above average; beans are 95, buckwheat is 93, flax is 71, corn for husking is 86, potatoes are 95, turnips and mangolds are 96, corn for fodder is 85, sugar beets are 92, and pasture is 92. In the Prairie Provinces, spring wheat is in Manitoba 85 p. c. of the average, oats are 86, barley is 89, and rye is 84. In Saskatchewan the figures are spring wheat 75, oats 75, barley 78, and rye 79. In Alberta spring wheat is 69, oats are 68, and barley 70 p. c. of the decennial average. Potatoes are for Canada 95 p. c. or 5 p. c. below average, as against 98 p. c. on July 31, 1917. In the Maritime Provinces and in Quebec spring wheat is 101 in Prince Edward Island, 104 in Nova Scotia, 105 in New Brunswick, and 106 in Quebec, conditions generally having improved during July. Other grain crops in these provinces are equally satisfactory. In Ontario, spring wheat sown to 158,000 acres is marked 118 p. c., as against 101 a month ago and 111 on July 31, 1917. The figures expressing condition for the whole of Canada indicate a total yield in 1918 for wheat of nearly 232 million bushels as compared with 233,742,850 bushels in 1917 and for oats a total yield of about 416 million bushels as compared with 403 million bushels in 1917. For the three Prairie Provinces the yield indicated by condition is for wheat 216,488,000 bushels and for oats 254,930,000 bushels.

CONDITIONS IN ALBERTA

A telegram from the Alberta Department of Agriculture dated August 10 states that recent rains throughout the southern country have made a material improvement in crop conditions. In certain districts of the south where the prospect was poor two weeks ago heavy rains have fallen and the grain is now filling nicely. On account of this moisture the seed situation in many localities is greatly relieved, and conditions are much more encouraging than they have been for some time. After the frost it was apparent that the greater portion of the wheat and barley crop was destroyed, but as the season advances some improvement is noticeable.

PUBLIC NOTICE

FUEL ADMINISTRATION

NEW BRUNSWICK

The Fuel Controller of Canada has advised me under date of Aug. 8th, that it is probable that the Maritime Provinces wil not receive 50 per cent. of the normal requirements of anthracite coal from the United States for the coming winter. He urgently requests that the consumers of ANTHRACITE COAL in the Province of New Brunswick take immediate steps to procure a supply of bituminous or soft coal to make up this shortage in anthracite, and if they neglect to do this, they will unquestionably suffer from cold in the coming winter season. By ordering or providing now, it will insure a supply of fuel. If neglected it means that in the cold weather, when rail transportation is difficult, and railways and equipment are crowded with export and local goods, and vast quantities of munitions are being forwarded, that coal will not be moving from the mines. By ordering now it gives an opportunity to dealers to release storage for new supplies, and thus make room for coal demands which must come later.

This statement is not made by the Fuel Controller without full knowledge of the facts, and it is to be hoped that this appeal will not remain unheeded, and that consumers of coal will take advantage of the opportunities now offering for obtaining soft coal which may be denied them at a later day.

JAMES H. FRINK,

Fuel Administrator for New Brunswick

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