

AN ABANDONED MARINE SAND-BAR IN THE CORNWALLIS VALLEY, NOVA SCOTIA.—By FREDERICK C. CHURCHILL, Wolfville, N. S.

(Read 12 May, 1920.)

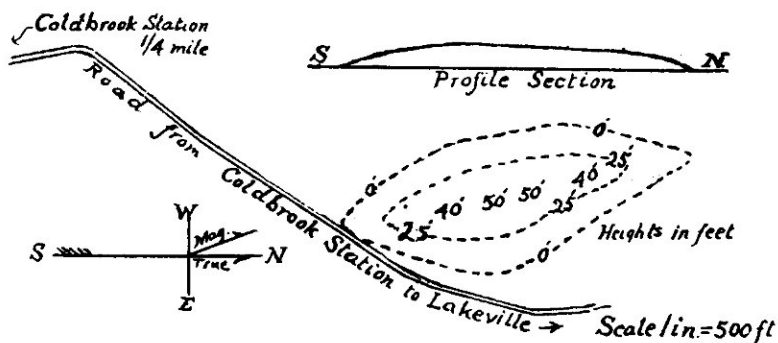
During the summer of 1917, while tracing out the floor of an extinct lake near Coldbrook, Kings County, Nova Scotia, I came across a large mound of sand with some gravel, and judging from its external appearance, my first impression was that I had discovered a drumlin.

This discovery led me to abandon what I first set out to do, and I immediately began to look for evidence to support my theory of a drumlin, but finally I felt uncertain as to its origin.

The following summer (1918), Prof. D. S. McIntosh, of Dalhousie, visited the spot with me, and we spent one day looking over the ground; and he agreed with me that, owing to its shape and the direction of its longer axis, it looked like a drumlin; but, being cautious, he suspended judgment.

Early in the spring of 1919, W. J. Wright, then professor of geology at Acadia University, spent a day with me examining the mound and surrounding country. He said he felt quite sure it was not a drumlin, stating for his reasons the following facts: the absence of boulder-clay in the mound itself, and that in the surrounding country the boulder-clay lies below the sand and gravel. These facts were verified by farmers who live near by. They say in digging wells, after penetrating the sand which is usually 8 to 10 feet deep, clay with loose stones is found. This I believe is the boulder-clay. Mr. Wright then suggested to me that if I wished to know the origin of this bank of sand I was to look for evidence later than the Glacial Period.

Before I continue my paper I should describe my drumlin-shaped sand-bank and the country immediately surrounding it.



Abandoned Marine Sand-bar in Cornwallis Valley, N S.

The Cornwallis Valley is flanked on either side by hills, namely, the North and South Mountains, and consists of numerous banks of sand and gravel. Very few of these rise high enough above the general elevation of the country to become conspicuous objects of topography, the whole country presenting to view a monotonous sandy plain dotted here and there with small groves of pine trees and poplars. The average elevation of the country is about 70 feet above sea level.

About half a mile north of Coldbrook station and a mile and a half from the foot of the South Mountain, lies the sand-bar now under discussion. The road from Coldbrook station to Lakeville passes near it on the east side. The mound is approximately 900 feet long, 300 feet wide, and 50 feet above the surrounding plain. It is so thickly covered with pine trees that a photograph fails to show its contour. It is composed of sand with some gravel, and the direction of its longer axis is N. 10° W.—S. 10° E., true bearings. The north end has a gentle slope, suggesting an ice movement from the north. The south end is much steeper. These facts first led me to think it was a drumlin, but there is stronger evidence against this idea.

I was fortunate enough to find that a quantity of sand had been excavated from the south end, and this afforded me an excellent opportunity to examine these deposits. I found the gravel to lie below the sand. They are both fine, and shew good evidence of being deposited in water. I was unable to find any trace of boulder-clay.

In the first part of this paper I pointed out that boulder-clay was found in this neighborhood by farmers upon digging wells; and I think I can show ample proof that this mound of sand lies above, and, as was suggested by Mr. Wright, is younger than the Glacial Period.

Following up Mr. Wright's suggestion, I examined a much wider field than this immediate vicinity. At Wolfville and Avonport I have found these stratified sands and gravels to overlie marine clay, and boulder-clay still lower. The scanty literature I find upon this subject supports this view in another part of the valley, namely Middleton. In some places I find the stratified marine clay wanting, but, according to Dawson, all these deposits are not necessarily found in any one place.

That the eastern part of North America experienced a submergence following the Glacial Period is an established fact, and there is evidence that the Cornwallis and Annapolis Valleys suffered a like fate. Marine clays containing fossils have been found at Avonport and Middleton. Marine benches are seen at different levels on the South Mountain. A wave-cut platform is also reported near Blomidon, and stratified sands and gravels are very common throughout the valley.

I have searched for fossils in this sand, but without success.

According to the late Prof. Haycock, this valley was submerged by the waters of the Bay of Fundy after the Glacial Period, and the North Mountain was left as a low island in the Bay.

In conclusion, I think that the origin of this bank of sand may be found by examining the effects this submergence

would have upon this part of the country. These strong tides, sweeping down and up the valley, over the material of the sea floor, would scour up loose sand and heap it in bars of various shapes.

The material of this bar consists of quartz sand, with small pebbles of bluish slate, quartz, trap, etc., all more or less abraded or semi-rounded. The slate was probably derived from the rocks of the Gold Measures or of the Devonian or Silurian formation, which lie to the south, and the trap from the Triassic igneous rocks of the North Mountain. Very likely the material is glacial drift worked over by the sea.

Upon the re-elevation of the country, the denuding agencies of the atmosphere would probably alter the sand-bar's original form somewhat, and would mould it into its present shape.

This interpretation may be erroneous, but it seems to be in harmony with the few facts that have been given me and with the scanty evidence I have been able to gather.

Supplementary Notes.

In my paper which I submitted to the society on May 10th of this year, I claimed that the mound of sand near Coldbrook was an abandoned marine sand-bar. Since then I have collected stronger evidence to support my claim.

During the early part of the summer of 1920, I spent part of a day in Woodside, Kings Co. The peculiar shape of a number of small hills and hummocks immediately drew my attention, and I investigated them.

Some of these mounds of sand are about 1,000 feet long, and 200 to 300 feet wide, but I do not think that any of them exceed 20 or 25 feet in height. They nearly all stand a little above the level of the surrounding country, which is a gentle undulating plain.

Generally speaking, the direction of their longer axis is east and west. This fact is certainly fatal to the drumlin

theory. Moreover, I think it supports the sand-bar theory, because some of them have not an east-and-west axis, but are at angles to this direction.

The material of these bars is chiefly fine water-worn sand, with some fine gravel. I examined the structure of one, where a large quantity of sand had been removed. It was well stratified, and this points to water-laid material, when it is supported by rounded gravel and sand. A slight trace of cross-bedding was also seen, which is characteristic of sandy deposits.

I also learned that the till lies below these sandy hills, which proves that their age is Post-Glacial.

These sand-bars are about ten miles in a northeasterly direction from the sand-bar I described at Coldbrook, and I believe they now stand on what was once the shore-line of the North Mountain, when it stood as a long narrow island on the Bay of Fundy. These bars are now situated about a mile, perhaps a little less, from the base of the North Mountain. They shew that shallow water, as well as strong currents, were the chief agents in their construction.

No doubt these soft deposits have experienced considerable erosion since they have been exposed to the destructive influence of the atmosphere, having both their size and shape altered. Notwithstanding the wear that time has imposed upon them, they still remain as monuments of geological change, and tell the investigator that once the sea dashed against the hills that lie to the north.