

Pictou Sept 14, 182

Sir C Lyell

Dear Sir

As agreed on when at  
Ankerst, I visited the submerged forest near  
that place, in company with S. Chandler Esq,  
on my return from Dorchester. I found it much  
more interesting than I had expected, and regretted  
that you could not visit it.

It occurs at the extremity of Fort Lawrence  
ridge, between the mouths of La Planché and  
Mispaguash rivers, on a gently sloping shore beyond  
the outer margin of the marsh, and nearly a  
quarter of a mile from the nearest upland  
which is low and slopes very gradually toward  
the level of the marsh.

The edge of the marsh, which is here  
thickly covered with salt grass and Salicornia,  
is cut off perpendicularly by the tide, presenting  
a front five feet in height. Below this I  
walked over a sloping expanse of red mud,  
the more recent layers of which were very irregu-  
lar, in consequence of partial denudations caused  
by the neap tides. On the surface of this mud  
I observed impressions of rain drops, footmarks  
of sandpipers and crows, sun cracks, and abun-  
dance of shells of Sanguinolina fusca.  
There were also a few long straight furrows,  
which I was told had been caused by the ice.

last spring. They had been covered by 3 or 4 inches of  
new mud, most of which had since been swept  
away by the tide without changing their form.  
Toward the low water mark, the mud gives  
place to sand & gravel, still however mixed  
with mud, and near the level of low tide  
numerous large stones are scattered over the  
surface.

At the distance of 326 paces from the  
abrupt edge of the marsh, and more than  
25 feet below the level of the highest tides,  
which here rise in all about 40 feet, I saw  
the first upright stump. Beyond this a belt  
135 paces in width, and extending to a consi-  
derable distance on either hand, was occu-  
pied by erect stumps and prostrate trunks  
scattered at rather wide intervals, as in an  
open wood. Probably 30 or 40 <sup>stumps</sup> may have  
been in sight at once, most of them worn  
down by decay and the pressure of the ice nearly  
to the level of the ground, but others projecting  
to the height of about a foot. Between the lowest  
stump seen and the water level, was a  
space of 170 paces in which no stumps ap-  
peared, though there were prostrate trunks and  
scattered fragments of roots, which may have  
been washed out by the tides.

On digging around and under some

may accumulate rapidly, their submergence may have occurred not many centuries before the discovery of the country.

1 Position of Submerged Stumps at Church's farm, W. side La Plouche R.

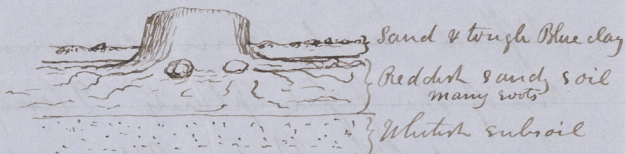


- (a) Clay and sand with pebbles & boulders — fragments of stumps  
 (b) Soil, partly covered with clay & gravel — rooted stumps  
 (c) Mud deposited by tides — footmarks, shells &c  
 (d) Salt marsh, overflowed by high tides

2 Beech stump



3 Pine stump



I have little doubt that the surface with stumps once extended over the space (a) Fig, and that it now extends under (c) and (d). A shaft sunk 30 feet through (d) would expose something very like a part of a modern "Loggins" section. This recurrence of similar conditions after so long an interval is very curious; and the study of these stumps and their soil would form an admirable preparation for that of the coal plants of the Loggins.

I had intended to leave with you the pocket map which we used at the Loggins, but forgot to do so. I send to day by mail a copy, on which I have marked the situation of the submerged forest and the anticline between Loggins & Rochester, with what I believe to be the continuation of one of them to the Gulf of St. Lawrence.

On comparing my collected notes with Lushon & Taylor, I am confident that the fish shales are under the Gypsum, and equivalents of Boston Bluff. You will see that it was this fact that forced Taylor to his 'old red' view. Lushon places them above the Gypsum, contrary to facts in his own plans, apparently because he could not believe coal measures to be so low. One of the shales from the creek at the mine (the "oolitic" one) is a mass of bituminous matter with imbedded crystals & concretions of lime, & retains its toughness after the lime is dissolved out. This helps to explain the great bed, which after all its squeezing is taken into account, must still have differed much from common coal in its mode of formation. One of the fossil plants I brought home is converted into coal precisely like that of the great bed. I have written to Mr Allison, stating the differences, and advising him to accept any fair compromise. I have also written to Mr Logan, and have sent the duplicates to Mr Brown.

I was surprised and grieved to hear on my return to New York, that Mr Duncan had died about the time we passed through, while on a visit to a friend near Boston.

Trusting that the remainder of your journey has been safe and pleasant, and with much good wishes to you & Lady Lyell

Yours respectfully  
J. W. Dawson

of the stumps, they were found to be rooted in a soil having all the characters of ordinary forest soil, but covered in places by an uneven layer of tenacious blue clay with salt grass roots, probably deposited on the surface while at a somewhat higher level, since salt grass cannot grow so far under high water mark as the present position of this clay. The soil in which the stumps are rooted is a reddish sandy loam, with small stones, similar to the ordinary upland about Amherst. Under one stump however I found a black peaty soil resting on a grey sand. The roots of the stumps were entire and covered with their bark, and the appearances were perfectly conclusive as to their being in the place of their growth.

On examining with the microscope specimens of the wood, I find that most of the stumps seen are pine (*P. Strobus*) and Beech, probably the Red Beech (*Fagus Ferruginea*); and it is worthy of note that these are trees indicative rather of dry upland than of swampy ground. The pine stumps are quite sound, though somewhat softened and discoloured at the surface. The beech is carbonised at the surface, and in the interior though retaining the appearance of sound wood it is so soft

Submerged forest

and brittle that it can easily be cut with a spade, and thick trunks can be broken across by a slight blow. The largest stump observed was a pine 2 ft 6 inches in diameter, and showing more than 200 rings of growth. I enclose small specimens of the wood, and may mention that pine is a very durable wood, and that red beech, though it decays rapidly when exposed to alternate dryness and moisture, is considered to be nearly as durable as British oak, when kept constantly wet.

The amount of subsidence required to account for these appearances is at least 30 feet, and the frequent occurrence of stumps, trunks and peaty soil under the wet marsh mud in all parts of the Bay of Fundy, makes it probable that it extended over a considerable area. The marshes have existed at or about their present level for 250 years, and if any subsidence has occurred within that period, it must have been very gradual and of small amount. On the other hand the condition of the wood <sup>shows</sup> ~~indicates~~ the growth of these trees ~~can~~ be geologically a very modern event, and as marsh mud