Second Geological Survey of Pennsylvania.

J. PETER LESLEY, State Geologist.
1008 CLINTON STREET, PHILADELPHIA.

Glen Ivy Sept 4 1881

Prof. J.W. Dawson L.L.D.

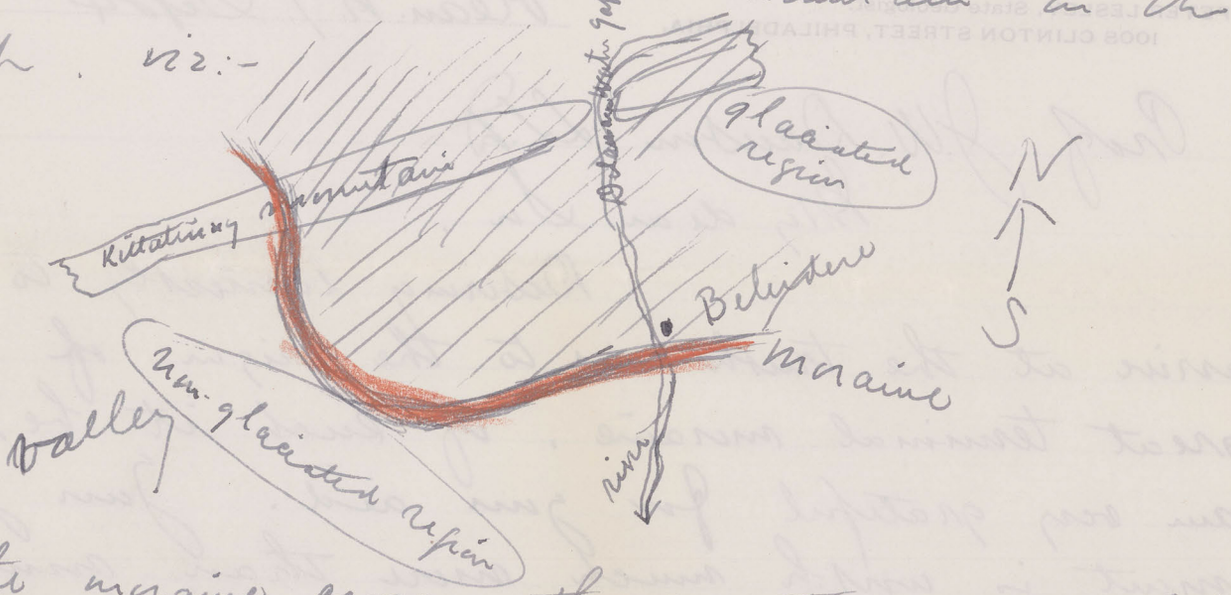
My dear Sir.

Desiring earnestly to arrive at the truth as to the origin of this great terminal moraine, if such it be, I am very grateful for your aid. Your judgment is worth much more than mine, yet I should like you to see some of the phenomena in person before either of us arrive at a definite conclusion.

If a great continental glacier really existed, it must have been so grandly different from any local Swiss glacier, that I think we should not too minutely compare their attendant phenomena.

Although indeed I can answer most of your questions in the affirmative, I cannot see how any sea-margin could possibly have existed in many places where we find the moraine. Take, for example, the point upon the Delaware river at Belvidere where the moraine enters the state from New Jersey. The moraine lies here in a broad open valley,

bounded on the South by a sharp long mountain 1800 ft. high, but with no mountain on the South. viz:-



How the moraine crosses the mountain and stops in a valley on grand sloping Southward. There is no beach or margin for any sea, and how could anything but ice have stopped in such a position?

Again, the moraine, unlike the Kames and valley deposits back of it, is unstratified and filled with striated sharp fragments. I have observed no driftwood in it, and any waterworn gravel which occurs in connection with it does not lie in it, but on either side, being made by the water which drained the edge of the ice South or South according to the direction of the marsh valley: viz.

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The material forming it is genuine till, and unlike any water deposit. It is thus different from many of the "Kettle-moraines" of the West.

In answer to your questions;

1. It does consist mostly of local detritus, in sharp striated fragments.
2. It has some far travelled pebbles and boulders, including,
3. Pebbles of gneiss and granite
4. No driftwood has yet been found in it.
5. The stratified sand is generally as explained above.
6. It is generally best developed on Northward or N.E. slopes, as is the till throughout the whole glaciated region back of it.
7. It is a broad hummocky surface rather than a succession of ridges. There are sometimes transverse ridges running in the direction of adjoining striae.
8. It is generally steeper on the North side. (Swiss moraines are also steepest at the back.)
9. Glacial striae are generally not as frequently seen close to the moraine as they are farther to the north. They are best seen on high ground

some distance back.

10. While the general course of the moraine is nearly straight it curves slightly locally over each mountain and valley, just as glacial striæ alter their directions locally in similar situations.

Last week I found the moraine finely developed, and containing frequent pebbles of gneiss, upon ground in Potter County Pa. 2580 feet above the sea. Its features were identical with those it had at Belvidere, 270 feet above the sea. It rested, not on the back side of a hill, but capped the very summit, the water descending on all sides. All back of the moraine is abundance of till, and of stratified kame-like deposits, while back of it not a single pebble occurs except in valleys draining it.

Could these phenomena be produced by any sea-margin? Do not you St. Lawrence lake local?

I hope that I have not wearied you with this long letter and that I may again have your counsel.

With regard and respect
Very truly Yours
Henry Carvill Lewis.

Lewis
Aug 8/82