

Survey work  
& plan of minutes

86 Boulevard de Port Royal

April 26, 1876.

Acc. 916

P.S. I have received your pamphlet on the Locust Invasion, & have found it very interesting.

My dear George,

I received yours of the 9<sup>th</sup> March on the 13<sup>th</sup> inst. It was the only one I received by that mail as the one from home was late & did not arrive till the week after.

We have been out surveying in the Bois de Vincennes to the east of Paris the last four days, to-day included. We are told off in "groups" of two each and there are a certain number of operations to be gone through, such as running level-lines angular & chain surveying etc. I am very glad of the opportunity of having a little practice with French

instruments. There is one which might be of use to you, at least in a modified form. It is constructed like a theodolite to read horizontal & vertical angles, & in the focus of the eye-piece there are three horizontal wires, one in the centre, and the other two at equal distances above & below it. They are all fixed, and serve for the measurement of distances. When the instrument is set up over a known point, the whole country around, <sup>as far as you can see</sup> can be surveyed without shifting it. ~~The horizontal angles give the directions.~~ A man with a graduated rod (such as a levelling-rod) is sent to any point, and when the instrument is directed to it, the horizontal & vertical angles must be read, & also the length of rod intercepted between the extreme wires, by which the point is determined both in direction & distance as well as in height above or below the instrument. The instrument we used was so arranged that the number of millimetres intercepted, gave the number of metres of distance. This is extremely useful in

broken & mountainous regions; it is said that an experienced operator will read off 120 points in an hour. This requires several rod-men as much time would be lost if only one were employed. For coast surveying it would also be very useful as all the sights would be level & much less time required in reducing the observations.

We left each morning at 9 from the station in the Place de la Bastille. We were provided with first-class tickets at the expense of the School. It takes about 20 minutes to get there, and there is a short walk from the station to the site of our work. This is on a small island, about  $\frac{1}{4}$  of a mile long in a lake in the aforesaid Bois. The island, however, is rather large for the lake, & only leaves an annular piece of water around it. A tent, composed of a piece of canvas stretched over a light house-frame, affords shelter for the instruments, & also protects a table

at which we take lunch. This is not  
provided gratis, but is brought with us.  
It kept quite fine the whole of the time we  
have been there, which is certainly a cause  
for thankfulness.

The examinations begin now, & continue  
till the 22<sup>nd</sup> May. One we have had already,  
& there are five a-head, all of which are  
oral, & each of us are examined <sup>for</sup> about half  
an hour. I have taken my pass up on  
board the "Peruvian" for the 25<sup>th</sup> May  
which just leaves me time to get to Liver-  
pool comfortably after my last exam:  
I would have preferred to have had a few  
days in London, but I cannot help it.  
It seems that the Exhibition will have the  
effect of lessening the Ocean traffic very  
much, as the Americans who stay at home  
will ~~pay~~ <sup>send</sup> far more than counter balance  
those who cross from this side — at least  
this is what I have heard. I suppose I will  
be leaving about the time this reaches you.

Believe me your affectionate brother

William.