Recd March 30th
Ans April 4

Office U. S. & C. W. Lake Survey
Detroit March 27th 1863

Dear Doctor!

You are an old meteorological observer and savant, and will therefore excuse the trouble I am about to give you, on a question which has troubled us very much. We appeal to you because you are experienced in the practical observations, as well as the theoretical deductions. — It is a fact of observation, however, which we want, more than the theory.

The question is this:— Does the wet bulb thermometer in any existing state of the atmosphere, stand higher than the dry bulb? In the instructions to the Smithsonian Observers, (10th An. Rep. Smith. Inst. P. 220,) the following paragraph occurs:— "During a fog the wet bulb may be somewhat higher than the dry bulb; then the air is over saturated, and contains, besides the vapor at its maximum of tension, water suspended in a disseminated liquid state". — I wrote last year to Prof. Guyot making inquiries with regard to this fact. He returned me the following answer. — "As to the temperatures of the "dry bulb recorded during a fog or over saturation, this is "a rare case. It may be only apparent if the two thermometers "do not exactly correspond in their indications which must be

" often tested. — Otherwise it only may arise again, I think,
" from the action of a different surface. The cloth will
" take in more water and condense a part of the vapor of
" the atmosphere, and its temperature may then slightly rise
" by the evolving of latent heat. But this explanation I
" would not insist upon. In the sentence of the instructions
" above alluded to, Smith. Rep. P. 220, I did not mean to convey
" the idea of a casual connection between the two phenomena
" though I confess the sentence is ambiguous.

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You can readily understand the importance of a decision of this question, when you know how difficult it is to get observers to take the pains to wait until the wet bulb arrives at its lowest point. We have another difficulty, again, in not knowing when it has gone to the point of saturation after it descends below temperature of the dry bulb, or, when an error has been made in the observation, especially with those observers who are so careless as frequently to record the wet bulb above the dry. — In looking over the sheets of all our stations, during the whole time we have been keeping meteorological records, when fogs have been recorded in the column of Remarks, the temperature of the wet bulb is generally below the dry, & not the same.

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By this we can see that it is not every fog, nor a majority of them, that indicates saturation, which is known by the equality of the temperature of the two bulbs — much less an over-saturation. We do not know by our observers when over-saturation exists, because they so often record the wet bulb above the dry, when we know that the air is not even simply saturated with moisture. We will be grateful for a practical answer, whether, in your many observations, you have ever observed the over-saturation spoken of by Prof Guyot; or whether a state of atmosphere does exist, where the dry bulb thermometer shows a lower temperature than the wet bulb. — Mr. Fendler has observed in tropical regions, and if such a state does exists, it should be found there.

I gave Mr. Austin your instructions about collecting pine cones &c., which he will willingly attend to when the season comes again. I can also make arangements with our observers in the Lake Superior district, for making some extra collections if they are to be had.

Most Respectfully yours,
John M. Bigelow.

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Dr J. M. Bigelow

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Rec'd 29 May
Ans 30 May

Detroit Mich: May 27th 1863

My Dear Doctor

I received a few days ago the Transactions & Journal of Proceedings the Academy of St Louis for which please accept my cordial thanks. I have to thank you also for the kind letter of the 4th April last with regard to the Psychrometer. I remember seeing among the Army observers an instrument very similar to yours with a wick-like absorbent extension from the muslin covered bulb terminating in a cistern of water below — exactly your contrivance in principle — but from some cause or other it appears to be laid aside and its place taken by the common wet & dry bulb.

We have made experiments with your instrument comparing them simultaneously with those of our wet & dry bulbs. — We find that although the mercury in the thermometer whose bulb is moistened by capillarity from the reservoir is lower — probably always lower — than the dry bulb yet it never descends as low as that in our wet bulb wetted & exposed to the air in the manner we usually

take our observations. — From this I should infer that the ascent by capillarity of the water in the vessel which is of the same temperature of the air to take the place of that evaporated from the muslin has a tendency to keep the temperature above the actual point of evaporation. — In our experiments with your instrument we find that it reads generally about a mean between temperature of the air & the true readings of the wet bulb. Can it be that we have failed in the manipulation with your instrument? — We have no difficulty in getting a difference, but it cannot be the difference between the temperature of the air and the true point of evaporation — which is the result we want — as long as we can still lower the temperature by means of evaporation from the wet bulb. Have you compared the operations of your instrument directly with those of the common wet & dry bulbs? If you have and they always read exactly alike I shall presume that our difficulty in getting true results is in our not properly managing the instrument. —

I send to-day some Spruces gathered in this vicinity from various sources — The wild ones I obtained at the market House

There appear to be but 3 kinds our native black Spruce, the cultivated Norway Spruce & the Balsam They are cheap to me if they serve you a good purpose I fear however they are little too common. –

Where is Dr. Parry now? I forgot to enquire of you while I was in St Louis about the habitat of our old friend Mr Schott. Is he in Georgetown yet?

With sentiments of the highest regard I remain

Most Respectfully yours John M Bigelow

No 1. alba said to be not a native?? obtained from a garden. The Lady called it "Black Norway" a vigorous grower She had another var. in the garden but without cones which she called "White Norway" exactly like this excepting lighter colored foliage.

No 2 nigra obtained at the market house from a Christmas tree brought from a swampy locality about 50 miles west if Detroit where trees of the kind grow 30 feet high

No 3 =2 From a Christmas tree at Market house from the country west of Detroit

No 4 Called "Norway" spruce from a yard in South Bend Ind.

No 5 nigra (not rubra!) From a yard in Detroit said to have been brought originally from Buffalo

No 6 From a yard in Detroit said to have been brought from Lake Superior balsamifera

alba

No 7 From a yard in Detroit

No 8 = From a Christmas tree in Detroit. —

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Recd Aug 19th
Ans Sept 15

Detroit Aug 15th 1863

Dear Doctor —

I will send by Mondays express some living specimens of Picea Nigra from Mr. Adair's nursery garden — the trees ~~two~~ were taken while quite young & transplanted into his garden from their native growth near Pontiac about 20 or 25 miles North west of Detroit — One of them I design for yourself & the other for Mr. Shaws garden — you will of course take choice. If they do not grow you will then have first rate ~~Dots~~ specimens for bot=anical ~~specimens~~ purposes. and after wards at a more propitious season living specimens for the garden can be easily had. It is quite interesting that you have found P. alba native on American soil — & that P. alba & P. nigra are as distinct

in species as Quercus alba & Q. nigra
I intend also to send by the same
express some flowering specimens of
pines that I have lately gathered from
the gardens and yards in the neighbor
hood. I will write more fully
afterwards. I merely drop this note
that you may be prepared to take
care of the living trees which to
insure their growth must be
attended to soon. Mr Adair
says he will put them up so that
he thinks there will no doubt about
growing. — I selected specimens that
have the present & the two past
years cones — He has the P. alba
in his garden - much slower in its
growth but they were imported
It was impossible for me to get the
Christmas trees now but about
Christmas time any quantity may
be had for a song. —

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Kind est regards to your family
& Mr. Roelter

Most Respectfully yours
J. M. Bejeloy

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Rec = Sept 23d

Supposed to reason

Detroit Mich.
Sept 20th 1863

Dr. Engelmann | Dear Sir.

I received your welcome letter yesterday and right glad you are pleased with the trees. — You flatter me too highly by saying I was getting jealous of my friend Austin and endeavoring to out do him. — I have been sight weaned sequesting me to get a Christmas tree from our market men & send it in sections by express. So I made application at the market house the next day after receiving your letter but none could be had. — The market is only sup=plied at that particular season by persons from the neighberhood where they grow. I supposed in consequence I could not supply you with one until the Christ=mas season came round again.

Happening some time afterwards to see

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those beautiful specimens which I sent you in Mr. Adairs nursery it occurred to me that your wish—which you must remember is a law to somebody—could be obeyed without difficulty. Mr. Adair told me he thought the trees transplanted properly now would grow as readily as in the spring and I considered if they did not grow they would make you excellent botanical specimens. As the expense of transmission by express would be very little if any more by the addition of the smaller specimen I put it up also to be presented to Mr. Shaw for his garden. Mr. Adair has the Picea alba in his ~~garden~~ nursery but they are not native moreover he had no specimen with a fine set of cones on. And this I think you will find a good distinctive character—their cones are not persistent like those of P. nigra. Need I excuse myself further?!

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Enclosed - or rather around this - I send you the entire meteorology of 4 stations from the 24th to the last of August with the temperature & Winds for the same times for all the stations we have received. Our Shutts for Superior City & Thunder Bay have not yet come in. We had a decided hoar frost here on the morning of the 30th of August & one also yesterday morning. We have not the means of tracing great meteorological changes all over the country as the Smithsonian has on account of our limited locality & the carelessness sometimes of getting in our Shutts

It is a pity but from some cause Austin has left the Lake Survey & is in town. It may be some time before he will be able to collect again for you. — See how the P. nigra does and if you need it I can send you nursery specimens of P. alba. You may however

be able to get living specimens of P. alba from their native growth on Green Bay. –

I am most Respectfully & cordially

yours J M Bigelow

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