

January 6, 1831

❧ 1831 ❧

FROM BENJAMIN SILLIMAN, SR.

Henry Papers, Smithsonian Archives

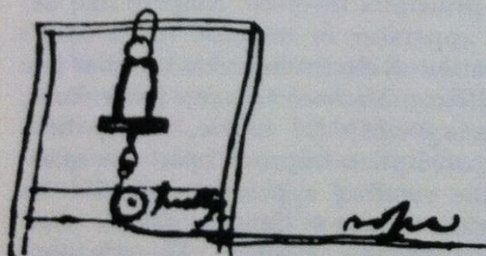
New Haven Jan 6 1831

My dear Sir

Your paper is done (figure etc) & I hope you will find it correctly printed.

It is a highly important & interesting paper & will undoubtedly be printed in the foreign Journals & I shall be much gratified in quoting the results in my chemical book.¹ As I must finish the electro-magnetic notices next week if there is any thing you would wish to add it may be in time; especially I should like to know it if you should carry the lifting power higher even than you have done. I shall be much obliged by receiving such an apparatus as you are kind enough to offer to have constructed for me. In order to exhibit it to my classes before the breaking up of the Medical School the instrument must be here the last week in Feb^y as the lectures end on the 26th of that month & I should have opportunity to become a little familiar with it by experience begun a few days earlier. I should like to have it fitted so as to shift for the revolving apparatus on the top & if any other apparatus admits of convenient adaptation to it for the purpose of exhibiting electrical & magnetic currents & revolutions² I should like it & will cheerfully pay any additional expense. As my time of preparation with it must of course be short, I will thank you to send me a memorandum of directions for the experiments to enact that I may lose no time in groping.

Would it not form an interesting addition as regards the impression to be made on a class if an armature were provided admitting of a hook from a rope passing round a pulley wheel & then let 2-3-4-5 *etc* persons pull—adding to the number till it should become affectual: a *shifting* beam might be adjusted—provided its permanent fixtures would [not] interfere with the scale for the weights. The frame would be easily fixed to the *floor by hooks*.



I shall have 50 copies of your memoir done up for you to distribute among your friends & I will direct that they go in M^r Little's³ bundle.

¹ Benjamin Silliman, Sr., *Elements of Chemistry*, 2 vols. (New Haven, 1831). The references to Henry's work are in 2:680-683.

² See the comment to which Silliman is re-

sponding in the "P.P.S." of Henry to Silliman, December 28, 1830, and footnote 8, printed above.

³ Weare C. Little (?-1885), a bookseller, was

January 15, 1831

I found room only to crowd in two lines with respect to the revolving experiment⁴ & shall be pleased to receive a notice of that or any facts for the April N^o.

I remain dear sir yours very truly & respectfully

B Silliman.

then a partner in the firm of Little and Cummings. Munsell, *Ann. Alb.*, 9:233, 234, 243. The firm came into existence in 1828. In addition to acting as Silliman's agent in Albany, Little was a successor of E. F. Backus in the publication and sale of law books. *Howell and*

Tenney, p. 702.

⁴ A reference to the lines which Silliman excerpted from Henry's letter to him of December [2]8, 1830, and printed at the end of Henry's article, at the bottom of page 408. See that letter printed above, especially footnote 8.

TO BENJAMIN SILLIMAN, SR.

Daniel C. Gilman Collection, Library, Johns Hopkins University

Albany Jan 15th 1831

Dear Sir

Yours of the 6th inst¹ was received three days since. I am happy to learn that you think my paper an interesting one and shall consider myself honored by any quotation you may please to make from it in your book on Chemistry. I have no other results to communicate at present as I have not made any experiments on this subject since I sent the paper but from those before made I think it is certain that no greater result than that stated (750 lb) can be obtained by a piece of iron of the size used in these experiments or in other words the iron appears to be magnetized to perfect saturation.

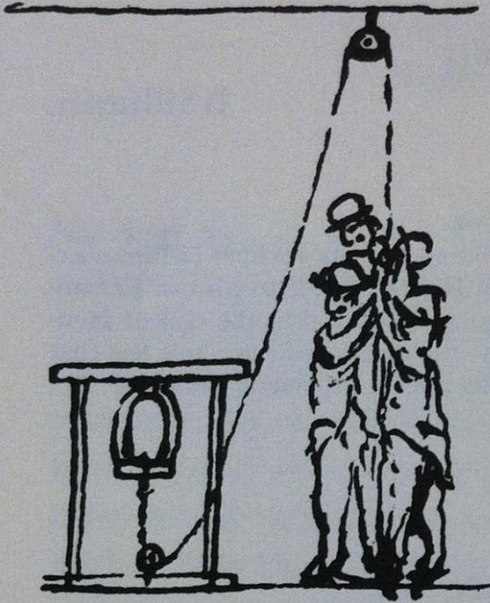
I commenced to day with the construction of your large magnet by drawing the plan of the iron part & it is now in the hands of the forger. I found some difficulty in procuring in Albany a piece of iron of the size and some little delay will also be caused by having to send to New York for copper wire of the proper diameter since the navigation of the Hudson is interrupted by ice.

The whole apparatus can be finished by the first week of next month. I am some what at a loss to know how I shall forward it to New Haven at this season of the year but perhaps you can direct some method of conveyance or I may possibly find some person with whom I can send it. I will try the method you suggest with regard to exhibiting the power of the magnet by

¹ See above.

January 22, 1831

several men drawing at a rope. I would however propose a slight alteration in the method of applying the power which would consist in having a pulley fixed to the floor directly under the magnet and a second pulley to the ceiling of the room—a rope passing through these from armature would hang like a bell rope.



Several men might hang their weight on this and the number be increased until the armature separated. By this arrangement each person could pull no more than his weight and as it would sustain 4 or 5 ordinary sized men the exhibition would be interesting. I usually show the power of the magnet by suspending from it by means of the scale beneath ten 60 lb weights which it readily sustains. On withdrawing the cup

containing the diluted acid from the small battery the whole weight falls with a great noise.

The journal has not yet reached Albany. I have no fears with regard to the accuracy of the printing of the paper. Please accept my sincere thanks for the agreeable and unexpected favour of the 50 copies to distribute among my friends.

I am Sir with much respect
Your humbl serv.
Joseph Henry

New Haven January 25th 1831

Dear Sir

I thank you for your prompt attention to my magnet¹ & am pleased with your modification of the pulley & as it happens it will exactly suit the fixtures in my laboratory; it will admit also of the common square board or scale of the grocers upon which either weights or men can be placed.

As regards the sending, the river will doubtless remain closed & there is I suppose no other way than to have the frame & all packed (in pieces of course) in a strong box & let them come over land by Hartford or Litchfield; the latter will be the most driest & to prevent imposition I shall be obliged to you to have the fare settled (by weight if they prefer it) & marked in the box & I will pay it here and your own bill anywhere & in any way you may prefer with many thanks for your kindness.

As the river closed just as the Journal was going away I fear it has met with delay but have written to New York to have it expedited. When you write me again respecting the magnet be so good as to mention whether the

¹ Purchased by Silliman from Henry for Yale College. See Henry's letter of January 15, 1831, to Silliman, above, and footnote 6 in

Isaac W. Jackson's letter of February 16, 1831, to Henry, below.

321

February 3, 1831

Journal & your extra copies have arrived.² I am not sure whether Dr Teneycks name should have been placed in the title;³ if so pray apologize if it is an omission certainly not intended & perhaps an apology may be due to you for placing it with yours in the chemistry.⁴ Had there been time I would gladly have sent you the abstract (brief of course) made of the most remarkable facts for the chemistry—but time did not admit of it. If agreeable to receive payment for your communication be so good as to note it in the bill for the magnet and excuse me if I am wrong in naming it; it is perhaps safer to err on that side than on the other.⁵

I remain dear Sir
with much respect
your obt & oblg^d Servt
B. Silliman

² Copies of Henry's article on the development of great magnetic power with a small galvanic element, published by Silliman in January 1831 (19:400-408).

³ Dr. Philip Ten Eyck, who frequently collaborated with Henry, and whose name does not appear in the by-line of the above-men-

tioned article.

⁴ See Silliman's *Elements of Chemistry*, 2 vols. (New Haven, 1831), 1:680.

⁵ Henry did not request payment for the article. See his comment at the close of the letter to Silliman of March 28, 1831, below.

March 28, 1831

TO BENJAMIN SILLIMAN, SR.¹

Retained Copy, Henry Papers, Smithsonian Archives

Albany March 28th 1831

Dear Sir

I take the opportunity of my friend Dr Powers² going to New Haven to send the long promised magnet. I found it impossible with my other engagements to have it finished before the close of your medical term and therefore concluded to wait until the river opened. Dr Powers has seen our³ method of operating with it and has been so obliging as not only to take charge of its conveyance but has also promised to attend the fitting of it up at New Haven.

The frame we have used in our experiments is too small, we have therefore concluded not to send it. Dr P. however can have one constructed to suit your Lecture room for but little more expense than the transportation of one from here would amount to be the steam boat.

We have also sent but one battery⁴ as the other used in our experiments (see paper)⁵ belonged to the academy. We have no time before Dr P's departure to have another constructed.

¹This is Henry's reply to Silliman's letter of March 12, 1831, above. Both letters are printed in Nathan Reingold, ed., *Science in Nineteenth-Century America* (New York, 1964), pp. 65-68.

²Titus William Powers (?-1863). Having attended the Albany Academy from 1817 until 1819, Powers entered the College of Physicians and Surgeons in New York City in 1825. He earned his M.D. degree in 1831 from Yale, where he was a student of William Tully, another of Henry's friends. A resident member of the Second Department of the Albany Institute in 1830, Powers was made a fellow of the College of Physicians and Surgeons in 1833. A resident of New York City from 1831 until 1847, according to the city directories, he was a practicing M.D. except in the years 1839-1844, when he was listed as a commission merchant. He died, unmarried, in Savannah, Georgia, in 1863. See Henry Hun, "A Survey of the Activity of the Albany Academy" (unpublished manuscript, 1922-1935, Manuscript Division, New York State Library and Albany Academy Archives); *Columbia Alumni*, p. 79; *Catalogue of the Officers and Graduates of Yale University in New Haven, Connecticut, 1701-1904* (New Haven, 1905), p. 206; *Catalogue of the Officers and Students in Yale*

College, 1830-31 (New Haven, 1830), p. 9; New York City Directories, 1831-1847; *Transactions*, Albany Institute, 1830, 1, part 2: Appendix, p. 74. Powers remains obscure. In New York he maintained his friendship with Henry, and his letters to Henry will appear in subsequent volumes of the Henry Papers. He does not appear to have played an active role in any of the New York scientific institutions, nor, apparently, did he publish anything on science or other subjects in the more prominent journals.

³Henry includes, of course, Philip Ten Eyck in the use of "our" and, later, "we."

⁴Henry and Ten Eyck were sending a cylindrical battery which they found to be the best source of power for the electromagnet. While several other types were used in the experiments, it is reasonable to assume that Henry and Ten Eyck would send the type of battery best suited for their demonstrations. Of course, they would have preferred to send two cylindrical batteries so that the demonstration of the reversing of polarity could have been performed with the apparatus as sent, but circumstances did not permit. See the article cited in the next footnote.

⁵Henry is here referring to the paper which originally accompanied this letter and which

March 28, 1831

The power of the magnet may be shown to a class in the manner you proposed with a rope and a pulley.⁶ We have however exhibited it by piling on the scale beneath the magnet about $\frac{3}{4}$ (say 1500 lbs) of the maximum weight which it will support. After showing that the magnet fairly sustains this, by slowly withdrawing the acid from the battery we suffer the whole to fall about 5 or 6 inches. This never fails to produce a great sensation among the audience as before the fall they can scarcely believe that the magnet supports the weight. We send one large revolver;⁷ the experiment would be more striking if two were used as they would turn in different directions.

The sec^d vol. of Your Chemistry was received only about 6 or 7 days ago. I am much gratified with the analysis of my paper and am pleased that you have mentioned Dr Ten Eycks name as you have done.⁸ In justice to myself however I must add that it is the opinion of those of my friends who are acquainted with the whole affair that my name alone should stand on the title of the paper. The communication was drawn up by myself and all the experiments detailed in it except those credited to Dr. Ten Eyck were devised solely by me. To Dr Ten Eyck belongs the merit of arranging the mechanical part of the apparatus.

The large magnet described in the last paper⁹ was constructed entirely by my own hands except forging the iron. The plan of the frame was made by Dr Ten Eyck and also the drawing made by him. The experiments with it were performed by both. In regard to the magnet we send to you, the plan was drawn by myself and the forging done under my direction. The winding with wire was done by Dr Ten Eyck. We mutually experimented with it. I have been thus explicit that you may understand what share each has had in the affair and also to answer a passage in one of your letters.¹⁰ <In the accompanying account of the magnet> I wish you would publish the account of the present magnet as an extract of a letter to you (if you

is printed in *Silliman's Journal*, 20:201-203, "An Account of a Large Electro-Magnet, Made for the Laboratory of Yale College."

⁶ See above, Silliman to Henry, January 6, 1831, where Silliman suggested this manner of demonstration.

⁷ Referring to the revolving apparatus of Marsh and Ampère. See above, Henry to Silliman, December 28, 1830, the "P.P.S." section and footnote 9.

⁸ Henry is citing Silliman's *Elements of Chemistry*, 2 vols. (New Haven, 1821); in the

cussed on pp. 680-683.

⁹ Of course, Henry's paper in *Silliman's Journal*, 19:400-408, which he transmitted to Silliman along with his letter of December 28, 1830, printed above.

¹⁰ The question of proper credit for the work in which Henry and Ten Eyck collaborated was raised first in Silliman's letter to Henry of January 25, 1831, printed above. Silliman subsequently attempted to clarify the problem in an editor's note on the first page of the paper, where he paraphrased Henry's

April 5, 1831

consider this mode not improper).¹¹ I was much gratified with your kindness in sending me fifty copies of the paper and consider myself much more than *paid for my communication*¹² by this and other instances you have shown me of good feeling.

Did my pecuniary circumstances permit I would gladly send you the magnet free of expense but this I cannot well afford. My experiments have already cost me considerable. The several items of expense without counting my own labour (which of course is sufficiently paid by the honour of constructing it) will amount to 35 Dollars. This may if you please be transmitted to me by Dr Powers and if you wish I will send a bill of particulars. The paper is perhaps too late for the journal you will perhaps give it a place in the appendix and may find leisure to make a few experiments with it yourself before the publication of the next number.

I am Sir with much respect
Yours Jos Henry

I¹³ commenced last fall a series of observations on the intensity of magnetism at Albany and used the needles furnished to Prof. Renwick by Cap. Sabine. I have since had a number of similar needles constructed and shall resume the obs. next month. The results I should be pleased to communicate to the Journal with the consent of Prof. Renwick.

¹¹ Apparently Silliman had no objection, for the account was published as if it were an extract.

¹² Henry is undoubtedly referring to Silliman's comment in his letter of January 25, 1831 (printed above), "If agreeable to receive payment for your communication be so good

as to note it in the bill for the magnet. . . ."

¹³ Silliman revised Henry's words in this postscript and printed the edited version as a "P.S." to the letter, the supposed extract of which was the paper describing the Yale magnet. See *Silliman's Journal*, 20:203.