

**A MEMOIR OF
ELIAS LOOMIS. PP.
741-770**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649165308

A memoir of Elias Loomis. pp. 741-770 by H. A. Newton

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Cover @ 2017

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BY

Written at request of
PROF. H. A. NEWTON.

FROM THE SMITHSONIAN REPORT FOR 1890.

WASHINGTON:
GOVERNMENT PRINTING OFFICE,
1891.

Educ U 8260.151.20

~~Educ 5755.77.19.5~~

5 June, 1893.

Gift of
Dr. Saml A. Green,
of
Cambridge.

A MEMOIR OF ELIAS LOOMIS.*

By H. A. NEWTON.

The President and Fellows of Yale College have requested that in this public place and manner, I should give an account of the life, scientific activity, and public services of our late colleague, Prof. Elias Loomis. It is a pleasure to perform the duty thus laid upon me. The hours of intercourse I have had with him, and his generous confidences, are precious treasures of my life. And I hope you will find it worth your while to have turned away from other thoughts for a single hour, to listen to the account of what, during near three score years of mature life, our colleague was doing for science, and through science for man.

Elias Loomis was born in the little hamlet of Willington, Connecticut, August 7, 1811. His father, the Rev. Hubbell Loomis, was pastor in that country parish from 1804 to 1828. He was a man possessed of considerable scholarship, of positive convictions, and of a willingness to follow at all hazards wherever truth and duty, as he conceived them, might lead. He had studied at Union College, in the class of 1799, though apparently he did not finish the college course with his class. He is enrolled with that class in Union College, and he also received, in 1812, the honorary degree of Master of Arts from Yale College. At a later date he went to Illinois, and there was instrumental in founding the institution which afterwards became Shurtleff College.

Although the boy inherited from his father a mathematical taste, yet his love for the languages also was shown at a very early age. At an age at which many bright boys are still struggling with the reading of English, he is reported to have been reading with ease the New Testament in the original Greek. He prepared for college almost entirely under the instruction of his father. He was, for a single winter only, at the Academy at Monson, Massachusetts. Owing in part to feeble health he was more disposed, in those early years, to keep to his books than to roam with other boys over the Willington hills. In later life

* A memorial address, delivered in Osborn Hall (Yale College, New Haven, Connecticut), April 11, 1890. (From the *American Journal of Science*, June, 1890, vol. xxxix, pp. 427-455.)

he frequently said that in his early days he never had a thought of asking what subjects he was most fond of, but studied what he was told to study.

At the age of 14 he was examined and was admitted to Yale College, but owing to feeble health he waited another year before actually entering a class. In college he appears to have been about equally proficient in all of the studies, taking a good rank as a scholar, and maintaining it through his college course. President Porter remembers well the retiring demeanor of the young student, and his concise and often monosyllabic expressions, peculiarities which he retained through life. During his junior and senior years he roomed with Alfred E. Perkins, whose bequest was the first large endowment of the college library. He graduated in 1830.

A few weeks before graduation he left New Haven and entered a school, Mount Hope Institute, near Baltimore, to teach mathematics, and he remained there for a year and a term. One of his classmates, the late Mr. Cone of Hartford, said that Mr. Loomis had intended to spend his life in teaching, and that it surprised him when he heard that his purpose was abandoned, and that Mr. Loomis had gone, in the autumn of 1831, to the Andover theological seminary with the distinct expectation of becoming a preacher. This new purpose was however again changed, when a year later, he was appointed tutor in Yale College. A vacancy in the tutorship in the May following (1833), and while not yet 22 years of age he returned to New Haven and entered upon the duties of the office. Here he remained for 3 years and one term. In the spring of 1836 he received the appointment to the chair of mathematics and natural philosophy in Western Reserve College, at Hudson, Ohio. He was allowed to spend the first year in Europe. He was therefore during the larger part of the year 1836-37 in Paris attending the lectures of Biot, Poisson, Arago, Dulong, Pouillet, and others. He did not visit Germany because of want of money. A long series of letters written by him at this time appeared in the *Ohio Observer*, and the contrast between England and France as he saw them, and the same places as seen by the tourist to day is decidedly interesting.

He purchased in London and Paris apparatus for his professorship and the outfit for a small observatory, and in the autumn of 1837 began his labors at Hudson. Here he remained for 7 years, maintaining with unflagging perseverance both his work in teaching and his scientific labors. In judging of this work at Hudson we must remember that he was not with perfect surroundings. He was without an assistant and without the counsel and encouragement of associates in his own branches of science. The financial troubles which culminated in this country in 1837 were peculiarly severe upon the young and struggling college. Money was almost unknown in business circles in Ohio, trade being almost entirely in barter. In this way principally was paid so much of the promised salary of \$600 per annum as was not in arrears. In one

of his letters he congratulates himself that all of his bills that were more than 2 years old had been paid. In another he says that there was not enough money in the college treasury to take him out of the state. When he left Hudson the college offered to pay at once the arrears of his salary by deeding to him some of its unimproved lands.

In 1844 he was offered, and he accepted, the office of professor of mathematics and natural philosophy in the university of New York. In this new position he undertook the preparation of a series of text books in the mathematics, and for some years a large part of the time which he could spare from his regular college work was given to the preparation of these books.

When Professor Henry resigned his professorship at Princeton in order to accept the office of Secretary of the Smithsonian Institution Professor Loomis was offered the vacant chair. He went to Princeton and remained there during 1 year, at the end of which he was induced to return again to his old place in the university of New York. Here he continued until 1860, when he was elected to the professorship in Yale College made vacant by the death of Professor Olmsted. For the last 29 years of his life he here labored for the college and for science, passing away on the 15th of August, 1889.

Let us look now in succession at the different lines of his activity during these 56 years,—4 here in the tutorship and in Europe, 7 at Hudson, Ohio, 16 in New York City and Princeton, and 29 in New Haven.

For the first year on returning from Andover to New Haven he was tutor in Latin, although it seems that he might, had he chosen it, have been tutor of mathematics. I believe that at the beginning his mind was not yet definitely turned toward the exact sciences. In his childhood he had taken specially to Greek. In college he was equally proficient in all of his studies. He is represented to have led his class at Andover in Hebrew, and now on entering the tutorship he chose to teach the Latin language and literature. During the second year he taught mathematics and the third year natural philosophy. His later success in scientific work was, I believe, in no small measure due to his earlier broad and thorough study of language.

I have made some inquiry in order to learn what it was that turned his attention and tastes toward science. One of his colleagues in the tutorship, the Rev. Dr. Davenport, says that he recollects very distinctly the first indication to his own mind that Tutor Loomis was turning his thoughts in this direction. The great meteoric shower of 1833 came early in the period of his tutorship, and the views of Professor Twining and Professor Olmsted about the astronomical character and origin of these interesting and mysterious bodies were a common topic of conversation among scientific men in the college, especially whenever Professor Olmsted was present. The tutors were accustomed to meet as a club from time to time in the tutors' rooms in turn, and Dr. Davenport well recollects the occasion when Tutor Loomis brought in

a globe and discussed before the club the new theories about these bodies. Up to this time Tutor Loomis had seemed to him to have given his thoughts and study to language rather than to science.

In January, 1834, there were constituted in the Connecticut Academy of Arts and Sciences twelve committees representing the several departments of knowledge, and Tutor Loomis was put on the committee on mathematics and natural philosophy. These are the only signs of scientific taste or activity which I have detected earlier than the autumn of 1834, after he had been a year and a term in the tutorship. From this time on to the end of his life he gave his time and energies to several subjects that are enough distinct one from the other to make it convenient to disregard a strictly chronological account of his labors and consider his work in each subject by itself.

A subject of which he early undertook the investigation was terrestrial magnetism. We often use the rhetorical phrase "True as the needle to the pole," but looked at carefully, the magnetic needle is anything but constant in direction. Like the weather vane on the steeple it is ever in motion, swinging back and forth, in motions minute and slow it is true, but still always swinging. It has fitfully irregular motions; it has motions with a daily period; motions with an annual period; and motions whose oscillations require centuries for completion.

The *daily* motions of the magnetic needle were those which Tutor Loomis first studied. At the beginning of the second year of his tutorship he set up by the north window of his room in North College a heavy wooden block, and on it the variation compass that belongs to the college. Here for over thirteen months he observed the position of the needle at hourly intervals in the daytime, his observations usually being for seventeen successive hours of each day.

The results of these observations, together with a special discussion of the extraordinary cases of disturbance, were published in the *American Journal of Science* in 1836. No similar observations of the kind made in this country had at that time been published. So far as I am aware, none made before 1834 have since been published, except ten days' observations made by Professor Rache in 1832. In fact I know of only one or two like series of hourly observations made in Europe earlier than these by Tutor Loomis. He also at this time formed the purpose of collecting all the observations of magnetic declination that had been hitherto made in the United States and of constructing from them a magnetic chart of the country. He appealed successfully to the Connecticut Academy of Arts and Sciences for its sympathy and aid. The work of collecting facts was so far advanced before leaving New Haven that when he had been a few months professor at Hudson he forwarded to the *American Journal of Science* a discussion of the observations thus far obtained, and with them a map of the United States, with the lines of equal deviation of the needle drawn upon it. Two

years later he published additional observations and a revised edition of this map.

These were the first published magnetic charts of the United States, and though the materials for their construction were not numerous, and in many cases those obtainable were not entirely trustworthy, yet 16 years later, when a map was made by the United States Coast Survey from later and more numerous data, Professor Bache declared that between his own new map and that of Professor Loomis, when proper allowance had been made for the secular changes, the "agreement was remarkable."

The northern end of a perfectly balanced magnetic needle turns downward, and the angle it makes with the horizon is called the magnetic *dip*. This angle is an important one, and is observed with accuracy only by using an expensive instrument, and taking unusual pains in observing. Hence only a few observations of this element were found by Professor Loomis. From these however he ventured to put on his first magnetic map a few lines that exhibited the amount of the *dip*.

While he was in Europe he purchased a first-class dipping needle for Western Reserve College, and at Hudson and the neighborhood in term time, and at other places in vacation, he made observations with this needle. Some of these observations were made before his second magnetic chart was published, and upon this map were now given tolerably good positions of the lines of equal magnetic dip. But he continued his observations for several years, determining the dip at over seventy stations, spread over thirteen States, each determination being the mean of from 160 to over 4,000 readings. These observations were published in several successive papers in the transactions of the American Philosophical Society at Philadelphia.

Various papers on terrestrial magnetism, in continuation of his earlier investigations, appeared in 1842, in 1844, in 1847, and in 1859, but movements in Germauy, England, and Russia had meanwhile been inaugurated, which led to the establishment by governments of a score of well-equipped magnetic observatories, and this subject passed largely out of private hands.

Closely connected with terrestrial magnetism, and to be considered with it, is the *aurora borealis*. In the week that covered the end of August and the beginning of September, 1859, there occurred an exceedingly brilliant display of the northern lights. Believing that an exhaustive discussion of a single aurora promised to do more for the promotion of science than an imperfect study of an indefinite number of them, Professor Loomis undertook at once to collect and to collate accounts of this display. A large number of such accounts were secured from North America, from Europe, from Asia, and from places in the Southern Hemisphere; especially all the reports from the Smithsonian observers and correspondents were placed in his hands by the secretary, Professor Henry.