

2000

Henry David Thoreau and Science: A Two Towers Tradition

Mike Los

Worcester Polytechnic Institute

Jim Lund

Worcester Polytechnic Institute

Dan O'Brien

Worcester Polytechnic Institute

Follow this and additional works at: <http://digitalcommons.wpi.edu/gordonlibrary-studentreports>

Suggested Citation

Los, Mike , Lund, Jim , O'Brien, Dan (2000). Henry David Thoreau and Science: A Two Towers Tradition. .

Retrieved from: <http://digitalcommons.wpi.edu/gordonlibrary-studentreports/1>

This Text is brought to you for free and open access by the The George C. Gordon Library at DigitalCommons@WPI. It has been accepted for inclusion in Library-related Student Project Reports by an authorized administrator of DigitalCommons@WPI.

00B 020 I

Project Number: WTM-1862-46

Henry David Thoreau and Science: A Two Towers Tradition

An Interactive Qualifying Project Report
Submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
In partial fulfillment of the requirements for the
Degree of Bachelor of Science
by

Mike Los
Jim Lund
Dan O'Brien

Date: October 31, 2000

Approved:
Professor Wesley T. Mott, Co-Advisor
Professor Kent P. Ljungquist, Co-Advisor

Abstract:

It is time to put to rest the popular misconception of Thoreau as a primitive naturalist who shunned science and society. His naturalistic tendencies sprang from science and technology, and he used the energy and work he put into his studies of nature, thriving on his work as a surveyor and pencil maker in order to produce natural history writings throughout his career. An exhibit on display at Gordon Library at WPI campus complements this report.

Table of Contents:

Executive Summary	3
Introduction	5
Thoreau's Natural Love	11
Thoreau According to J.R. Lowell	20
Emerson: A Friend Turned Enemy	23
An Idealist in an Imperfect World	29
Not Just a Writer	34
Into the Future	47
Appendix A: Exhibit items	49
Appendix B: Exhibit pictures	51
Selected Bibliography	52

Executive Summary:

Thoreau encompassed the values that WPI students should uphold. As a scientist and engineer, he was dedicated, meticulous and passionate. But Thoreau was also a humanist, always concerned with the effect of nature on humanity, and vice versa. This philosophy is the basis of the Two Towers tradition at WPI. It is important that we study Thoreau's life, and his literary work, so that we recognize the true genius of his work, which instills in us a strong feeling that Thoreau was more than just a writer; he was an observer of nature; a scientist. In many ways, Thoreau embraced the same kind of "Two Towers" tradition we value here at WPI. He was a scientist, but also a humanist. As a scientist, Thoreau did not seek to simply describe plants, animals or nature around him. He sought a greater philosophical understanding of how nature relates to man.

We shall attempt to illustrate the factors in Thoreau's life that demonstrate his lifelong dedication and excellence in science. It is also our goal to debunk the misconceptions of Thoreau as a misanthrope. By citing his own writings, and that of others, we will show that Thoreau's work and his motivations have been popularly misconceived; we hope to change the misconceptions.

It seems fitting that, in the end, Thoreau sought to really know nature by studying it in more depth than perhaps any predecessor by taking, at once, a scientific, philosophic and mystical approach. "Science is often like the grub, which, though it has nestled in the very germ of the fruit, and so perhaps blighted or consumed it, has never truly tasted it" (Thoreau *Wild Fruits* 242). Thoreau did not just practice science in this sense, he created a form of transcendental science in which he did not just "consume" the fruit of

knowledge by just doing research as most scientists do, but he whole heartedly “tasted” the sweet nectar of the fruit by pulling out what he learned in natural science and incorporating it into his entire life and literary works.

Even though Thoreau has been publicly scrutinized, even criticized for his opinions on life, nature, politics and technology, we cannot disregard them, for we have seen that these criticisms are usually misguided. Thoreau continually challenged mankind to appreciate its world and take time to recognize the complexity and beauty of nature. It is time that we do the same for Thoreau.

Special Thanks

Professor Jed Watters, Assumption College

Rodney Obien, Gordon Library Curator, WPI

Laura Walls

Professor Wesley T. Mott, WPI

Professor Kent P. Ljungquist, WPI

Introduction:

Henry David Thoreau. The name conjures the image of an angry hermit pacing in his cabin on the outskirts of society with a scowl on his face, trying to write down all of the reasons he hates people. Why should we not get this image? Ted Kaczynski was a hermit, and he turned out to be an antisocial with murderous tendencies, harboring horrible fantasies of destroying the framework of society. With images like this, what kind of uninformed judgments are people making about Thoreau, the man who supposedly shunned society in order to live in isolation at Walden Pond?

Most people do not even know that he only lived at Walden for two years of his life. More importantly, most believe that he went to Walden woods to in an attempt to escape society and run from mankind. There is partial truth in this idea, but Thoreau was attracted to Walden, in part, by his scientific drive to study the natural world. It is time to put to rest the misconception of Thoreau as an ignorant naturalist who shunned science and society. His naturalistic tendencies sprang from science and technology, and he used the energy and work he put into his studies of nature in order to produce natural history writings throughout his career.

Thoreau encompassed the values that WPI students should uphold. As a scientist and engineer, he was dedicated, meticulous and passionate. But Thoreau was also a humanist, always concerned with the effect of nature on humanity, and vice versa. This study of both science and its effects on humanity is the basis of the Two Towers tradition at WPI. It is important that we study Thoreau's life, his literature, and his work in science so that we recognize his true genius.

In his early years, he produced “Natural History of Massachusetts”, which, according to Carl Bode, contains the most genial observations Thoreau ever achieved. Throughout “Natural History”, Thoreau scatters poetry along with his occasional denunciations of society to complement his detailed examination of the nature in Massachusetts, all of which combine to make lively discussion, proving Thoreau’s avid dedication to the study of natural science even early on in his life.

Natural science and natural history were evolving as a field of study at the same time as Thoreau was beginning to take his afternoon walks in the woods to study trees, birds, berries and leaves. The study and development of natural history was such an enormous undertaking for Thoreau because it is, in effect, the search for the cipher that will decode what Emerson calls the “hieroglyphics” of nature. Thoreau spent the last ten years of his life outside in all conditions, counting rings on trees, measuring streams depths, and listing plant species. Laura Walls, author of *Henry David Thoreau and Nineteenth Century Natural Science*, asks the question why, what drove him to this behavior? She suggests two reasons: Thoreau’s intense joy in physical engagement with the woods, and his belief that he was on an intrinsic quest that would define the totality of his career. This intrinsic quest ended too early when Thoreau died, putting together *Wild Fruits*, what would be the culmination of a life of dedication to the study of natural science.

Wild Fruits, just recently published (2000), was discovered as a tattered manuscript in a chest in the home of Thoreau’s mother following his death in 1862. This manuscript was Thoreau’s final book-length work, what he thought would be his life’s work, and it was left unfinished. It contains many of the same themes as “Natural

History”, which shows that the study of natural science and history was a continual thread in Thoreau’s life, a thread that held fast through his personal evolution from teacher, to engineer, to craftsman, to literary scholar. We can no longer think of Thoreau as a hermit, a nihilist, or a misanthrope with disregard for both the government and his fellow man.

Certainly, in his attempts to change the ways we live, Thoreau has given fodder to these false impressions. He did say in a journal entry in October 1851, “it is impossible for me to be interested in what interests men generally. Their pursuits and interests seem to me frivolous”. Statements like this, taken out of context, could lead to criticism. We must realize that Thoreau’s attempts to change society were deeply pondered and well calculated.

Thoreau evolved from student, to teacher, to writer early in life, while always utilizing his skills as both a surveyor and a natural scientist to get by if the writing would not support him. Once he graduated from Harvard in 1837, he was ready to write and teach. He soon found that teaching suited neither himself nor the people he was teaching; finding it hard to work under the assumption that he would have to beat the ABC’s into his students. Along with his brother, Thoreau attempted to open what would now be considered a progressive school. But teaching never became Thoreau’s passion, for it was merely a tangential interest.

Between 1847 and 1854 (after his stint at Walden Pond) Thoreau spent time walking the countryside, making pencils, surveying, and composing *Walden*, which he revised for over seven years. Thoreau’s exploits as a pencil maker and surveyor exemplify his pure intelligence as an engineer. As we will see, these tasks are not simple,

yet Thoreau mastered them as he mastered everything in his life. He was a skilled craftsman. When he was not working, or writing, Thoreau took long afternoon walks in the country, where he would contemplate nature, and gather material for his work in natural science. Thoreau owed much of his focus, and much of his desire to study nature to Ralph Waldo Emerson.

Thoreau stayed with the Emerson family in 1841 and later on in 1847 as a handyman, close family friend, and protégé. Emerson saw Thoreau as becoming the man of Concord; this was the beginning of Thoreau's period of dedication to literature, and the time of his closest friendship with Emerson. Thoreau lived with the Emersons until 1843, when he went to New York to stay with Emerson's brother, attempting to make publishing contacts . . . he failed. Having no interest in the politics of publishing, Thoreau returned in 1845 and received permission take his axe to Walden Pond on Emerson's land to make his home for the next two years. And so, by going to Walden Pond, Thoreau began the dedication to nature that would characterize the latter half of his life.

Thoreau left the woods in 1847, when Emerson went to England in the fall of that year, to once again join the Emerson household and look after Emerson's family. It was in Emerson's absence that Thoreau took an interest in Emerson's wife Lidian. Some say Thoreau loved Lidian like a sister; others like a wife. No matter how he loved her, he could never have an exclusive relationship with her, which deeply hurt him. Once we examine the loss that Thoreau felt, we will see, at least in part, why he lost interest in society, and dedicated so much of his life to science and writing. Emerson returned from

Europe a changed man, affected by the pomp and politics of English society, Thoreau did not like the transformation one bit. Their relationship henceforth was never the same.

At this point, Thoreau was ready to publish *A Week on the Concord and Merrimack Rivers*, written mostly under the tutelage of Ralph Waldo Emerson. The book failed, and it was Emerson who turned out to be the foremost critic. This criticism precipitated an already budding estrangement between Emerson and Thoreau. Left in financial ruin by the failure of his book, Thoreau decided to concentrate on his journal writing while he did odd surveying jobs around Concord and surrounding parts of New England, never failing to take his walks in the woods. Thoreau supported himself financially at this point by surveying. With his basic training in mathematics at Harvard, and his comfort outdoors in various terrains, surveying came naturally to Thoreau.

To Thoreau, surveying was a compromise between earning a living and being able to pursue his interests in the study of nature. Surveying provided income, and this was good for him, but it was not his goal. In the time he surveyed, he was also gaining experience in natural science. It has to be recognized that Thoreau was an astute natural scientist. Corresponding with his friends Louis Agassiz and Asa Gray, who were both leading scientists of the day, Thoreau even discovered and classified numerous unknown plant samples. Natural science was perhaps Thoreau's most beloved interest, because he was able to discover yet unknown facets of nature.

Before we move on to a discussion of Thoreau's interest in the subject, we should discern what defines natural history and natural science. Just as science was evolving at the time, so were the terms to describe them. Natural history is empirical and descriptive because natural historians take a "bottom-up" approach to studying nature. Thoreau's

journal entries with countless descriptions of leaves, trees, and bushes show his empirical and descriptive approach to natural history. As time passed, natural history needed to be further classified. Finding the history of nature became the search for the natural clues that would prove something about the overall diversity of nature's wonder. Natural science became the more systematic discovery, observation and description of plants and animals. Thoreau pursued both natural history and natural science throughout his life by taking both a scientist's approach in discovering and cataloguing species of plants and animals, and a historians approach in making sense of his discoveries.

“The Naturalist”, a lecture by Emerson, also provides an early definition of natural history. Emerson says that natural history seeks directly what sciences, arts, and trades seek mediately—knowledge of the world we live in. He points out that

Men have been fingering characters carved on Egyptian remains for thousand of years, sure that they mean something if we could only find the cipher, so for a much longer period men have been groping at the hieroglyphics of Nature to find out the cipher, assured that they mean something, assured that we will understand ourselves better for what we read in the sea, land and sky...

Natural History seeks directly to provide this key or dictionary by observing and recording the properties of every individual and determining its place in the Universe by its properties.

(Emerson Early Lectures, 78)

Natural history is the search for the key to nature's mysteries, and Thoreau, with scientific precision, sought as his life's work to probe the mystery of nature for the cipher, the key to the mystery.

Thoreau's natural love:

Thoreau used all of the knowledge he gained studying nature to write such books as *Walden* and *A Week on the Concord and Merrimack Rivers*, which instill in us a strong feeling that Thoreau was more than just a writer; he was an observer of nature; a scientist. In many ways, Thoreau embraced the tradition we value here at WPI. He was a scientist, but also a humanist. He practiced what we call the “Two Towers” tradition. As a scientist, Thoreau did not seek to simply describe plants, animals or nature around him. He sought a greater philosophical understanding of how nature relates to man.

It was not merely that he might discover a new plant or animal species, but that he might study how this species has affected nature and man in some timeless way without our previous knowledge. Thoreau aimed to demonstrate how nature and life are intertwined. As he says in *A Week*: “some flitting perspectives and demi-experiences of the life that is in nature are in time veritably future, or rather outside to time, perennial, young, divine” (Portable Thoreau, 142). Nature is timeless, says Thoreau, her effects on our lives perennial and divine. This is why he studies nature:

How indispensable to a correct study of nature is a perception of her true meaning. The fact will one day flower out into a truth. The season will mature and fructify what the understanding had cultivated. Mere accumulators of facts – collectors of materials for the master-workmen – are like those plants growing in dark forests, which ‘put forth only leaves instead of blossoms.’

This quotation from Thoreau’s Journal of December 16, 1851 shows us that Thoreau firmly understood that we co-exist with nature. As a humanist, Thoreau himself could be compared with the “plants growing in dark forests” as he focused his work on observing nature in its simplest form. He felt that a day not spent with at least five hours in nature

was a waste. He did not neglect the human aspect to life; he regarded it highly compared with the scientific aspect.

Despite his many observations and discoveries, Thoreau was more concerned with the role that man and nature played together. He believed that an understanding of nature is essential to our existence. Thoreau says in his journal:

Like Antaeus of old, modern man must derive his strength from his contact with the earth and with nature. Deprive man of that contact and he becomes weak physically, spiritually and morally. Let him commune directly with nature and he becomes sturdy (quoted in Meltzer 212).

To this end, Thoreau took a broader approach to studying nature. He did not simply classify, he observed.

It is the job of the natural historian to move beyond classification to a broader sense of place in the history of nature. He regarded every specimen in its own habitat, seeing how it behaved, trying to gain a higher understanding of it, and its impact on humanity. He was not concerned merely with narrow scientific details of the organism, but rather the organism in the broader sense of its relationship with man. From his Journal on June 20, 1852, Thoreau writes:

We must view nature humanly to view it at all; that is, her scenes must be associated with humane affections, such as are associated with one's native place, for instance. She is most significant to a lover. A lover of Nature is preeminently a lover of man. If I have no friend, what is Nature to me? She ceases to be morally significant.

(Thoreau Journal, 1852)

This quotation shows the very essence of Thoreau's regard for nature. Comparing nature to a friend lends a more symbiotic relationship, rather than one where man simply takes from Nature.

In the 1840s, Thoreau became acquainted with Louis Agassiz, who had recently come to America. Agassiz was interested in classifying the species of flora and fauna indigenous to America. While much classification and research in this field was occurring in Europe at the time, very little was being done in America. Thoreau's studies and observations of nature seemed to integrate almost seamlessly with the work that Agassiz was doing in America.

While these two men shared an interest in nature, Thoreau did not share Agassiz's interest in taxonomy. Thoreau was never as concerned with the naming of species as he was with the organism itself. Additionally, Thoreau believed that while man observed and studied nature, he was still part of the nature that he was observing. Often butting heads with Agassiz's explanation of nature, Thoreau's beliefs were that the earth was alive, still in the process of creating itself while growing.

Faced with the question of how toad spawn appeared at the summit of Mt. Monadnock, Thoreau concluded that they could have come from a different location. The toad spawn spread to a new area. He dismissed Agassiz' theory that if they appeared at the top of the mountain, they must have developed there. "The sum of what the writer of whatever class has to report is simply some human experience, whether he be poet or philosopher or man of science. The man of most science is the man most alive, whose life is the greatest event" (Quoted in Walls, 12).

While Thoreau observed and studied the flora and fauna in Massachusetts, others around the county and in Europe were contributing to science in varying ways. The arrival of Agassiz brought European classification to the United States. Meanwhile, people like Charles Darwin and Alexander von Humboldt prided themselves on true

immersion into nature to see human's interaction as symbiotic with nature. About one century before Thoreau's time, Carolus Linnaeus had been developing a system of plant classification. Government funded explorations of the West provided new opportunities to see previously uninhabited land.

Just as science was evolving at the time, so were the terms to describe them. During Thoreau's time, natural philosophy comprised a broad education in fields such as physics, astronomy and mathematics. Natural history included more empirical sciences like botany, physical geography, zoology, entomology and ornithology. The strong distinction between these two lie in the manner in which they are approached. Natural philosophy was a "top-down" approach to science where everything was deductive, while natural history took a "bottom-up" approach, making it more empirical and descriptive. In "Natural History of Massachusetts" Thoreau asserts that one cannot be purely deductive. It is the job of the scientist to make connections to human life, much like a historian does with the events of the past.

The Association for Advancement of Science liked Thoreau's approach to science and offered him membership in 1853. On the survey they asked him to complete, he found himself unable to respond to the question of what branch of science interested him. What could he say, "the philosophical branch"? With so few others interested in science the way he was, Thoreau would have been better suited living a century later than he did. If that were the case, he would have been considered an ecologist and likely found himself in the company of others (Harding *Handbook* 138). He considered himself to be "a mystic, a transcendentalist and a natural philosopher" (Quoted in Meltzer 214).

Among Thoreau's greatest accomplishments as a natural historian were his observations of the succession of forests. While surveying, he noted growth patterns of trees and how time affected them. With this information, he wrote a lecture named "Succession of Forest Trees" (written and published in 1860) a piece that documented the differences between old- and new-growth forests. "Succession" was a lecture that Thoreau gave to farmers at Middlesex County cattle fair, where most of the farmers were familiar with Thoreau because he had done surveys for most of them. Here, Thoreau explains why he has developed an interest in forest succession.

In my capacity of surveyor, I have often talked with some of you, my employer . . . I need offer no apology if I invite your attention, for the few moments that are allotted me, to a purely scientific subject. . . I have often been asked if I could tell how it happened, that when a pine wood was cut down an oak one commonly sprang up, and *vice versa*. To which I have answered, and now answer, that it is no mystery to me.

(Quoted from "Succession of Forests")

From this quotation it is blatantly obvious that when he was surveying, Thoreau was certainly more interested in the nature around him rather than the work he was doing. We also see that the questions farmers asked him about how trees replenish themselves fascinated Thoreau.

In further explanation, Thoreau asserts that a new oak or pine tree growing, "though in some quarters still it may sound paradoxical, came from a seed." Thoreau goes on to explain how seed dispersion works through animal, wind and water movement. While he can be criticized for contributing to the destruction of forests (as a surveyor, he was usually called in before a lot was cut for wood) he also can be praised for his discussion of a system of forest management through forest succession (Harding *Handbook* 70).

Thoreau was a scientist ahead of his time; his beliefs as a natural historian were about a century early. Shortly after his death in 1862, the term “natural scientist” became more widely used, replacing “natural historian”. This is because science and literature were moving apart, and some natural historians were taking more scientific approaches to their studies. Thoreau could certainly be described as both a natural scientist and a natural historian because of his meticulous and methodical approach to the study of nature. We know from Thoreau’s journal that he did not share the same visions and goals as other, more literary scholars of his time because

Scholars have, for the most part a diseased way of looking at the world. They mean by it a few cities and unfortunate assemblies of men and women, who might all be concealed in the grass of the prairies. They describe this world as old or new, healthy or diseased, according to the state of their libraries, -- a little dust more or less on their shelves. When I go abroad from under this shingle or slate roof, I find several things that they have not considered. Their conclusions seem imperfect.

(Thoreau *Journal X*)

Thoreau was definitely singular in his exploits as a scientist. In order to understand fully the impact of his work as a scientist, we must look at his conclusions about the relationship between man and nature. We can find these conclusions in works like *Walden*, *Wild Fruits*, and even “Civil Disobedience”.

Almost all of Thoreau’s writings include at least a hint of natural science. In a work such as *Wild Fruits*, Thoreau is directly recording his natural observations, but in “Civil Disobedience” he has a more subtle approach using natural symbols to depict society. Even when criticizing Thoreau, James Russell Lowell gives him credit for his inclusion of nature in his works: “...his metaphors are always fresh from the soil; he had watched Nature like a detective who is to go upon the stand...” (Quoted in Rossi 341). Thoreau was certainly not the only writer to include natural symbols in his writing: his

mentor Emerson was one of many writers who used natural symbols, but they differed in manner from Thoreau. From his move to Walden Pond we know that it is not just the inclusion of nature in his writings that makes Thoreau unique, but rather his entire envelopment in nature that makes him stand out as one of the leading nature writers.

And this is because what Thoreau has done in moving to Walden Pond is to move himself, literally, into the world of his own figurative language. The literal woods, pond, and bean field still assume the same classical rhetorical guises in which they have always appeared, but they are suddenly readable in addition as the nonfigurative ground of a naturalist's account of life in the woods.

(Johnson in Rossi 450)

Thoreau was a writer, but he was also a student his entire life. He clearly states that he was trying to learn about nature and he learns by going to Walden Woods. "I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach..." (Thoreau *Walden* 61). This was Thoreau the scientist at his best trying to find the "facts" of nature.

Referring to Walden as an explanation of Thoreau, Stanley Hyman writes:

As he explains it in the book, it was an experiment in human Ecology (and if Thoreau was a scientist in any field, it was Ecology, though he preceded the term), an attempt to work out a satisfactory relationship between man and his environment.

(Hyman in Paul 26)

Hyman's interpretation of Thoreau trying to bridge a gap between man and his environment could be a very easy way to sum up this complicated man's writings. From the perspective of Thoreau's political views his goal was to have man return to the natural laws and be able to govern himself on what nature and God says is just, not on what any kind of society's laws could govern. It was Thoreau's attempt to take man back to nature at least consciously if not physically.

The only problem with Hyman's theory is that he suggests that Thoreau was looking for a "satisfactory relationship between man and his environment." Thoreau was an idealist. Thoreau was not looking for anything "satisfactory"; he was instead looking for perfection . . . the ideal connection between man and nature, or rather the quest for perfection that governed Thoreau's life and writings. It is fitting that Thoreau searched for the ideal connection of nature and man, because he was at heart, an idealist. This must have become apparent to him as he evolved from scholar, to writer to scientist through out his life.

It is too bad that Thoreau was on such a singular journey to discover the science and history behinds nature's wonder. Because his lifelong interests were such individual pursuits, Thoreau's work was subject to a lot of criticism early on in life. This is because Thoreau's opinions were really the only facet of his work that was recognized during his life. Too many critics fail to recognize the interest Thoreau held as both a scientist and philosopher, targeting their criticisms at selected opinions Thoreau may have had. Too often, attackers base their criticisms on assumptions, and then come to find out that their criticisms were misguided. Robert Louis Stevenson admittedly based his first criticisms of Thoreau on assumptions. Later, after Stevenson had become better acquainted with the work of Thoreau, he recanted his criticism. Besides Stevenson's essay on Thoreau, essays by James Russell Lowell and Ralph Waldo Emerson make up what are perceived as the three most damning analyses of Thoreau's character, as a skulker, and a nature lover.

We will see that attackers of Thoreau had philosophical and personal axes to grind with Thoreau. To those who failed to truly study his life, Thoreau's retreat to the

woods, refusal to pay his taxes, and attack on the integrity of society have all given him an offensive persona. J.R. Lowell smartly rips into the character and motivation of the man in his 1865 essay “Thoreau.” This is one of the major essays to influence popular opinion of Thoreau, as Lowell was long considered the first ranking American critic (Harding *A Century* 44).

Thoreau According to J.R. Lowell:

Widely considered the most damning analysis of Thoreau ever published, Lowell's essay was a sharp reprimand of everything for which Thoreau stood. We must realize, though, that Lowell had a long-standing argument over the editing of Thoreau's article "Chesuncook" which appeared in Lowell's *Atlantic Monthly* in 1858 (*A Century* 44). Even Emerson said that Lowell had a lingering "feeling of self consciousness, and never forgave Thoreau for wounding it" (*A Century* 44). In the argument over the article Thoreau had publicly criticized Lowell for being selfish and ignorant. With this in mind, we shall examine Lowell's criticisms of a man he believes has "insisted on our accepting his. . .defects and weaknesses of character as virtues and powers peculiar to himself" (*A Century* 44).

Thoreau was never recognized as a genius during his lifetime, and what little recognition he did receive was strongly colored by some unfortunate remarks by Emerson and Lowell, two very influential men in matters of literary taste. Both men published essays shortly after his death and virtually determined for quite some time the public's attitude toward Thoreau. Emerson's eulogy personifies Thoreau as "a somewhat cranky, anti-social hermit," while strongly emphasizing Thoreau's ability as a naturalist. However, Thoreau's genius in the study of natural science was lost in the criticism.

Lowell asserts that Thoreau suffered from a severely closed mind, but this closed mind is what made Thoreau such an effective student of nature. Because Thoreau lacked success, success was contemptible. Because Thoreau was "indolent, he found none of the

qualities that attract or employ the rest of mankind worthy to himself.” Because he was poor, money was an “unmixed evil.” Another criticism is that Thoreau

...makes his own whim the law, his own range the horizon of the universe. He condemns a world, the hollowness of whose satisfactions he has never had the means of testing...his critical power, from want of continuity of mind, is very limited and inadequate

(A Century 45)

Lowell believes that Thoreau has no right to criticize the satisfactions of society because he has never subjected himself to these same wants. These satisfactions include wealth, excess, and success in business or industry. Thoreau was disillusioned, believes Lowell, because his “faculty of generalization” spread no wider than himself, and because Thoreau had no experience to supply the material to “condemn a world.”

Lowell also addresses Thoreau’s avid curiosity in the natural world. Thoreau often marvels in his writing at the wonder and complexity of nature, the behavior of animals, or the seeding of plants, or perhaps the flight of birds. Lowell’s assertion, though, is that Thoreau’s studies of nature were nothing but a front. “He discovered nothing. He thought everything a discovery of his own, from moonlight to the planting of acorns by squirrels” (*A Century* 46). Lowell suggests that this wonder was not pure fascination, but a calculated attempt by Thoreau to alienate all others from his way of thinking so that he would be unique in his thoughts. Says Lowell:

This itch of originality infects his thought and style...
he sometimes invites our attention to a particular sophism
as that biggest yet maintained by a single writer...it is not
the true that he loves, but the Out-Of-The-Way.

(A Century 47)

Lowell cannot stand that Thoreau had a unique way of thinking. He rants that if one told Thoreau that Nature was beautiful, he would find a better argument in her ugliness, and

that Thoreau always wishes to “trump your suit and to *ruff* when you least expect it,” (*A Century* 47). Lowell believes that no one can be unique in thought; “a man cannot escape in thought...the notion of absolute originality is an absurdity, as if one could have a patent-right in it” (*A Century* 47).

Lowell’s final arguments address Thoreau’s stint in Walden Woods, and Thoreau’s aim at clean living and high thinking. “Thoreau’s experiment presupposed all that complicated civilization which it theoretically abjured” (*A Century* 52). The evidence Lowell offers to support this argument is this: Thoreau borrowed all of his tools, all of his books, his lamp, his fish-hooks, the supplies to build his house, and he squatted on a another man’s land. These actions are an “accomplice in the sin of artificial civilization” which Thoreau hoped to escape, and without his borrowed existence, says Lowell, Thoreau would never have survived.

His last point is that Thoreau’s “whole life was a rebuke of the waste and aimlessness of our American luxury, which is an abject enslavement to upholstery” (*A Century* 52). This, in Lowell’s opinion is a great contradiction, which renders Thoreau’s theories on society incredible. So we can see that Lowell certainly harbored negative feelings for Thoreau, and the reasons he may have had for his opinions. But the ill-founded jokes by Lowell and others came to an end during the 1890s when serious scholars began to take a closer look at the basis of Thoreau’s reputation. The ultimate irony of Lowell’s critical essays and poems is that to this day, virtually no one except specialist in American literature reads either Lowell’s poetry or his literary criticism. By maligning Thoreau’s genius, Lowell effectively buried his own reputation as a credible American author.

Emerson: a friend turned enemy:

The man who knew Thoreau best, Emerson, was fittingly the last man to have a public word on Thoreau in his 1862 eulogy “Thoreau.” Even though it was written with the intention of honoring his departed friend, Emerson’s eulogy had a most devastating effect on the fame of Thoreau, though Emerson saw it as high praise (Harding 22). Emerson created the concept of Thoreau as a Stoic (Harding 22). Especially for those who are not aware of the falling out between the two, criticism from the great companion of Thoreau’s early years creates great misconceptions. Emerson was Thoreau’s teacher, and his friend. Even though Emerson may not have generated Thoreau’s interest in nature, he certainly shared it, and always searched for ways in which Thoreau could refine his studies to form original and credible ideas.

So if they were so close, so aligned in their ideals, why would their relationship eventually fall apart? It is because Emerson gradually moved away from his interest in nature. Leaving Thoreau to look after his family, Emerson took an extended trip to Europe, and cultivated a new interest in politics and society. When Emerson returned to tell everyone about his new ideas, Thoreau was appalled. Their relationship thereafter was never the same.

The character and ultimate motivations of Thoreau can be better understood not through Emerson’s words, but through an analysis of their relationship, particularly the specific origins of their quarrel (Sattelmeyer 187). Within the tattered remains of this relationship, we may find some of the motivations that drove Thoreau’s dedication to the study of natural history as his life’s work.

Emerson's criticism of Thoreau's 1849 book, *A Week on the Concord and Merrimack Rivers* publicly revealed the disenchantment between the two. Thoreau complained in a journal entry that he was surprised that Emerson did not "offer that criticism which is most valuable and indispensable" until they were estranged from one another. Surprised was Thoreau because when he wrote the book, he "asked [Emerson's] criticism, and never got but praise for what was good in it," until their alienation, when Emerson "shot the truth to him on a poisoned arrow" (Journal of HDT 3: 61-62). It truly must have hurt Thoreau to be criticized by Emerson, for Thoreau says in his journal "Emerson's influence [was] greater than any man's," (Quoted in Sattelmeyer 191). *A Week* was supposed to represent both the culmination of Thoreau's apprentice years, and the period of his deepest obligation to Emerson (Sattelmeyer 192). Thoreau must have been devastated when his efforts to gratify and impress Emerson were not realized.

It must be recognized that the controversy surrounding *A Week* could have had a hand in creating Thoreau's seeming disregard for public opinion later in his career. Thoreau poured all he learned from Emerson into *A Week*, and he wrote it "out of a desire to prove himself worthy of Emerson's faith in him" (Sattelmeyer NEQ 192). So when Thoreau could not earn Emerson's praise, what motivation had he to win the praise of anyone else?

More reasons for Thoreau's inclination to "skulk" on the outskirts of society can be found in his failing attempts at finding the love of a woman. In 1839 he fell in love with Ellen Sewall, but by 1840, Sewall had finally rejected him. But by then, he was thoroughly entrenched as Emerson's literary son, and was living with the man and his family, so he must have been able to recover from his lost love. As a handyman, friend,

surrogate father and husband at the Emerson household, Thoreau cultivated a strong love for none other than Emerson's wife Lidian.

If we examine more closely Thoreau's feelings for Lidian, we will see why he had feelings of contempt for society, domestication and possession. It is important to recognize this contempt because it was another driving factor behind Thoreau's dedication to science later in his life. As we know, Thoreau was left to tend to Lidian and the children while Emerson was in Europe. So strong was the bond that developed between Lidian and Thoreau that he took to calling her his "very dear sister." According to Sattelmeyer, Thoreau must have, to a certain extent, transferred to her the role of exalted influence and inspiration he had once reserved for her husband. He cites at length a passage in Thoreau's journal, which is an "extended paen" to an unnamed sister. Written shortly after his final departure from the Emerson household, Thoreau says in his journal that a sister is

one whom I can purely love...but the one whom I almost have
no more to do with. [But] I shall know where to find her. It is
those whom I do not love that concern me—and make affairs for me.

(Sattelmeyer NEQ 199)

A passage such as this makes us ask, almost tongue in cheek, who could be making affairs for him? Thoreau seems to point his finger directly at Emerson as the reason he cannot have the one he purely loves. Henry Seidel Canby concluded in his 1939 biography, "Thoreau was what the common man might call in love with Emerson's wife" (Canby *Thoreau* 163).

It is unfortunate that we will never know the true feelings Thoreau had for Lidian. However, Thoreau's journal entry is among the most emotionally charged passages he ever wrote (aside from those about nature), revealing him to be deeply moved,

vulnerable, and not a little confused by the intensity of his feelings (Sattelmeyer 200). The evidence suggests that Thoreau believed Emerson took the last chance Thoreau had at true love.

Now we can see why Thoreau had contempt for the workings of society, domestication, possession, and love. Thoreau had had his domestication for a short time while Emerson was away in Europe, only to have it taken back by a once beloved friend turned enemy. What became perhaps Thoreau's final hardship after his break-up with Emerson, and what Walter Harding acutely shows in his biography of Thoreau is that

Here Thoreau was in his thirties and had so little to show for it...
Was he never going to fulfill the promise he had shown so strongly
as a young man? Emerson had promised that Thoreau was to be *the* man of
Concord, but what had he accomplished since [the break-up]?
His only book had been a failure, his name hardly known (Harding *Days* 298)

To make matters worse, charges that Thoreau was imitating Emerson were being renewed. James Russell Lowell asks Thoreau in a poem why “with good fruits of your own/ Can't you let Neighbor Emerson's orchards alone?” (Lowell *Poems* 42). So the latter years of Thoreau's life were a time of deep confusion and rejection. Now it is at least understandable why he shunned society and “skulked” on the outskirts with only his thoughts and nature to surround him.

Emerson did have the last public word on Thoreau in his ambivalent eulogy, but he lived to privately recant some of criticism on Thoreau's wasted talent (Sattelmeyer 204). This change of heart came when he read Thoreau's complete journals following Thoreau's death, for it was only then that he realized the depth of Thoreau's devotion to his natural history studies and his mastery of craft as a writer (Sattelmeyer 204).

The first reason Sattelmeyer presents is that the Emerson who returned from Europe “had changed in way that could not have pleased his provincial friend.” Following Emerson’s return, there was awkwardness, for Thoreau knew that Emerson had left Lidian in delicate health, and left their three young children for an indeterminate excursion abroad that stretched for the better part of a year (Sattelmeyer 196). Possibly even more shocking to Thoreau, was the praise Emerson suddenly gained for English economy, transportation, and culture. Emerson had become a socialite, everything that Thoreau disliked. This is very good reason to understand some of the hostilities Thoreau harbored towards the merits of society. *A Week* was his first attempt at real literature, although it still had aspects of natural science. After *A Week* failed, Thoreau started writing mainly for himself, and natural science became the main theme of almost all of his work.

This quarrel must have been increasingly disappointing to Thoreau, because Emerson had so much knowledge and insight to offer regarding natural history and natural science. Emerson’s 1834 essay “The Naturalist” defines these terms, and although is certainly was not deliberate, the essay practically delineates the motives of Thoreau’s retreat to Walden Woods. One might take this quotation as evidence:

I [Emerson] cannot but think that a ramble in the country with the set purpose of observation to most persons whose duties confine them to the city would be a useful lesson. By such excursions the student will see a day perhaps in a light which he never regarded it...go out into the woods and, break your hours...you shall see a day as an astronomical phenomenon. You shall forget your petty relations to Boston and Cambridge and see nothing but the noble earth on which you was born.

(Emerson Early Lectures, 96)

This is, in effect, what Thoreau’s goal was when he left for Walden. He used this technique of seeing the day as nobody else when he made his observations of nature in

the woods. Immersed in his observations, Thoreau forgot his “petty relations” to the city, and thus his goal in life became the study of the wonder of nature.

He started work on *Wild Fruits*, which he never finished, because of his untimely death at age 44. In the words of editor Bradley Dean, the unfinished *Wild Fruits* “presents Thoreau’s sacramental vision of nature—a vision compelling because it grew out of an approach to the natural world at once scientific and mystical” (*Wild Fruits* 9). Dean goes on to say that this period culminates in a long and remarkable journal entry written September 7, 1851. Thoreau realizes his life’s work:

The art of spending a day!... If by watching all day and night, I may detect some trace of the Ineffable, then will it be worth wile to watch? Watch and pray without ceasing?...

I am convinced that men are not well employed—that this is no way to spend a day...we are surrounded by a rich and fertile mystery. May we not probe it....To devote your life to the discovery of the divinity of Nature...

(*Wild Fruits*, 12)

Thoreau’s earlier works simply recorded his excursions into nature, with this new goal of probing the “rich and fertile mystery” of nature; he would begin to describe nature itself.

An Idealist in an Imperfect World:

In his quest to describe nature itself, Thoreau employed various techniques to convey his ideas. Pastoralism was one of the most useful of these techniques, becoming one of the central themes in *Walden*, which Leo Marx, in *The Machine in the Garden*, calls “the report of an experiment in transcendental pastoralism.” Far away from the corruption of city life, the pastoralist seeks a return to the simple rural life of a farmer or shepherd. Marx calls pastoralism “distinctively American view of society. . .to withdraw from the great world and begin a new life in a fresh green landscape” (Marx, 3). By embracing pastoralism and going to Walden, Thoreau was able to cultivate his growing dedication to natural science.

Unlike the pastoral works of Hawthorne and Washington Irving, Thoreau did not just write about a return to nature away from the vice of society; he actually moved to the woods. However, Thoreau did not go to the woods to completely withdraw from society and technical progression. He did not have a “Luddite” view towards technology as Marx points out in *The Machine in the Garden*. Instead Thoreau’s view toward technology was much more intricate and represents the complexity of the man himself. Thoreau’s view of technology must have been a personal contradiction. On the one hand, technology could compromise the beauty and wonder of the nature which he so loved. But on the other hand, all of the new technology of the industrial era culminated the wonder of all the new discoveries in science and engineering, which must have fascinated Thoreau.

From Thoreau's evaluation of the railroad in *Walden*, we can effectively evaluate his views on technology. It is important to understand Thoreau's views on the railroad. At times he appears to be human contradiction, at once loving and hating the railroad. But upon deeper examination, we see that it was the scientist in Thoreau that admired the precision, and mechanical genius of the railroad. The pastoral naturalist in Thoreau feared the railroad because it was a machine in nature's garden, an intruder.

Thoreau's inclusion of the railroad in *Walden* is important not just because it is an example of mid-nineteenth century progress, but because the railroad was a much greater symbol. The technology of the railroad was the most advanced of the time. The scientific side of Thoreau could appreciate the marvel of this giant man-made machine and the intricacy of its precision. He realized that the railroad was not just new technology, but rather the symbol of a new and rapid revolution that could not be completely ignored. So, what was the problem with the railroad?

Thoreau had a fear of what technology meant to nature, the effect that the railroad, in particular, had on the surrounding wildlife. Thoreau also feared that the workingman would soon become, much like the railroad, just a cog in the business machine of America. "[The workingman] has no time to be anything but a machine" or else his work and subsequent pay would be less. Early on in *Walden* we see that Thoreau, by living a subsistent existence and distancing himself from society, has beaten this deterministic existence, thus becoming completely self-reliant.

It seems possible that man can completely withdraw from society, and live an existence without the artificial time dictated by society, living simply by nature's seasons.

The startings and arrivals of the cars are now the epochs in the village day. They go and come with such regularity and precision, and their

whistle can be heard so far, that the farmers set their clocks by them,
and thus one well conducted institution regulates a whole country.

(Thoreau *Walden* 79)

Even in the Walden Woods where Thoreau seems to have escaped civilization, he is still reminded with the regularity of a train whistle about the existence that society has tried to determine for him. The railroad served Thoreau as a link to civilization both symbolically and literally. Thoreau mentions in *Walden* several times his commutes to the town of Concord via the railroad tracks. “I usually go to the village along its causeway, and am, as it were, related to society by this link” (Thoreau *Walden* 78).

Thoreau’s description of the railroad shows the opposing beliefs that he has toward institutional control of life. He originally compares the railroad to a partridge with a very delicate description that it “touches the pond”. (Marx 250) “...for the last half hour I have heard the rattle of railroad cars, now dying away and then reviving like the beat of a partridge...” (Thoreau Walden 77). Then a subsequent paragraph refers to the railroad’s whistle as sounding like the “scream of a hawk.” This contradiction is transcendentalism at its best. It represents the odd contradictions he harbored towards the railroad. He believes, in one sense that it is good, because he can use the tracks to get to town. But the train also screams through his yard, shaking and disrupting everything in its path.

It seems that all of Thoreau’s analogies to the railroad involve natural metaphors. Whether the railroad is a hawk or a pheasant, it does not matter. He has already accepted the railroad as being part of Walden. Even though he refers to the railroad as a “deep cut” in one point, it seems that by the end of the section on the railroad, nature has grown accustomed to it and has grown back around the lines. Even though the train makes noise

and “shakes the earth”, it comes cyclically and with the same frequency, thus harmonizing with nature.

Thoreau sums up his thoughts on the railroad with this poem:

What’s the railroad to me?
 I never go to see
 Where it ends.
 It fills a few hollows,
 And makes banks for the swallows,
 It sets, the sand a-blowing,
 And the blackberries a-growing,
 But I cross it like a cart-path in the woods.
 I will not have my eyes put out and my ears
 spoiled by its smoke and steam and hissing.

(Thoreau *Walden* 83)

Thoreau is coming to grips with the railroad as an institution over which he physically has no control. Even trying to find a place where the railroad does not go is impossible. For as he said before about the train whistle, “I doubt if there is such a place in Massachusetts now” where the whistle can not be heard (*Walden* 77). Thoreau points out that a physical reality of an absolute pastoralism is not possible, that it only exists in fiction.

Completely escaping technology, more specifically the railroad, was not an option. In fact as seen in his poem, nature had even grown acclimated to what was once a “deep cut” in her. Thoreau accepted the railroad as what it was and that it was here to stay, but he practiced a mental form of pastoralism when he conscientiously rejected the fatalism that accompanied the railroad, which most others accepted all too readily.

Since Thoreau moved the pastoralism which he so desired into a conscious sense rather than a physicality he did not have to completely reject technology or for that matter society. Maybe the scientist in Thoreau forced him to accept the railroad. This principle

is probably the most important thing that he learned from his “experiment” at Walden. Because he discovered that pastoralism is primarily a sense of consciousness, he no longer needed to distance himself from society, or fear technology. Even in the midst of the evils of society (from which he could not really escape) Thoreau could still exercise his freedom of choice to live how he wanted. He could still study the science behind nature, trying to make sense of nature’s wonder in his lifelong search for what Emerson called the cipher that would unlock the mysteries.

There was only one pressing problem with such a noble effort; it certainly did not pay very well. Remember, Thoreau only subsisted at Walden for two years, for the rest of his life, whether he liked it or not, he needed means to support himself. For a long time, Thoreau worked for the family pencil business. Once again proving his genius as both a scientist and chemical engineer, we will see how Thoreau succeeded in his quest for the perfect pencil. Thoreau also succeeded as a civil engineer, doing surveying jobs around Concord, and surrounding Massachusetts for most of his life.

As a surveyor, his map of Walden Pond became the official map used by the town of Concord in their charter. Not one to waste any time, Thoreau utilized all of the time he was out surveying to observe the woods, gaining an excellent grasp of the science of nature. He worked closely with scientists like Louis Agassiz and Asa Gray, both leading natural scientists of the day, who frequently received from Thoreau previously undiscovered plant and animal samples he found while out on surveying jobs. When he went into the family pencil business, Thoreau studied and invented until he had created the perfect pencil.

Not just a writer...

Thoreau always sought to excel at everything he did because he was no fool. As seen in previous chapters, he knew that critics, including his long-time friend Ralph Waldo Emerson, often accused him of lacking the right ambition. Rather than pursuing a career solely in engineering or science, Thoreau sought to travel two paths in life: one of science, and one of humanities. The humanistic path is evident in his many writings, but what of the scientific; he is often not credited with what is rightly deserved and earned. Thoreau was a great engineer; let us now examine his prowess in pencil making for proof of this.

He attended and graduated from Harvard College, where he studied medicine, theology, law, education as well as some mathematics (geometry, trigonometry) and physics. Upon graduation, he chose to become a teacher. His education of philosophy and science was typical for a college student of the time. For a brief period he taught in Concord, but he was criticized for his unconventional ways and soon after gave up teaching (Petroski 106).

With no means of income, Thoreau took up the family trade: pencil making. He approached the trade as a challenge, trying to improve it. From an engineering point of view, Thoreau refused to simply continue manufacturing pencils in the conventional American way. American pencils of the time were made of inferior materials, which rendered them inefficient, greasy and gritty, and by no means competitive with European pencils. Thoreau applied scientific knowledge gained at Harvard and his own ingenuity toward improving the whole pencil manufacturing process (Meltzer 136).

Thoreau wanted to better understand why European pencils were of higher quality than American pencils. He studied all aspects of the pencil, from the materials to the production process. Observing that the quality of the American pencil was inferior to European counterparts, he began his mission.

Thoreau consulted references available at Harvard to see what process European pencil makers followed. He discovered that they employed the Conté process, which allowed pencils be softer or harder depending on the mixture of graphite and clay (Petroski 113). However, this moved Thoreau no closer to the conclusion that he sought. He still did not have a firm understanding of the process, nor how to improve his own pencils.

Further research at Harvard may have produced the result he sought, though. Engineer and historian Henry Petroski believes that Thoreau might have come upon this paragraph in the *Encyclopaedia Perthensis* under the heading of “black lead”:

A coarser kind are made by working up the powder of black lead with sulphur, or some mucilaginous substance; but these answer only for carpenters or some very coarse drawings. One part of plumbago with 3 of clay, and some cow hair, makes an excellent coating for retorts, as it keeps its form even after the retorts have melted. The famous crucibles of Ypsen are formed of plumbago mixed with clay.

(Petroski, 113)

This paragraph could have been the gateway between the pencils that his family was manufacturing at the time and the pencils for which they would later be known. This entry in the encyclopedia did not clearly give Thoreau what he was looking for, but might have been enough to get him started on the Conté process. Although including sulphur in pencil lead was usually associated with carpenter’s pencils, if he overlooked that sentence and read into the next sentence about mixing clay with plumbago, he may have been able

to deduce that it would create a pencil suitable for artists. From this he deduced that having some clay in his mixture would improve the darkness of the mark his pencils produced. In addition, clay made the pencil harder. This meant that the pencil could be sharpened to a finer point, thus allowing it to be far better than was possible before. Although this was a good start, it was not the complete answer. A problem still needed to be addressed: grittiness (Petroski 113).

A pencil that produces dark, sharp marks is worthless if it scratches the writing surface or shatters into gritty pieces. Thoreau understood from his studies of European pencils that finely ground graphite would produce a pencil without the gritty characteristics found in American ones. Drawing on his talent for engineering, according to Edward Emerson, he devised a chamber for isolating only the finest ground graphite. It was some 7 feet high, with a draft of air to accelerate graphite/lead particles upward. Only the finest particles were trapped on a shelf overhead. He also designed a graphite mill that would grind lead or graphite particles to be used in the chamber. Most importantly, his design was so simple that anyone could use it (Petroski 114). He didn't just design equipment that was functional; he employed his ingenuity and engineering background to make equipment and processes better. Pencils produced using this new equipment were equal in quality to those of German pencil-makers. Thoreau quietly kept his new methods hidden so competitors would not try to copy them. Those working for him were not even trusted to know certain aspects of the business, as he and sister Sophia would handle packaging in an upstairs room of their Main Street home (Harding *Days* 56).

Thoreau's next refinement came while he found himself in debt, shortly after the death of his father. A few months before, he had been tutoring on Staten Island, New York, and continued to ponder ways to improve the pencil manufacturing process. He gave considerable thought to the way lead was placed into the wooden shell. The process involved making a groove in two halves and gluing the halves together. While this process worked, it still resulted in inferior pencils when compared to European ones. He envisioned a way to bore a small hole in the piece of wood, and then fill the hole with lead. This would not require the two halves of the pencil to be glued together, and the lead would not need to be brushed into the two halves. The pencil would start out as a solid piece of wood and lead would be inserted. Cylinder-shaped lead could be used because of this advancement. This type of lead was already being used in mechanical pencils in Britain. The benefit here is that when sharpened, it is easier to sharpen round lead to a sharp point. This meant another improvement to the Thoreau & Company line of pencils: even finer quality lines! Thoreau wasn't out of the woods yet, though. He still needed to devise the mechanism to drill the hole in the wood (Petroski 117).

To accomplish the task of drilling a hole in the cedar wood, Thoreau used a drilling machine to create the hole and found that what he created was a fine pencil (Meltzer 139). The round shape of the lead could be sharpened to a fine point easily, and by experimenting with different ratios of clay to plumbago, he created pencils of varying hardness (Petroski 117). They ranged from S.S. to H.H., with S. and H. in between. These abbreviations probably stood for "softer than soft," "soft," "hard," and "harder than hard." Thoreau marketed these new pencils to engineers, surveyors, architects, and artists (Petroski 117).

These refined pencils brought Thoreau & Company much praise, including this letter from D.C. Johnson of Boston, dated June 1844:

Sir: Having made a trial of your pencils, I do not hesitate to pronounce them superior in every respect to any American Pencils I have yet met with, and equal to those of Rhodes, or Beeckman & Langdon, London.

Letters like this one show that Thoreau had succeeded in what he set out to do: improve the pencil by improving the technology and methods used to manufacture it (Petroski 120).

In 1849, Thoreau & Company moved from making pencils to selling plumbago for electrotyping. The advent of the electrotyping brought new demand for finely ground plumbago. As Thoreau & Company already had the best methods for grinding plumbago for their pencils, they could easily sell ground plumbago to electrotypers. They were selling 500 pounds per year, at a cost of \$10 per pound. It became more profitable for Thoreau & Company to sell ground plumbago than to manufacture pencils. In 1852, they stopped selling pencils in favor of selling plumbago to electrotypers (Meltzer 139).

Selling finely ground plumbago to electrotypers was possible because of Henry Thoreau's innovations to the family business. Before he improved the process and developed new machines for pencil making, such an idea for a second application would not have been feasible.

Thoreau continued to work in the pencil/plumbago business until he could not improve it anymore. It is rumored that Thoreau stopped because he had created the perfect pencil, but this might have been a façade for competitors. Nonetheless, Thoreau did not want to manufacture pencils for the rest of his life; he wanted to improve them,

and when he couldn't improve them anymore, he lost most of his interest in the pursuit (Meltzer 136). Once there was no promise of intellectual stimulation in a job, Thoreau could never see fit to keep doing it except to maintain income for his family. It simply became boring, and Thoreau refused to be bored in his life. There is yet another perfect example of a job that Thoreau worked to perfection: the work he did as a surveyor.

Thoreau had such prowess as a surveyor that it prompted Emerson to say that "Thoreau wants a little ambition in his mixture. Fault of this, instead of being the head of American Engineers, he is captain of [a] huckleberry party." He implies that Thoreau had the capacity to be the best engineer in America, but instead he chose to focus his efforts in other areas, including surveying and writing. Although Thoreau never intended to spend so much of his time surveying, he found that it provided him with a decent income, and yet allowed him to spend time outdoors studying nature. To Thoreau, surveying was a compromise; a compromise between earning a living and being able to pursue interests outdoors studying nature. Despite the remarkably accurate work he did, his rates were quite reasonable. Often charging only a few dollars for a surveying job, Thoreau could easily have asked significantly more for the work he performed. After all, his work was just as accurate as that of a professional firm of the time (Harding *Days* 191).

Although he was meticulous and thorough in his work, Thoreau surveyed because he needed money badly, and it was a personal interest to him; he did not want surveying to be his career.

I have lately been surveying the Walden woods so extensively and minutely that I now see it mapped in my mind's eye – as, indeed, on paper – as so many men's wood-lots, and am aware when I walk there that I am at a given moment passing from such a one's wood-lot to such another's. I fear this particular dry knowledge

may affect my imagination and fancy, that it will not be easy to see so much wildness and native vigor there as formerly.

In this entry from his Journal on January 1, 1858, Thoreau shows us that he is aware of what he is becoming, and fears that he will not be able to go back to the naïve life of observing without having thoughts of property lines and surveys in his mind.

While living at Walden Pond, he surveyed the depth of the pond using a few crude instruments. With only a compass, fishing line, and a weight, he was able to measure accurately the depth of the pond, keenly noting that the point where it was deepest was precisely at the intersection of the maximum length and width. Despite these crude measurement tools, we see today that even compared with a modern-day map, his measurements were surprisingly precise (Struik 280).

Surveying requires meticulous attention to detail. Although today we commonly observe surveyors using sophisticated equipment, no such equipment existed in Thoreau's time. What did exist, however, was the transit. Along with the compass, it was the primary instrument of surveying in Thoreau's time. In order to accurately survey a plot of land, it is often necessary to trek through heavy woods and brush. Moving across varying terrain for significant distances is also not uncommon. Thoreau also had to keep a sharp eye out for obscure stakes in the ground, and old markings on trees. He was often assessing deeds that were created over a hundred years prior with significant land boundaries only marked by overgrown gouges in the sides of trees (Perno 11). After that many years, those gouges significantly changed, and in many cases were barely visible (Thoreau *Journal X*: 225). Thoreau had to have a meticulous scientific method of work in order to complete his jobs.

It was in surveying jobs where boundaries could not be located, or were difficult to spot, that Thoreau relied most on his skills as an observer and natural scientist. By identifying how markings and gouges change over a period of time, he was able to find them or other identifying marks that were made years before. In some cases he found major errors, and had to correct the misinformation from earlier deeds done by less-skilled surveyors (Thoreau *Journal X*: 225).

Thoreau's map of Walden Pond that he made while he was living there laid was the best drawn up to that point in time. Although not considering that his map of Walden would ever be published, a year later it would appear as part of the official town map of Concord, Massachusetts. The survey of Walden Pond was only the beginning of what was to come for this amateur surveyor (Struik 279).

Among Thoreau's earliest surveying jobs was one he did for his friend Ralph Waldo Emerson. Thoreau surveyed land at Walden Pond for a cabin similar to his own to be used by Emerson. Although the cabin was never built, Thoreau still received his modest dollar fee (Perno 9). His services became known in Concord, and he was requested for deed retracement surveys, which meant he had to examine and correct errors in the deeds. He even advertised in town for his surveying services, noting that those looking for him could find him "by the pond." Typically, boundary disputes motivated land owners to seek his appraisal of their boundaries. The outcome of Thoreau's survey would play a role in determining how much wood was on a particular plot of land, and which wood was valuable.

Retracement surveys were quite common, and were often difficult for Thoreau because deed holders frequently knew little about their own land. Their deeds, often

tattered and torn, were either difficult to read or contained incorrect information. Thoreau's job was to correct these inconsistencies despite farmers' and landholders' greedy desires for more land in any way possible, including mistakes on deeds. He was even hired to verify surveys done by other surveyors for accuracy. As his rates were so low, his accurate and precise work left him in high demand. The question to be posed then: why didn't Thoreau charge more for his work? Although there seems to be no definitive answer, it's clear that Thoreau never intended for this to be his career. Perhaps that explains why he worked so inexpensively. It is reasonable to think that Thoreau might have hoped that more requests to lecture would come from being well known as a surveyor. Or, Thoreau may have just underestimated his himself and his ability as a surveyor.

An excerpt from Thoreau's Journal from December 22, 1853 shows us Thoreau's growing impatience with farmers:

Surveying the last three days. They have not yielded much that I am aware of. All I find is old boundmarks, and the slowness and dullness of farmers reconfirmed. They even complain that I walk too fast for them. Their legs have become stiff from toil. This coarse and hurried outdoor work compels me to live grossly or be inattentive to my diet; that is the worst of it. Like work, like diet; that, I find, is the rule. Left to my chosen pursuits, I should never drink tea nor coffee, nor eat meat. The diet of any class or generation is the natural result of its employment and locality. It is remarkable how unprofitable it is for the most part to talk with farmers. They commonly stand on their good behavior and attempt to moralize or philosophize in a serious conversation. Sportsmen and loafers are better company. For society a man must not be too *good* or well-disposed, to spoil his natural disposition. The bad are frequently good enough to let you see how bad they are, but the good as frequently endeavor [to] get between you and themselves.

(Thoreau journal 22 Dec. 1853)

Comparing farmers to sportsmen and loafers, and adding that they are worse company, enables us to read into his frustration. Perhaps it is the monotony of surveying that

Thoreau is really frustrated with, and takes it on farmers because they have requested his services. Clearly Thoreau would rather be writing or lecturing than surveying.

The town of Concord was among his employers. Contacted in 1851 to assist the town selectmen in the annual survey of town boundaries, Thoreau agreed. Despite his frustration with the job, partially due to the “emphatically trivial things” his co-workers disputed about, the job successfully resolved all of the borders in dispute (Thoreau *Journal* 5). This would not be the last job that Thoreau would do for the town of Concord. In the same year, he did a survey of White Pond that was included in the town map.

Thoreau’s reputation as a surveyor continued to strengthen. As a result, his services were requested locally, and as far away as Perth Amboy, N.J. During a boundary dispute between Emerson and Charles Bartlett, they agreed that whatever boundary Thoreau concluded would be final. The land in question had been disputed for some years, and even went to court before finally being settled. Emerson accused Bartlett of cutting wood on his land, but after Bartlett gave the wood back, he produced an old deed, which showed different boundary lines. The dispute was finally settled in December of 1857 when Thoreau found that both Emerson’s and Bartlett’s deeds were incorrect. Thoreau concluded that both men should end up with more land than they previously had.

Because of his skills as a natural scientist, Thoreau was a keen observer of the terrain and vegetation, which made him well suited for surveying. He was able to keep notes on the behavior of the plants that he studied daily. Observing that the type of wood used for boundary stakes played an important role in determining how long it would last,

he made note of which ones were best. He observed that Hickory stakes lasted less than 10 years, while white-colored stakes still stood after well over 10 years. He also understood that when paper deeds get old they irreparably deteriorate. In cases where rugged maps were needed, he printed them on cloth. Remarkably, these maps are still intact today (Thoreau, Journal X: 222).

While in the field surveying, Thoreau discovered that birch trees were best for long sight viewing because their color made them easy to see. Of course this was not the case in winter with snow on the ground. Even some of his companions taught him better ways of doing things. In 1851, an Irishman showed him a better way to drive stakes into the ground. Using a notch carved into the side of it, he was able to pound stakes more easily.

Thoreau is still considered a remarkable surveyor for his time, as he had little formal training. His knowledge came mostly through experience. He is recognized in recent scientific publications for the surveying work he performed. Despite his skill, he found little reward in surveying. Knowing that he was doing a job that a hundred other men could easily do, he used it as a tool to get what he really wanted: literary recognition. By ingratiating himself into Concord society through the work he did surveying, he hoped to be requested for more lectures, but settled for the few requests he did receive.

I have dined out five times and tea'd once within a week. Four times there was tea on the dinner-table, always meat, but once baked beans, always pie, but no puddings. I suspect tea has taken the place of cider with farmers. I am reminded of Haydon the painter's experience when he went about painting the nobility. I go about the houses of the farmers and squires in like manner. This is my portrait-painting, -- when I would fain be employed on higher subjects. I have offered myself much more earnestly as a lecturer than a surveyor. Yet I do not get any employment as a lecturer; was not invited to lecture once last winter, and only once (without pay) this winter. But I can get surveying enough, which a hundred others in this country can do as well as I, though it is not boasting much

to say that a hundred others in New England cannot lecture as well as I on my themes.

(Thoreau Journal 22 Dec. 1853)

Thoreau found that he had no trouble being sought out for his surveying skills, but was rarely asked to lecture. In this quotation from his journal, dated December 22, 1853, Thoreau is comparing farmers who contract him to survey with nobility. He notes that they eat pie instead of pudding, and drink tea and coffee instead of cider. While Thoreau would like to be associated with people of this class, he would like to do so because of his lectures, and not because of surveying.

Hard and steady and engrossing labor with the hands, especially out of doors, is invaluable to the literary man and serves him directly. Here I have been for six days surveying in the woods, and yet when I get home at evening, somewhat weary at last, and beginning to feel that I have nerves, I find myself more susceptible than usual to the finest influences, as music and poetry. The very air can intoxicate me, or the least sight or sound, as if my finer sense had acquired an appetite by their feet.

(Thoreau Journal 22 Dec. 1853)

Surveying brought him closer to his goal of literary recognition by another means. It put him closer to nature on a daily basis, and offered him experience as a natural scientist. He was able to study the outdoors while on surveying jobs. While this was not the same as lecturing, it was a catalyst for thought, as this quotation from his Journal dated November 20, 1851 suggests. The dramatic differences between surveying and writing gave Thoreau a better appreciation for “the finest influences, as music and poetry”.

So we can see that from surveying, Thoreau wanted only to seek opportunities to enhance his career as a writer, and find time devote to his scientific study of plant life. Proof of this can be found in the number of previously unknown specimens that he sent to Louis Agassiz. In his travels, he collected samples of flora and fauna, usually un-

catalogued species. He sent many plant and animal specimens to Agassiz for cataloging that Agassiz had not previously seen (Struik 280). In the same way as he gained respect in the engineering field of surveying, Thoreau was winning respect from natural scientists as well. Natural science was perhaps Thoreau's most loved work, because he was able to discover unnoticed facets of nature, thus implying that the kind of writing was turning to (as in *Wild Fruits*) was related to his being outdoors.

Into the Future:

It seems fitting that, in the end, Thoreau sought to really know nature by studying it in more depth than he had ever before, or perhaps anyone had ever done. “Science is often like the grub, which, though it has nestled in the very germ of the fruit, and so perhaps blighted or consumed it, has never truly tasted it” (Thoreau *Wild Fruits* 242). Thoreau did not just practice science in this sense, he practiced a form of transcendental science in which he did not just “consume” the fruit of knowledge by just doing research as most scientists do, but he whole heartedly “tasted” the sweet nectar of the fruit by pulling out what he learned in natural science and incorporating it into his entire life and works. Maybe his imagination was overwhelmed by dry facts; however this is the job of the natural scientist—to study exactly the details of the tree, or the leaf, and incorporate them into the history of nature.

Even though Thoreau has been publicly scrutinized, even criticized for his opinions on life, nature, politics and technology, we cannot disregard them, for we have seen that these criticisms are usually misguided. Thoreau continually challenged mankind to appreciate its world and take time to recognize the complexity and beauty of nature. The fruit of knowledge is often high on the tree, and it takes effort to finally grasp it. Understanding Thoreau’s dedication to the natural world is to understand that we all need to appreciate it. To study Thoreau is to study what it takes to be a better human being, a pursuit that spans all generations. Thoreau’s writing is not pure philosophy, or pure science, but a clever mix designed to take anyone to a higher personal appreciation of the world. Perhaps this was his desire when he dedicated

himself as a transcendentalist, mystic, and natural philosopher. The transcendental contradictions in his writing challenge us to continually question what we value in life, and change these values if we must. People fear Thoreau because they are afraid to change their motivations in life. It is time for us all to have the courage seize the fruit of knowledge that Thoreau spent a lifetime cultivating so that we may taste the sweet nectar, and be better people because of it.

Appendix A: Exhibit items:

Below is a list of items and descriptions that are part of our exhibit at Gordon Library. We designed the exhibit to complement the paper by giving passers-by a visual tour of the themes we developed. So, we made efficient use of pictures, models, and textual material in order to show the common misconceptions of Henry Thoreau. The exhibit ran through December/January 2000.

Surveying Transit [mid 1800's]:

This surveying transit is similar to the one that Thoreau used for surveying. The optical part of the transit is mounted to a graduated scale from which vertical measurements can be obtained. Flat land distances can be calculated from these measurements.

Surveying Advertisement [circa 1845]:

A copy of an advertisement for Thoreau's surveying business that could have been seen in Concord. The advertisement describes the services that Thoreau was willing to perform and details about his methods. He notes that he can be found "near the pond" on this advertisement.

Pencil Making Advertisements [circa 1840's]:

Two advertisements describing the pencils that John Thoreau & Co. produced in Concord, Massachusetts. Henry David Thoreau contributed enormously to the business by pioneering methods for creating better quality pencils. John Thoreau & Co.'s pencil were well known throughout the United States and were considered by many to be the best American pencils available at the time. The advertisements also describe the available hardness scale of the pencils.

Two Copies of *Walden* [first published 1854]:

Representing the time Thoreau spent at Walden Pond, *Walden* is Thoreau's most known piece of work. In *Walden*, Thoreau talks about the two years that he lived by Walden Pond and attempted to live a pastoral existence. One copy is an edited, annotated edition by Walter Harding, while the other book has a more traditional leather bound.

A Copy of *The Lackawanna Valley* [1856]:

A landscape painting of a train cutting through pastureland by George Inness. The painting was featured on the cover of Leo Marx's book *The Machine in the Garden*. Marx's book was an in depth look into the quest of American writers to come to grip with the idea of pastoralism. Thoreau is highly regarded by Marx for his effort to try and create a physical pastoralism by not only writing about, but totally enveloping himself in the idea with his stay at Walden Pond.

A Model Train [Mid 1800's]:

The model train is similar to the trains that passed through Walden Woods during Thoreau's stay. The train was an important symbol in *Walden*, representing Thoreau's persistent concern about technology and yet also his fascination of it.

A Copy of *Wild Fruits* [1999]:

The rediscovered lost manuscript of Thoreau's put together by Bradley Dean. *Wild Fruits* is prime example of Thoreau's lifelong interest in Natural Science.

Seeing New Worlds and Material Faith:

Two recent books by Laura Dassow Walls, a prominent author in the field of Thoreau and science.

Pictures of Walden:

Three pictures of Walden Pond. One picture features the railroad tracks which proved to be Thoreau's "link" to society both literally and physically during his stay at Walden. The other two pictures show the beauty of Walden Pond that drew Thoreau to it.

Picture of Ralph Waldo Emerson [1803-1882]:

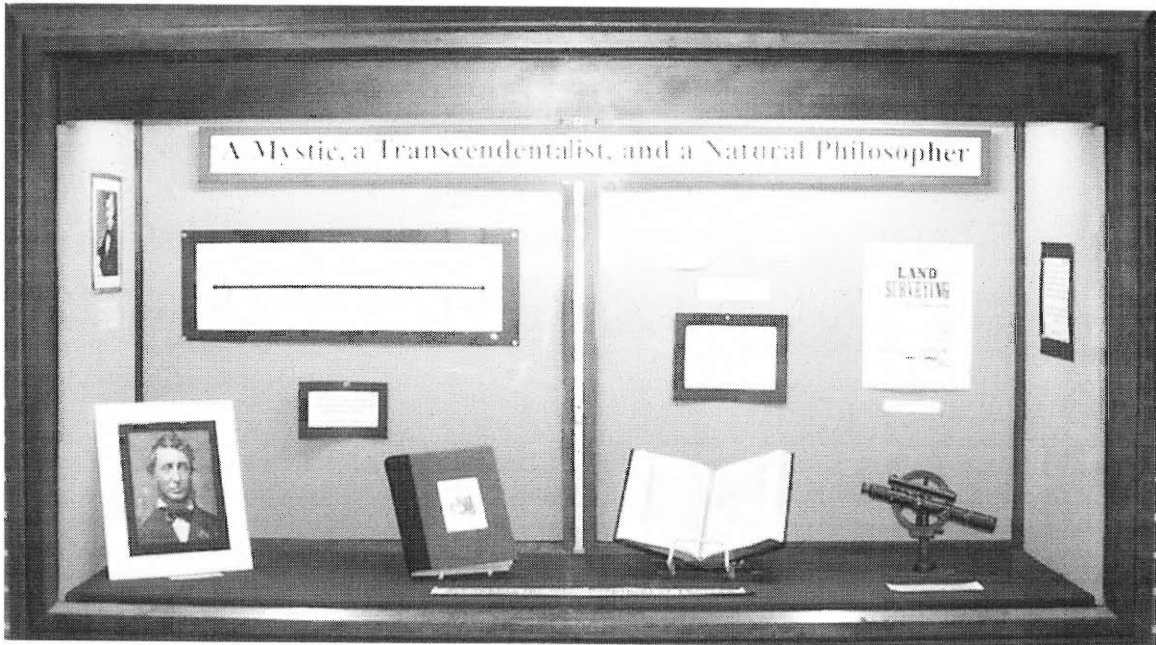
Emerson was a friend and mentor to Thoreau. Thoreau developed a close bond between the entire Emerson family that he lived with in Concord, Mass for some years. Emerson also proved to be the source of many of Thoreau's early transcendentalist ideas. Although the two were at odds when Thoreau died, Emerson later went on to take back his harsh criticism of Thoreau.

Pictures of Asa Gray [1810-1888] and Louis Agassiz [1807-1873]:

Two prominent natural scientists that were contemporaries of Thoreau. Thoreau often sent previously unclassified specimens to Louis Agassiz for taxonomy purposes.

Appendix B: Exhibit pictures:

These are pictures of our exhibit that is on display in the entrance of Gordon Library.



Picture of the display case seen upon entering the library.



Picture of the display case seen when leaving the library.

Selected Bibliography

- Bode, Carl, ed. *The Portable Thoreau*. Penguin Books, 1982.
- Dean, Bradley P., ed. *Wild Fruits*. New York: W.W. Norton and Company, 2000.
- Edel, Leon. *Henry D. Thoreau*. Minneapolis: University of Minnesota Press, 1970.
- Emerson, Edward Waldo. *Henry Thoreau as Remembered by a Young Friend*. Mineola, NY: Dover Publications, Inc., 1999.
- Harding, Walter. *A Thoreau Handbook*. New York: New York University Press, 1970.
- Harding, Walter et al. *Henry David Thoreau: Studies and Commentaries*. Rutherford, NJ: Fairleigh Dickinson University Press, 1972.
- Harding, Walter. *The Days of Henry Thoreau*. Princeton: Princeton University Press, 1982.
- Harding, Walter, ed. *Thoreau: A Century of Criticism*. Dallas: Southern Methodist University Press, 1954.
- Hovey, Allen Beecher. *The Hidden Thoreau*. New York: AMS Press, 1966.
- Marx, Leo. *The Machine in the Garden*. New York: Oxford University Press, 1964.
- Meltzer, Milton, and Walter Harding. *A Thoreau Profile*. New York: Thomas Y. Crowell Company, 1962.
- Mott, Wesley T., ed. *Encyclopedia of Transcendentalism*. Westport, Connecticut: Greenwood Press, 1996.
- Nordloh, David J., ed. *American Literary Scholarship*. Durham and London: Duke University Press, 1989.
- Oehlschlaeger, Fritz and George Hendrick, ed. *Toward the making of Thoreau's Modern Reputation*. Urbana: University of Illinois Press, 1979.
- Paul, Sherman, ed. *Six Classic American Writers*. Minneapolis: University of Minnesota Press, 1970.
- Petroski, Henry. *The Pencil: A History of Design and Circumstance*. New York: Alfred A. Knopf, 1990.

- Porte, Joel. *Emerson and Thoreau: Transcendentalists in Conflict*. Middletown, CT: Wesleyan University Press, 1965.
- Richardson, Robert D. Jr., *Henry Thoreau*. Los Angeles: University of California Press, 1986.
- Rossi, William, ed. *Walden and Resistance to Civil Government; Norton Critical Edition*. New York: W.W. Norton and Company, 1992.
- Sattelmeyer, Robert. "When he became my enemy." *New England Quarterly* (1989): 187-204.
- Sayre, Robert F., *Thoreau and the American Indians*. Princeton: Princeton University Press, 1977.
- Schivelbusch, Wolfgang. *The Railway Journey; The Industrialization of Time and Space in the 19th Century*. Berkeley, CA: The University of California Press, 1977.
- Shepard, Odell, ed. *The Heart of Thoreau's Journals*. Boston and New York: Houghton Mifflin Company, 1927.
- Sherman, Paul, ed. *Thoreau; A Collection of Critical Essays*. Englewood Cliffs, NJ: Prentice-Hall Inc., 1962.
- Stuik, Dirk J. *Yankee Science in the Making*. New York: Dover Publications, Inc., 1991.
- Thoreau, Henry David. *Civil Disobedience and Other Essays*. New York: Dover Publications Inc, 1993.
- Thoreau, Henry David. *Walden and Other Writings*. New York: Barnes & Noble Books, 1992.
- The Journal of Henry David Thoreau*. ed. Bradford Torrey and Francis H. Allen, 14 vols. Boston: Houghton Mifflin, 1906, 3: 61-62. (10 Oct. 1851)
- Walls, Laura Dassow, ed. *Material Faith: Thoreau on Science*. Boston: Houghton Mifflin Company, 1999.
- Walls, Laura Dassow. *Seeing New Worlds*. Wisconsin: The University of Wisconsin Press, 1995.
- Whicher, Stephen E. and Robert E. Spiller, ed. *The Early Lectures of Ralph Waldo Emerson*. Cambridge, MA: The Belknap Press of Harvard University, 1966.