Essay Review

SCIENCE ON WALDEN POND: THE BEDROCK OF TRUTH IN A WARMING WORLD
LAURA DASSOW WALLS


THE two books under review here take up a question that has baffled and intrigued literary scholars for decades: that is, the nature and degree of Henry David Thoreau’s involvement with science. Thoreau’s career tends to divide in two, trending from poetry to science. His earlier, “poetic” phase aligns closely with transcendentalism as led and defined by his friend Ralph Waldo Emerson. Emerson’s program wasn’t exactly unscientific, for he was inspired to write his manifesto Nature (1836) following a conversion experience at the Paris Museum of Natural History, and he spent the rest of his long career working out the ramifications of this powerful, quasi-evolutionary revelation into the unity of all nature. Still, Emerson saw himself fundamentally as a poetic mediator who could inspire scientific discoverers and the general public alike to behold the deeper meaning and beauty of the universe then being newly revealed by modern science. What Emerson did not do was imagine himself to be a man of science, in either laboratory or field. While he relished long walks along Concord’s bucolic paths, his own investigations were abstract and philosophical.

Not so for his protégé Thoreau, who from his first published essay showed a flair for the crisp delineation of particular natural
phenomena and an uncanny sympathy for individual plants and creatures. In this he was not unlike other writers of his generation whose observational acuity and descriptive power placed nature at the center of their writings: Nathaniel Hawthorne, for one, frequently deployed this talent in his fiction; Susan Fenimore Cooper, for another, became a remarkable literary naturalist. By contrast, Thoreau’s imagination led him down a third path: he became a practicing scientist. While we know when this happened (he started seriously to retool toward the end of 1849 and was fully in the groove by mid-1851), and we can see the how (records show Thoreau devoting ever more time to deep reading in contemporary science and to purposive walks in nature, during which he recorded observations and measurements), we don’t really know why: he left few records of his thought process during this remarkable turn. But we’d like to know, especially since the first product of the shift in focus was his revision of Walden, which transformed it from a very good book of social critique into a world masterpiece of spiritual alienation and rebirth.

The difficulty of particularizing Thoreau’s involvement with science intensifies after the publication of Walden in 1854, when Thoreau’s work in natural science became his central preoccupation. It yielded thousands of pages in his late Journal, scores of phenological lists and charts in which he tracked seasonal events day by day in exhaustive detail, elaborate surveys of the Concord River’s hydrology, extensive collections of pressed plants, birds’ nests and eggs, mineral specimens, Native American artifacts—basically, of whatever he could lay his hands on out of doors. Some commentators—including, tragically, Emerson himself, whose 1862 eulogy for Thoreau did much to establish stereotypes of his friend as a cold and stoic hermit, a bit inhuman in his unaccountable obsession with measuring nature—have judged his predilection a kind of compulsion and a symptom of decline. Others—and I am unabashedly in this camp—see Thoreau’s turn to the materialities of the world out of doors, and his exacting and disciplined documentation of the planet’s dynamic processes, as the key to his unique genius. Without science, there is no Thoreau.

But what did “science” mean in Thoreau’s day? Not what it means today, to be sure, for science then was still an element of a collective intellectual culture, particularly in the United States, where until the 1850s there was no center of professional science and no central authority to credential those aspiring to scientific practice. If Thoreau was self-taught, so (in the U.S. at least) was virtually everyone else. Since science was part of the public commons, the exchange of natural
knowledge was open, vigorous, even chaotic. This predisciplinary fer-
ment stabilized rapidly starting in the 1850s, as “scientists” became a
distinct, university-trained class of professionals pursuing specialized
career paths in teaching and research. Indeed, the word “scientist,”
coined in 1833, didn’t come into everyday use until after Thoreau’s
dehth. In this sense, to call Thoreau “a scientist” is sheer anachronism:
he never thought of observation, collecting, theorizing, and testing as
activities distinct from his literary work but, rather, as how he did his
literary work. To misunderstand this point is to misread his writings.
Moreover, to misunderstand the tight interweave of poetry, science,
aesthetics, and meaning more generally is to misread our relationship
with, and our place upon, the very planet we inhabit.

By definition, literary scholars today are untrained in the sciences:
that’s one consequence of the disciplinary split that Emerson and
Thoreau protested but couldn’t prevent. What makes the two books
treated here exceptional is that both are written by practicing sci-
entists who find Thoreau compelling precisely because he speaks
their language. Richard Primack, in Walden Warming, wants us to
understand that Thoreau is important because he “was a climate
change scientist whose research was almost a century ahead of its
time”; his biological studies of seasonal change would, had they been
published, likely have had “profound impacts on modern ecological
thinking” (p. 30). Robert Thorson, in Walden’s Shore, is deeply im-
pressed with Thoreau’s methodological rigor: beneath the polished
surface of Walden, he sees a scientist seeking theoretical explanations
for seemingly unrelated observations, converting them into predictive
models, and testing them quantitatively. As Thorson asserts, not only
does such a characterization meet the Supreme Court’s legal defini-
tion of a scientist (p. 9), but it marks Thoreau as something more:
driven by curiosity, unwilling “to let go of an observation he does not
fully understand” (p. 73), always moving from his results to further
investigations. “Creating ignorance with new questions is preferable
to filling in the blanks of old ones,” Thorson explains. “This impulse
is the diagnostic mark of a true scientist. Thoreau bears that mark”
(p. 270).

The underlying tension that Thorson identifies, which animates
science and animates Thoreau, has proved confusing to most of his
commentators. That is, Thoreau experienced science not as a set of
answers but as a yeasty and exciting medley of questions, and what
fattened his Journal to over two million words was his discovery that
every answer generated a dozen more questions. That’s why science
does not silence his poetic phase but brings it to life: from a closed matrix of literary self-reference, he stepped into an open and infinite universe of deep time, deep space, infinite mind. It’s in his early phase that he vows to find “a hard bottom and rocks in place,” where he might set “a Realometer” to measure the shams and delusions that cover the surface of the globe. With some relief, he finds that Walden Pond is not, as legend has it, “bottomless” but has, in fact, “a reasonably tight bottom at a not unreasonable, though at an unusual, depth.”

Finding an empirically verifiable bottom would seem to put an end to it: a question, an answer, time to go in for the poetic meaning.

But that’s not how the later Thoreau works. Even in Walden, which as Thorson shows winnows out nearly all of the scientific process so evident in the Journal, Thoreau slips in qualifiers: as he measures the depth of the pond, the measure changes as the pond rises and falls. As a professional surveyor, he knows that even the most excruciatingly exact measurement is accurate only within a range of error. Most surprising, in practice he finds that as soon as he cuts a hole in the ice to lower his plumb line, meltwater runs down through the hole, raises the ice, and changes the measurement: the very process of taking a measure changes the measure being taken. So, while Walden Pond of course has a solid bottom, the joke is that we can’t be sure exactly where it is. Thoreau’s scientist is like the Artist of Kouroo in the fable that closes Walden, who, to make his staff of knowledge perfect, must live forever.

But since we live only the span of a human life, how does scientific uncertainty help us found a useful philosophy? Both Primack and Thorson feel Thoreau’s longing right to their bones, and both use the “Realometer” passage as a touchstone: “Truth is bedrock,” says Thorson, who as a geologist will show us just how deep this metaphor goes (p. 23): Primack urges that “we need such a realometer to examine the truth of global warming and the associated effects of climate change” (p. 25). They both admire Thoreau’s insistence on grounding his belief and action in the world in a clear understanding of how earth’s planetary systems actually work. And they both fear that nonscientists, by losing this grounding in the planetary real, are doing incalculable damage. For Thorson, the damage is to knowledge itself: as he reminds us, quoting Stanley Cavell, “we cannot ‘know

---

what *Walden* means unless we know what Walden is,”’ which for Thorson means knowing how Thoreau’s lake behaves as a natural system (p. 168). To Primack, the damage is to the very planet itself, the material condition for knowing at all.

To get their work done, both books must set some limits. Thorson’s are quite stringent: as he says, “I have exempted social history from my table of contents” (p. 172), and indeed (despite the book’s subtitle) one will find here neither an intellectual history of science nor any general sense of how science in the nineteenth century was lived and experienced. Thorson admits that he finds “Economy,” the cantankerous first chapter of *Walden*, “boring” (p. 230), and when he views Thoreau’s gravestone, he’s annoyed by the pilgrims’ gifts of pencils, rocks, flowers and messages and wants nothing more than “to simplify his grave by cleaning the mess up” (p. 331). (To a social, cultural, and intellectual historian who enjoys documenting these pilgrims’ gifts, Thorson’s admission is a little disconcerting.) What excites Thorson is the bedrock reality beneath the messy clutter of society, culture, philosophy, religion—literally, the Andover granite underlying Walden Pond, specifically the extraordinary narrative of how glaciers repeatedly scoured that bedrock and deposited upon it a mantle of silt, gravel, stones, rocks and boulders, sifted and arrayed by various geological processes to create an astonishingly varied landscape and, most of all, the beautiful Walden Pond itself, a classic “kettle pond” created when a block (actually, in the case of Walden, four blocks) of stagnant ice slowly melted away and collapsed, leaving a deep, self-enclosed, and pure body of water. As a geologist specializing in glaciation and polar ice caps, Thorson is deeply impressed that Thoreau was able to see beneath the official rejection of glacial theory by his day’s leading men of science to perceive for himself the truth of glacial formation. Moreover, Thorson is genuinely amazed that Thoreau scholars have failed to recognize as much, and he is simultaneously baffled and outraged that Thoreau’s mineral collection had been neglected for so long that Thorson discovered its existence only by sheer chance.

Thorson’s book is teeming with a convert’s passion. He came to Thoreau later in life, and part of the book’s charm is Thorson’s conversational, heart-on-sleeve approach: his voice always rises from the page, speaking directly to us. For instance, instead of wading through the bog of literary, philosophical, and historical definitions of transcendentalism, Thorson simply pulls off the shelf his “trusty, second-hand, and duct-taped 1955 *Oxford English Dictionary,*” where he finds that
“the root word for ‘transcendental’ is scendere, to climb over.” Thus, he reasons, “to transcend” something means to pass over or go beyond it, like a hurdle in a race. As he concludes, “Perhaps it is my geological perspective that is confusing me. But when I read Walden against the early Journal, I feel like I am on a very different journey, one that is descending inward toward the simplicity of a lower heaven in Walden’s waters, rather than ascending to an outward heaven via . . . flights of fancy to the stars” (p. 322). Thorson’s alternative, “Descen
dental” Thoreau, who mines and burrows downward, ever deeper, until he arrives at the foundational formative processes of the planet, is refreshing; yet, as someone who has been thinking about transcen
dentalism about as long as Thorson has been thinking about rocks and ice, I wished his pages had registered something more of the depth, strength, and subtlety of intellectual history on the subject. I suppose as a literary scholar I desired, quite as much as Thorson expects as a scientist, the specialist’s due. But that would be asking for a very different book.

Taken on its own terms, then, Thorson’s book is exemplary as a three-way hybrid. First, it is a book of science. The middle chapters offer a technically dense textbook of glacial geology written with zeal and vividness by a master of the field. I learned an immense amount from these chapters, and anyone reading them will never see Walden, or Walden, the same way. Second, it is a book about the doing of science, told by someone eager to show how the scientific process is deeply creative. “Many non-scientists assume from their formal education that research scientists follow a logical, inevitable process toward the truth,” he notes. “This is laughable to any working professional who knows from their own experience that the tidiness of textbooks is an illusion, and that methodological rigor holds true only for data-collection protocols and final reports” (p. 215). And finally, it ends as a book of literary criticism, venturing, on this bedrock of geological truth, to erect a new interpretation of Thoreau’s literary dance with science, giving us a “geo-Walden [that] is a downward journey toward ultimate spiritual truth on a bedrock unconformity” (p. 322). Thorson’s overriding point is one that Thoreau himself would have appreciated: beware the fortress mentality of the siloed academy, in which interdisciplinary work becomes impossible because no one human person can learn enough to engage meaningfully in any discipline beyond one’s own training. If literature is to live, it must also be read in a post-disciplinary way, open to multiple forms of expertise and, ideally, energized by them—perhaps even brought back to life itself.
Thorson approaches Thoreau not as a dead text but as a living author, and he imbues his reading with the verve and urgency of someone who thinks the act of reading can, actually, matter.

Richard Primack’s Walden Warming takes the next step. He, too, wants to focus his book on the Walden Pond side of Thoreau’s career, and he limits himself to Thoreau’s most scientific texts: namely, the massive phenological lists and charts that have been largely ignored by all but diehard Thoreau specialists. (Unpublished to this day, many are now being digitized for online access.) These documents become Primack’s foundational data set. Hoping to establish the effects of climate change in the temperate zone, he needed records of plant flowering times that predated the accelerating temperature rise of the last fifty years. For two years his research project hung fire, until a friend, the philosopher and Thoreau scholar Philip Cafaro, asked him whether he’d looked at Thoreau’s flowering-time observations. Once Primack obtained some of Thoreau’s lists from another Thoreau scholar, Brad Dean, he was on his way: “The list was everything I could have wished for: the first flowering dates of plants in Concord for the years 1851 through 1858. . . . We now had our baseline data to see how plants had changed their flowering dates over time” (pp. 4–5). As this story suggests, the book does not foreground the many technical scientific papers Primack and his team published. Instead, like Thorson, Primack writes in an informal, occasionally even confessional, tone, seeking a conversation with the reader. His goal, again like Thorson’s, is not to present science neatly packaged for delivery but, rather, science in the doing: messy, creative, serendipitous, full of false starts and blind alleys and lucky breaks but, importantly, doggedly persistent, always and again self-questioning, advancing through doubts and counterarguments toward real, bedrock knowledge.

Primack’s own search was launched in 2001, when he looked up in dismay from his studies of deforestation in Borneo and realized, first, that as a conservation biologist he had the responsibility to “take an active role in protecting what we observed, valued, and loved”; and second, that “as a scientist I needed to influence opinion on environmental issues in the United States. To build a compelling case, I would need evidence of the impacts of warming temperatures not in the far-off rain forests of Malaysia, but back in the United States” (p. 2). He must turn detective, seeking for signs of climate change yet not knowing what he would find, how to find it, or how to fund his new direction. But gradually, step by step, we see connections forged,
allies recruited, and data located. This drama resurrects Thoreau’s observations as “not just dead numbers, but rather a living link to the past—and a key to understanding the modern impact of global warming” (p. 30).

Primack’s team went to work plotting the data Thoreau had recorded. Filling in the timeline between his moment and ours was one challenge; another was documenting such additional seasonal phenomena as the return of migrating birds, the emergence of insects, and the hatching of frogs and salamanders. Here is where Thoreau’s very incompleteness became a virtue, for, inspired by Thoreau, generations of observers have taken up his methods and continued his fieldwork, leaving a nearly continuous series of nature observations from his day to our own. Primack discovers small pockets of devotees: the Nuttall Society leads him to bird data, the Massachusetts Butterfly Club provides insect data, and on and on, a group here, a lone naturalist there, all working quietly and without public notice to perpetuate the tradition of observing and recording. The result is a patchwork. Birds are fairly well studied, yielding rich data sets; insects are unevenly studied; amphibians are studied hardly at all, leaving immense and discouraging gaps in our knowledge.

Here is where Primack’s approach yields its richest fruit. Thoreau’s field method requires no college degree; anyone can take up and continue some part of this essential work; anyone can forge a link in the chain of observations that will help preserve Thoreau’s legacy into the future, keeping the door open for the next Thoreau, who might otherwise be stuck indoors, ensnared in a culture detached from seasonal rhythms and oblivious to nonhuman nature. Thoreau said, in his first published essay, that the man of science is the man most alive: “the true man of science will know nature better by his finer organization; he will smell, taste, see, hear, feel, better than other men. His will be a deeper and finer experience.”2 Exactly: Primack shows that science is a way to be more alive, more deeply engaged in the world and responsive to it—and to take responsibility for protecting it in the future. Or even for helping assure that it has a future at all.

For this is the devastating, bedrock reality Primack’s research reveals: one quarter of the plants Thoreau found in Concord have

---

vanished from his woods. An additional third are on their way out, existing only in marginal populations. Primack concludes that “around half of the species that Thoreau observed in Concord will no longer be present in a few decades from now; they are destined for local extinction” (p. 39). His further research shows that the missing and vanishing plants—such treasures as orchids, lilies, and mints—are the ones unable to adjust to warming temperatures by shifting their flowering times. As the seasonal calendar changes, the only species that will persist are those that can change with it—which often means the adaptable colonizers known to the rest of us as “weeds.” Climate change, whether we are conscious of it or not, has already registered in the natural world to profound effect, even in America’s temperate backyards. Scientific measurements maintained over 160 years reveal that human beings are degrading the fundamental processes of natural ecosystems, not just in the distant Arctic or in alpine meadows but globally, everywhere.

Thoreau would have been appalled. And he would, as Primack urges, have returned us to the arguments he made in “Economy,” that only by simplifying our material needs can we realize a rich spiritual and artistic life. To live “alive” instead of asleep is to understand the workings of the planet that provides us with the essentials—food, water, shelter—without which there simply is no life. Primack tells us he became “convinced of climate change when I saw blueberry bushes flowering in early April, a month earlier than Thoreau had seen them on the shores of Walden Pond” (p. 227). Paying attention is the first step to taking action, and so Primack concludes by urging us to do just that, to take up our own version of Thoreau’s Journal, explore our own home wherever we are, collect our own individual observations of our world, help measure the rate of change and perceive the nature of it, and join networks of observers to compare and connect (pp. 229–34).

Thoreau concludes Walden not with hard and unyielding bedrock but with a melting sandbank, “the laboratory of the Artist” generating endless new forms of life.3 Early in his scientific turn, he seems to fear that he’ll run out of questions. Instead they multiply, until after ten years his faith is unflagging; each day’s walk still brings, without fail, something new, exciting, something he doesn’t yet understand. The sublime mass of his Journal records not a linear process of trying and failing to reach Truth but a nonlinear and infinite series of explorations, each excursion leading to the next, all of them revealing an

3Thoreau, Walden, p. 306.
exhilarating sense of ignorance opening to possibility. Thoreau kept going until he was stopped cold by tuberculosis. He accepted his end with unnerving serenity, perhaps because he knew others—the friends, neighbors, students who would follow him—would continue his broken task, each in his or her own way. Thorson and Primack, who know that Thoreau’s work is not done, have taken it up, and they encourage us to do so as well. Their goal is to show us how, and to persuade us of something we are in danger of forgetting: that reading, and living, in a Thoreauvian way means inhabiting the mind of a scientist.

Laura Dassow Walls is the William P. and Hazel B. White Professor of English at the University of Notre Dame, where she teaches nineteenth-century American literature and science. She has published extensively on Thoreau and Emerson, and her most recent book, THE PASSAGE TO COSMOS: ALEXANDER VON HUMBOLDT AND THE SHAPING OF AMERICA (University of Chicago Press, 2009), received the Merle Curti Award from the Organization of American History and the James Russell Lowell Prize from the Modern Language Association. Currently she is at work on a comprehensive biography of Henry David Thoreau.