

Faith and Historical Geology: Amos Eaton's Journey from Hard Labor to Deep Time

Sermon for First Unitarian Church of Worcester, summer service July 13, 2014

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To introduce you to the central figure of my sermon, let me share an extended passage from Chapter 3 of the book I published earlier this year about Amos Eaton and the important role he played in bringing ideas about New York's geology into world prominence:

Born just forty-eight days before the Declaration of Independence was signed in 1776, Amos Eaton was a charter member of that first generation of citizens who would live their entire lives in an independent United States. American social historian Joyce Appleby has characterized these revolutionary war babies as a cohort saddled with an identity crisis. Eaton grew up roaming the foothills of the Taconic mountain range, near his birthplace in Chatham, New York before attending Williams College in Massachusetts. Graduating in 1799, Eaton was just a couple of years older than the classmate who would later venture out to Ohio to make his mark in law, frontier diplomacy, and science: Caleb Atwater. Like Atwater, Eaton considered the option of entering the clergy upon graduation, but the fervor of the Second Great Awakening, a Protestant religious movement which swept through the region during the 1790s, left Eaton somewhat disaffected. Instead, he planned to get married right away and so he needed a secure income to be able to provide for his family.

[The newlyweds] moved to New York city where Eaton would begin his legal studies with Josiah Ogden Hoffman. Hoffman was a close associate of Alexander Hamilton, the brilliant legal architect of Federalism. Shortly after being admitted to the bar in 1802, Eaton suffered a personal blow. Poor Polly Eaton, who had always been a sickly girl, died of pulmonary consumption (tuberculosis). The young widower and his 3 year-old son Thomas moved upstate

to Schoharie County, where he set up a small law practice and land agency. Despite this tragedy, Eaton also recognized his good fortune. He asked his first love, Sally Cady, to become his wife after all, and the reconstituted family relocated to the beautiful little town of Catskill in 1804.

Domestic bliss prevailed for the remainder of that decade, with four more Eaton boys arriving at the rate of one nearly every other year. Professionally, however, Eaton's life was not so smooth. Inept in his business dealings, Eaton managed to antagonize a gang of real estate speculators who had ties to Nathaniel Pendleton, a powerful New York judge. On January 7, 1811, Eaton was placed under arrest, having been indicted for the crime of forgery. Eaton's accusers alleged that he had misdated a November 29, 1806 land sale document so that it would appear to have been signed on June 1, 1811, a day that had not yet even occurred! By the time his case reached trial in May, the prosecution had manufactured the evidence it needed. A Catskill jury convicted Eaton of forgery in conjunction with the now foreclosed property. By August 26, the forlorn 35-year-old found himself locked up in New York State's Newgate Prison, at the head of Tenth Street in the Greenwich Village section of Manhattan, contemplating his harsh sentence of punishment "at hard labor for life."

Life was indeed very hard for the convict. The first year and a half of that sentence brought Eaton unremitting despair. First, his mother died while he awaited trial, and then his father died in October, 1812. He was unable to attend either funeral. Meanwhile, the prison routine at New York's first penitentiary, though considered modern and enlightened in its design, was brutal enough. According to a memoir later published by a fellow Newgate convict, from the moment of arrival, one's life became all but forfeit. "[H]e is immediately put to work, and kept at hard labour, agreeable to his sentence. In summer the rooms are unlocked at 6 o'clock in the morning; in winter at day-light, when the prisoners are called to work, at which

they continue till 6 o'clock in the evening, allowing sufficient time for their meals, which are three every day. On the beat of a drum, at 9 o'clock in the summer, and 8 o'clock in the winter, they retire to bed." There were precious few of Eaton's social and intellectual caliber with whom to commiserate, for the Newgate prison was intended for felons only. A person could be imprisoned for life for any of the following crimes: "Rape, robbery, burglary, sodomy, maiming, breaking into and stealing from a dwelling house, some person therein being put to fear, forging the proof of a deed, or the certificate of its being recorded, forging public securities, counterfeiting gold or silver coins ..." Adult males, female criminals, juvenile delinquents, and the criminally insane were all housed eight to a room (each room being a 12-foot by 18-foot rectangle) at Newgate. The genders were, of course, segregated. Solitary confinement was an expensive punishment that the wardens reserved for only the most refractory and dangerous prisoners.

Late in 1813, while the rest of the country was caught up in the war with Great Britain, Eaton underwent something of a spiritual rebirth. Although he later attributed his renewed hope to the ministry of the prison's chaplain, Mr. Milldoller, Amos Eaton's redemption began when he resolved to commit himself fully to the study of nature, regardless of the difficulties imposed by confinement within prison walls. Harbingers of this calling had predated Eaton's downfall. Had he paid more attention to his inward springs, Eaton might have avoided his prison nightmare entirely, for though he was injudicious as a land agent and hapless as a practitioner of the law, Eaton had always been a gifted observer of nature. Eaton had devoted many hours to wandering the hillsides along the Hudson River. From the fruits of these rambles, Eaton began to assemble a collection of notes that he hoped to publish as an amateur manual of botany. He had even tried to open a Botanical School at Catskill back in 1810, but this plan collapsed as soon as his professional legal reputation was attacked. Then, while Eaton languished in custody

awaiting trial in the spring of 1811, Sally gave birth to yet another son. Incidentally, all of Eaton's offspring were named in honor of people he respected, admired, or loved, a practice which provides strong clues regarding his shifting values system over the course of a lifetime. ... Eaton sent instructions that this sixth boy be christened Charles Linnaeus Eaton, in honor of the great eighteenth-century Swedish botanist Carl Linnaeus ... who had promulgated the binomial Latin nomenclature system intended for the classification of all living organisms. Sadly, Eaton would never get to see his baby Charles, who died before reaching the age of three.

Somehow setting aside his afflictions and regrets, and though still deprived of his liberty, Eaton discovered a means of virtual escape from the shackles of Newgate Prison. He decided to exercise his lifelong fascination with the orderliness of nature. Eaton began by ravenously devouring the few scientific resources available to him through the prison's modest library, and then he continued his rehabilitation by building relationships with any and every person who could assist him in his quest for knowledge. Eaton detailed the changes to his regime in a letter to his wife in February 1814. After each long day's labor in the prison workhouse, Eaton stayed awake for hours to pursue his science by candlelight: "I spend my evenings in progressing with my Botanical work, which I commenced in Catskill. I have contrived a new method of arrangement, by which I can exhibit all the known species of plants (about forty thousand) in one small duodecimal volume. So that you can readily determine the name of every plant and its uses in medicine, diet, agriculture and the arts by merely inspecting the flower and some few other parts." Though he soon exhausted the relevant holdings of the prison library, Eaton's interest in botany attracted the notice of the prison Agent's 17-year-old son, who offered to supply the convict with books he might want to consult, which were not in the State-prison library. ... John Torrey, Eaton's youthful visitor and book provender, would eventually found the

New York Botanical Garden, become the leading American botanist of his generation, and remain a lifelong devoted scientific friend and confidant to Eaton.

The first fruits of Torrey's companionship were those scientific books. Having scoured the prison library for works on natural philosophy (incredibly, it possessed a copy of the German laboratory chemist Friedrich Accum's 1802 *System of Theoretical and Practical Chemistry*), Eaton specifically requested that Torrey obtain for him an edition of Irish geologist Richard Kirwan's 1794 *Elements of Mineralogy*. This relatively scarce work had special meaning for Eaton, for he had first become acquainted with Wernerian ideas about geology, which attributed the formation of all rock types to the action of water (sedimentation and precipitation), by transcribing a borrowed copy of Kirwan in 1802, that painful year when his young first wife Polly Thomas had died. Perhaps seeking to recapture a familiar feeling of therapeutic distraction, Eaton now became immersed in his self-appointed task of compiling and cross-referencing all the information he could glean from these authoritative European works on natural history. From December 6 to December 21, 1814, and again from January 16 to February 6, 1815, Eaton worked feverishly to produce a 346-page manuscript. Building upon his annotations of the Kirwan and Accum texts, Eaton appended four pages of notes on Werner's *Mineralogy* to his compilation, which he entitled "A System of Mineralogy." This handwritten notebook, which is preserved among the Eaton papers at the New York State Library, was meticulously organized. Eaton evidently intended it to serve as a practical guide for how to write up one's field notes. Did Eaton imagine that he would ever get to use the system himself, or were these just the pathetic labors of an eccentric hopelessly incarcerated person?

Though he could not have anticipated it, Eaton's intellectual companionship with John Torrey rekindled the possibility of a happier life. John's father William Torrey was not only the

warden at Newgate Prison, but also an alderman. At that time, New York City's mayor official duties included intimate oversight of the judicial system. Naturally enough, when the elder Torrey mentioned that his son had befriended a studious scientifically-minded prisoner, Mayor Clinton was particularly intrigued. Gaining an interview with the powerful politician, a man already enamored of natural history and heavily committed to the cultivation of learned societies, amounted to an enormous stroke of good fortune for Eaton. Ironically, under normal circumstances, these two men might have experienced several obstacles to the formation of any kind of personal relationship: Eaton had come from a traditional stock of New England Congregationalist farmers and soldiers, a demographic that tended heavily toward Federalist and away from Republican political sentiments. Despite these differences in heritage, social station, political beliefs, and the stark realities of liberty versus captivity, both men shared a passionate interest in all aspects of natural history. Though no record seems to have survived of their first conversation, it is not hard to imagine that the convict made the most of his unusual opportunity to win De Witt Clinton's respect, sympathy, and support.

I should probably issue a spoiler alert at this point, but for anyone who is interested, there is a lot of interesting stuff in the subsequent six chapters of the book, including the details of how Eaton serendipitously regained his freedom, acquired some formal training in the sciences at Yale, was invited back as a geological expert by the canal-enthusiast and newly-elected Governor Clinton, and finally found himself in 1824 perched outside that cavern overlooking the Erie Canal, thinking not only about his patron Stephen van Rensselaer's extraordinary generosity, but also how he could expand his own impact on the culture and intellect of the time by persuading that man to dig even deeper into his vast wealth in order to establish and bankroll a college that would train future generations of New York's "practical scientists," while elevating the now 48-year-old Amos Eaton to the much-coveted status of "Professor." Needless to say, I have developed considerable sympathy for this man and his aspirations.

I thought Eaton might serve as an appropriate centerpiece for this summer service because of the ways in which his own personal journey provides such an extreme and vivid sense of the radical changes in what scientists understood about Earth's history that as they began to investigate this very landscape 200 years ago, even though they were highly influenced by a body of received Scriptures that provided a written account of that same history. It may come as some surprise to you that professional geologists of that time considered the Bible one of the most highly reliable pieces of geological evidence, and so Noah's Flood was a cause of first resort whenever fossil evidence of marine life was found far inland. In other words, scientists were not engaged in a war against religion, by any stretch. Rather, the savants of Eaton's generation were generally confident that an ultimate harmony would emerge if investigations into natural history could be pursued to their ends, and Biblical texts were properly interpreted by an equally adept and energetic cadre of scholars of ancient languages. Though there was of course a wide array of opinions, ranging for outright atheists to Biblical literalists, the largest group among those who studied natural history generally felt that a religiously harmonious scientific Truth would win out in any sincere search, regardless of how peculiar or surprising the evidence might seem to be along the way.

Amos Eaton's diluvial theory is an excellent example of an ingenious, if short-lived scientific paradigm based on the assumption that the Flood might account for all the jumble of clays, sands, rocks and even massive boulders that are scattered across New England and New York State, often lying immediately atop far different kinds of bedrock. Keep in mind that Swiss geologists were only beginning to formulate a theory of glacial action to account for the transcontinental transport of erratic boulders during the 1830s. So for the preceding decade, the imaginations of geologists were basically limited to the agencies of fire (volcanic eruptions and earthquakes) or water (tidal waves and floods) to explain apparently violent transformations of the surface of the land. I might also mention time here, but note that time only seemed to them relevant to account for erosion of rocks, and the deposition of layers of

sediments to form horizontal layers of sandstone or limestone. In England in 1823, the Reverend William Buckland discovered a site called Kirkland Cave, where he found a collection of hyena bones. Buckland speculated that these beasts had been sealed into the cave during Noah's Flood, and their subsequent extirpation from the British Isles might thereby be explained.

Buckland's discovery and analysis electrified the world of science. Caves were suddenly elevated in importance in the following years, as investigators around the world scrambled to identify other sites of antediluvian relics. Most desirable of all would have been to discover an antediluvian human who might have perished by seeking shelter from the Deluge. The reading I selected from Eaton's geological journal thus witnesses the thrill of excitement about his work and anticipatory confidence in the theory he was then developing by painstakingly sorting out the "diluvial debris." Eaton went on to propose a precise sequence of episodes: first a violent inundation swept southward from the poles, followed by a quiescent period of soggy high water which enlarged the preexisting Mohawk and Hudson river watercourses, and then a gradual process of drainage of the flooded landscape which generally blanketed the region with the rocks that had been swirled around by the preceding turbulence and the soils that were held in that watery solution. The diluvial theory represented a remarkable combination of physics calculations, inorganic chemistry, and speculative fluid dynamics.

Eaton's views were widely read and respected for about a decade, until contending visions (first of boulder-laden icebergs borne by the Flood, and then the radical vision of a continental sheet of ice advancing and then melting) were proposed to account even more persuasively for many of the same phenomena. As additional evidence propelled these debates, the perceived age of the Earth inevitably continued to expand, from the tens of thousands of years Eaton had been taught to work within, to the millions of years that Charles Lyell would shortly require for his uniformitarian system's insistence that only observable gradual processes of uplift and erosion should be used to explain all the world's rock

formations. Eaton's close friend and geological disciple, the Reverend Edward Hitchcock of Amherst, Massachusetts, would adapt remarkably adroitly to all these shifts, and publish a very important defense of the harmony of science and the Scriptures in multiple editions up through 1854, entitled *The Religion of Geology*.

To summarize, we have seen that the mental discipline of scientific study initially redeemed a prisoner from the depths of despair. The chance to engage in actual nature fieldwork investigations then brought Eaton to the pinnacle of his lifelong aspirations. Though he endured his share of hardships and disappointments along the way, he could look back upon his life by the time he reached his mid-fifties (about my own age now), and proudly total up his accomplishments: "... I have had more than 7,000 pupils already. .. I have, during the last fifteen years, traveled over 17,000 miles [on foot] for the express purpose of collecting geological materials, the results of which are comprised in this little [text-book] and exhibited in the accompanying map and wood cuts..."

For myself, there has never really been a deity to believe in or to doubt, and yet I do acknowledge a magnificence and sense of awe whenever I experience or even just contemplate the vast amounts of time and tremendous natural forces that have raised mountains high and worn them into sand, in a relentless cycle whose duration is now measured in the billions of years. And so I can readily believe that, for a man of Amos Eaton's time, someone raised to suppose that an all-powerful God had created a world machine whose results were so apparently chaotic and worn down in just a few thousands of years, that the evidence he uncovered of a far greater antiquity and a widening scope of nature's history did not diminish, but rather redoubled their respect for that ultimate author of existence, truth, and beauty that they called God. Let us turn now to our final hymn, number 341 in the gray hymnal, "O World, Thou Chooseth Not the Better Part."