

DR. JAMES DEANE OF GREENFIELD
EDWARD HITCHCOCK'S RIVAL DISCOVERER OF
DINOSAUR TRACKS

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and photography by Bill Finn and Ed Gregory

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Preface

For a time in the middle of the 19th century, what is now known as the Pioneer Valley in Massachusetts was one of the epicenters of early paleontology. From 1835 onward the tracks of dinosaurs—first thought to be those of birds—were found in Jurassic sandstone millions of years old in the Connecticut River Valley, ranging from northern Massachusetts to central Connecticut. No fossils from birds had yet been discovered in such early stone, so this news was revolutionary. The British geologist Charles Daubeny visited Amherst and Greenfield in 1837 to examine the stony footprints, and Charles Lyell, Britain's most famous geologist, came there also in 1842.

Three men were at the beginning of this discovery, Edward Hitchcock (1763-1864), professor of natural history at Amherst College, James Deane (1801-1858), a Greenfield physician, and Dexter Marsh (1808-1853), a local quarrier and workman. Because Hitchcock's books and his articles were well known on both sides of the Atlantic (he was Daubeny's and Lyell's host during their visits), he eclipsed Deane although the Greenfield doctor had also corresponded with British geologists and paleontologists; Marsh was only recently brought to light. Not only did Hitchcock first publish news of the foot tracks, but also it was he who identified and named the new field, *Ornithichnology*, "study of stony bird tracks" (later shortened to *Ichnology*). Deane's contributions amounted only to a few bricks compared to the huge structure erected by his famous colleague, but Hitchcock couldn't do without Deane's bricks. The two neighbors entered into a dialogue distinguished as much by competition as by cooperation. By documenting Deane's little-known role, and the consequent rivalry with Hitchcock, the history of the discovery and interpretation of dinosaur footprints will be greatly enriched; Hitchcock will again acquire the fellow worker that his own fame had pushed aside.

To recover Deane's long forgotten role is the purpose of this monograph. For more than two decades Deane managed two careers side by side. Although he was a practical man who could turn his hand to many things (he raised silkworms), he concentrated so well on surgery and on sandstone fossils that he fulfilled the normal attainments of both fields. It's fortunate that he published significantly in each domain because his life otherwise is not easily reestablished. Except for a handful of letters, his correspondence has disappeared, no diary or journal has surfaced, and no letters or witness accounts by family and acquaintances have survived, except for

two memorial articles by his Boston colleagues Dr. Henry I. Bowditch and Thomas T. Bouvé, and an obituary by his nephew Dr. Adams C. Deane.

I've therefore carried out this study without knowing how he related to his wife and children or to his neighbors and friends. In the only known image of him (fig. 1) he appears stiffly formal, perhaps owing to holding his pose for the many seconds required by contemporaneous daguerreotypes and photographs. We have to try to approach him by studying the contents of his house and library which are known thanks to the inventory made by the Greenfield probate office upon his death. Although a purely factual listing, it lets us deduce a good deal even if it's like describing the husk rather than the kernel. We come closer to him in some ways by looking into his many published articles on medicine and on sandstone impressions. In these he expressed ideas and patterns of reasoning that permit us over the course of this study to posit something of the way he conducted his life..

I came to James Deane after several years of studying the work on dinosaur tracks by Edward Hitchcock, Dexter Marsh, and Roswell Field, all of whom collaborated with Deane. (See the Bibliography for my publications.) During my researches I met Sarah L. Doyle, an energetic independent scholar who generously offered her collaboration. She had begun gathering documents on Deane long before I turned to him, and she selflessly gave me everything she found. She has made numerous suggestions for style and content that have greatly improved my manuscript.

Among others who aided my researches, I particularly thank the following: Peter S. Miller, Greenfield historian; the staff of Amherst College's Archives and Special Collections, particularly Margaret R. Dakin and Christina Barber; David Bosse, librarian of the Pocumtuck Valley Memorial Association Library; Jack Eckert, Countway Library of Medicine, Harvard University; Nick Baker; James Ghert; Ed Gregory; Jerry Marcanio; Nicholas McDonald; Lindley Wilson, and Dr. Jane Winchester. For numerous courtesies in travel and research, I warmly thank Barbara Bosworth and Bill Finn.

R. L. H., South Hadley, 2014

Abbreviation used throughout this study: AJS = *American Journal of Science*. For short titles see the appropriate author and date in the Bibliography.

Those items often cited in the text are signaled not by footnotes, but by capital letters in parentheses which are keyed to the Bibliography.



Deane's home, office, and library

At the time of his death, and for many prior years, Deane's home was a two-story brick house on the corner of Hope and Main streets in Greenfield (figs. 2 and 3). The probated inventory of his estate reveals the interior in some detail, showing that it had the space and refinements suitable to a middle class urban professional. Downstairs was a parlor, a dining room, and a front hall large enough to hold a sofa and table. There must have been a kitchen and pantry, but none is mentioned in the inventory, although a "refrigerator" (an icebox) is listed. Deane's wife, Mary Clapp Russell (1811-1871), was the youngest sister of John, Nathaniel and Francis Russell of the Russell Cutlery family, the likely source

of some of the elegant furnishings and perhaps for the purchase of the house. Among the objects was a "French China Dinner and Tea Sett" (valued at \$25), a dozen cut glass goblets, champagne and wine glasses, two "Britannia Tea Pots,"¹ a "Plated Cake Basket," eight silver table spoons (\$18) and eight plated forks (\$12). The dining room had an "Extension Table," a "Painted Table" (\$5), eight "Cane Seat Dining Chairs," and two "Caster Stands." The piano, valued at \$125—the most highly priced household item—was there instead of in the living room. In the parlor was a sofa, four "Hair Seat Chairs," a rocking chair, a "Centre Table" with marble top, and

¹ Britannia was a British trade pewter originally made in Sheffield.

a “Tea Poy” (small table for a tea set). It had a carpet worth \$21, compared with the “Oil Carpet” in the hall (\$5), and straw matting in the bedrooms upstairs (\$6 and \$3).

On the second floor was a hall with a wardrobe and bureau, and three bedrooms. One had a maple bedstead with hair mattress and an “Underbed” for storage, a small writing desk, a tea poy, a “Fancy Chair” and a rocking chair, a bureau, and a wash stand with “Accompaniments.” Another bedroom had a costly “Painted Chamber Sett” (\$25), and a homely “Slop Pail,” a water pail, and a foot bath. It had the only coal stove listed for the house. The third bedroom must have been the largest, for in it were two maple bedsteads, a feather bed, three “Under Beds,” three hair mattresses plus a “Single Mattress,” six cane seat chairs, a bureau, another tea poy, and a looking glass. Perhaps this room housed the family’s three daughters who were aged nineteen, sixteen, and four when their father died in 1858. Nathaniel Russell, his brother-in-law, was designated protector of the children.

Separately from his home, Deane established his office in 1838 in a new building nearby on Federal St.² We can assume that this remained his work place for the rest of his life. To judge from its contents listed in the probate inventory, it had substantial space because there was a desk, a sofa, a table, an armchair, probably one or two straight chairs, at least five cases of medical instruments, and several cases of books and pamphlets. It was here that Deane received patients and operated on them with the aid of a full array of instruments for trepanning, amputating, cupping, birth delivery (“Midwifery Forceps”), cataract treatment, tooth extraction, and bone setting. For the latter he had a “Double Inclined Plane” and pulleys. This was an instrument of two wedge-shapes, supported overhead, that secured a leg bone while setting a break. He also possessed “Jarvis surgical adjusters,” a controversial mechanical instrument for pressing fractured bones together.³ In addition to miscellaneous forceps, catheters, scissors, and specialized needles,⁴ he had a stethoscope, a guttapercha [rubber] shirt, and a skeleton.

To support his practice, he had 101 medical publications, totaling 195 tomes when multi-volume editions are separately counted. The inventory lists books individually but in phrases like “Treatise on Onanism,” “Millers Surgery,” and “Ducamp on Detention of Urine.” Despite such general wording, a few titles can be

² *Greenfield Gazette & Franklin Herald*, Nov. 27, 1838.

³ Deane discussed the use of each of these devices in an address on treating fractures of the femur he gave to the Franklin District Medical Society, printed in the *Boston Medical and Surgical Journal*, vol. 50, 1854, pp. 57-58, 96-97, 113-15, and 141-43. He condemned them but might earlier have used them.

⁴ Including a “Seton Needle,” used for a stitch that allows a fistula to drain.

established: his mentor Amariah Brigham's *An Inquiry into Diseases and Functions of the Brain, Spinal Cord and Nerves* (1840), Giambattista Morgagni's *The Seats and Causes of Diseases* (1822), and J. C. Spurzheim's *Observations on the Deranged Manifestations of the Mind, or Insanity* (1833). Less obviously related to Deane's profession were four books of statistics. He used at least one of them, "Mortality Statistics 1850," in preparing one of his most important medical articles, "On the hygienic condition of the survivors of ovariectomy [surgical removal of an ovary]," published in 1855.⁵ Two others, "United States Census 1850" and "Census Statistics 1850," might have contributed to the same researches. The fourth book, "Palfrey's Statistics," which lists agricultural and manufacturing statistics across the state,⁶ has no mortality or medical statistics, but is related to Deane's interest in agriculture, and to his faith in rational researches.

For a well-known urban doctor of Deane's generation, a good medical library would be assumed, but his non-medical books are less predictable. They nonetheless reflect the tastes of a cultivated male professional of the middle of the nineteenth century. Sixty-six books and journals, totaling 124 tomes, covered a variety of subjects, chiefly geology and natural sciences, agriculture, contemporary geographical exploration, biographies of notable men, English and Continental history, and United States politics and culture. Very much a man's library, it included *Uncle Tom's Cabin*, an obvious choice for an anti-slavery adherent, and only three literary works, and these may have been acquired for his daughters' education: Nathan Welby Fiske's *Manual of Classical Literature* (1839), volume 5 of an edition of Sir Walter Scott's work, and two volumes of Shakespeare.

Books related to Deane's work with fossil footprints, the central issue of the present study, are relatively few but telling. Although no titles are listed, surnames of authors, some attached to subjects ("geology," "mineralogy") permit their identifications. Deane was acquainted with John Collins Warren, the famous Boston physician and collector, so it's no surprise that he owned Warren's *Remarks on Some Fossil Impressions in the Sandstone Rocks of Connecticut River* (Boston 1854), a book which had additional interest for Deane because it contained the first photograph, a salt print, ever to appear in a scientific publication in America. Deane would have been keenly interested in this because he was himself a pioneer in the preparation of photographs of the sandstone fossils (see below). He also had two other publications by Warren but their titles can't be deciphered from the inventory.

⁵ Deane 1855. In the same year Deane's article was republished by John Wilson & Co., Boston.

⁶ John G. Palfrey, *Statistics of the Condition and Products of Certain Branches of Industry in Massachusetts for the year ending April 1, 1845* (Boston 1846).

Supplementing Warren, he had John L Comstock's *Elements of Geology, including Fossil Botany and Palaeontology* (1847); Ebenezer Emmons's *American Geology* (1855), with passages on sandstone tracks from Turners Falls; two editions of Charles U. Shepard's *Treatise on Mineralogy* (1832, 1852); Thomas Wyatt's *A Synopsis of Natural History* (1847) translated from Ceran Lemonnier's *Programme de l'enseignement de l'histoire naturelle dans les collèges* [1837]; a book by Cuvier of unknown title, and Charles Brooks's *Elements of Ornithology* (1847). The latter would have concerned Deane because of the prevalent belief that the stony tracks were made by birds. Also valuable for fossil sandstone impressions and for the sciences generally were nineteen volumes of Benjamin Silliman's *American Journal of Science*, to which Edward Hitchcock and Deane himself had submitted salient articles on the sandstone fossils. (Bibliography).

Deane had several books on geographical expeditions that incorporated some of the recent American explorations of the newly opened-out West: John C. Fremont's *The Exploring Expedition to the Rocky Mountains*, 1851, the "Sitgreaves Expedition" (the scientific and military mission to explore the Colorado River system in 1851 led by Capt. Lorenzo Sitgreaves), and the "Stansbury Expedition & Map" (Major Howard Stansbury's two-year expedition to survey the environs of Great Salt Lake, 1849-1851). Like so many of his contemporaries, Deane was caught up in the thrill of the adventuresome and often ruthless settlement of the West, when new states were being carved out of Native American lands. The excitement was brought to a pitch by the discovery of gold in California in 1849 and the consequent rush west of Easterners to share the riches.

Also in Deane's library were other books of exploration, making a total of fourteen altogether. This is not unusual because vicarious adventure linked with contemporary history was a trait shared with many men. Deane owned one volume of the three-volume edition of Commodore M. C. Perry's *Narrative of the Expedition . . . to the China Seas and Japan . . . 1852, 1853, and 1854 . . .* (Washington 1856), and the arctic expedition of Elisha Kent Kane, *The United States Grinnell Expedition in Search of Sir John Franklin, a Personal Narrative* (New York 1851). The sensational two volumes by William Lewis Herndon and Lardner Gibbon, *Exploration of the Valley of the Amazon, Made under the Direction of the Navy Department* (Washington, 1854), was shortened by the probate clerk to "Exploration of Amazon, map." Closer to home, Deane also had "Owens Geological Survey," that is, one of David Dale Owen's several surveys from 1838 onward of the geology of the north Midwest, and Joseph D. Whitney and John W. Foster, *Report on the Geology and Topography of a Portion of the Lake Superior Land District* (Washington DC, 1851-1852).

More books of exploration, not necessarily involving geology, are listed in the inventory with phrases too general to permit identification. The broadest are “Explorations & survey” and “US Naval Expedition.” Several show Deane’s concern with coastal geography. “U. S. Coast Survey, 2 Sketches of do. [i.e., from the book],” could refer to any one among dozens of official surveys of the east and west coasts. Because several were published in 1853 (including those on the California coast and the mouth of the Connecticut River), the inventory’s phrase “U. S. Coast Survey 1853” also lacks specificity. These surveys featured topographical maps which were often collected independently of their texts; they are still much prized. “Annual Report Coast Survey with map” stands in for another such publication.

Among Deane’s readings were several devoted to American and European history. Three books were listed without titles but which documented the founding of the United States, one on the Declaration of Independence of July 4, 1776, and two on the ratification of the U. S. Constitution in Massachusetts on February 6, 1788.⁷ Perhaps Deane took pride in the fact that Massachusetts’ ratification was a compromise that set the model for other states’ favorable votes. Two more books were contemporaneous studies of George Washington by Jared Sparks and Joel Tyler Headley.⁸ Headley featured military history, itself one of Deane’s interests because he also had Headley’s book on Napoleon and one volume of Napier’s account of the Peninsular War.⁹ Loosely associated with them was “Hoyt’s Military Instruction.” Epaphras Hoyt was a long-lived and locally famous military man (1765-1850), author of several edited and original works on the military and on geography.¹⁰ His best known work, probably the one Deane owned,¹¹ incorporated tactics of guerrilla warfare (“petite guerre”), which was featured also in Napier’s study of the Peninsular War. Like many cultivated Americans, Deane was abreast of European history. He had all six volumes of Hume’s history of England, and one from Macaulay’s more recent history. Also among his books was a “Life of

⁷ “The Old Bill of Independence,” “Massachusetts Convention 1788,” and “Constitution U. S.”

⁸ Sparks’s *The Life of George Washington* (Boston 1852); Headley’s *Washington and his Generals* (New York, 2 vols., 1847 et seq.).

⁹ Joel Tyler Headley, *Napoleon and his Marshals* (New York, 2 vols., 1846 et seq.); William F. P. Napier, *History of the War in the Peninsula* (Philadelphia and New York, 6 vols., 1828 et seq.).

¹⁰ General Epaphras Hoyt (1765-1850) was Hitchcock’s uncle and mentor. Nephew and uncle studied astronomy together from 1811 to 1815.

¹¹ Hoyt, *Practical instructions for military officers* (Greenfield 1811).

Cromwell,” perhaps by Headley.¹² For lighter reading about Britain, he acquired a satire on fashionable society and a book of more sober reflections on contemporary British and French mores.¹³

The most curious of the publications in Deane’s library were five reports of the U. S Patent Office, one listed only as “Pat Office Report,” but the other four are given their dates: 1848, 1853, 1857, and 1858. They lend themselves to speculation about the practical side of his life in a time in America when patents of medical devices were constantly accorded, including that of the “Jarvis surgical adjuster.” That he was a practical man is certain, as we shall see in other sections of this study. In addition to his dozens of medical instruments, he had several tools that point to his work around house and garden: carpet hammer, pruning shears, “Brad Awl,” half-inch chisel, and an “Ivy Square.” If he thought of any remodeling of his house, he had a good guide, Gervase Wheeler’s book on all aspects of building houses from small cottages at \$1200 to mansions at \$22,000.¹⁴ His brief commerce in the silk industry (see below) is one token of his involvement in the public realm, and so is his preoccupation with sandstone fossils. Further, he was a pioneer in the use of photography to document fossils. And like many residents of Greenfield, he had a garden and probably also chickens. The inventory’s listings of several related books are, as usual, too general to permit identification,¹⁵ except for one: “Insects Injurious to Vegetation.” This is Thaddeus William Harris’s *A Report on the Insects of Massachusetts, Injurious to Vegetation* (Cambridge 1841). Harris was likewise a Massachusetts physician, which aligns him with Deane whose silkworm venture was terminated by statewide insect predation of mulberry leaves.

Although much is learned from the probate account of Deane’s possessions, many objects are nowhere mentioned although we know he owned them. Especially vexing is the absence of anything related to his daguerreotypes and photographs of sandstone fossils, although these were central to his activity at the time of his death. The necessary equipment was too prominent to have been overlooked. One possible explanation is that he conducted his photographic work in the premises of one of Greenfield’s several professional photographers. Missing also from the inventory are

¹² David Hume, *The History of England* (London, 6 vols., 1754-1761); Thomas Babington Macaulay, *The History of England from accession of James II* (Boston, 5 vols., 1849-1856). Possibly Joel Tyler Headley, *Life of Oliver Cromwell* (New York, 1848 and 1852).

¹³ George William Curtis, *The Potiphar Papers* (NY 1853 and 1856), and Henry Colman, *European Life and Manners* (Boston and London, 2 vols., 1849).

¹⁴ Gervase Wheeler, *Homes for the People, in Suburb and Country: the Villa, the Mansion, and the Cottage . . . with Examples Showing how to Alter and Remodel Old Buildings* (New York 1855).

¹⁵ “Massachusetts Agriculture Papers” (7 volumes), “American Gardener,” “Botanist,” and “American Poultry book.”

some sandstone fossils we know he possessed, and that were incorporated in his work in photography. Also absent are several books he referred to in his publications, including those by Hitchcock and by Dr. Stephen Williams of Deerfield. Of course Deane could have lent books, and in 1852 when he joined the new library, he was obligated to give books, so we'll never have a complete listing of his own library.

Deane's early life

James Deane's father Christopher (c. 1756-?) was a blacksmith of Stonington CT, who moved to Colrain MA some time in the 1790s. His first wife Rebecca Palmer had died in 1791, leaving several children, including Christopher (1783-1854). The senior Christopher married his second wife Prudence Denison in 1794, and this couple had several children. James, born on February 24, 1801, was said to be the youngest of all the children, apparently eight from both marriages. Three of his siblings died young, but his sister Rebecca, born in 1797, outlived him, dying in 1882.¹⁶ His older half-brother Christopher studied medicine with Dr. Samuel Ross in Colrain, and practiced there.

The principal source for Deane's youth and early career is the obituary address of 1858 by Dr. Henry I. Bowditch (1808-1892).¹⁷ Bowditch first corresponded with Deane in the late 1840s when he was secretary of the Massachusetts Medical Society, but they met subsequently more than once in connection with the Boston Society of Natural History in which Bowditch was a prominent member. He was also an outspoken abolitionist, and would have warmed to Deane's anti-slavery convictions. He refers to their conversations in which the Greenfield doctor spoke of his early years, his studies and some of his operations. Bowditch also interviewed an unnamed schoolmate of Deane's, and visited his birthplace in Colrain. Much of what follows here that's not separately footnoted derives from Bowditch's forty-two pages.

Deane's youth was spent on a farm on a high hill in Colrain, from which, Bowditch remarked, there were memorable views of Monadnock and Wachusett mountains. "James's father," he wrote, "was a hard-working farmer, of a strong mind, and rather puritanic, conservative character. He expected his son to labor with him on the farm. He was, however, fond of books . . . James respected and obeyed

¹⁶ Jabez, Nathan, and Mary Ann, originally buried in Colrain, were re-interred in James's family plot in Greenfield.

¹⁷ *Bowditch 1858*. Bowditch also published an abstract of his address in Deane's posthumous book, edited principally by Thomas T. Bouvé (*Deane 1861*).

rather than loved him. His mother was a woman of sterling piety, good sense and of a more genial nature. For her he always entertained the utmost respect. . . . Her death, which happened when he was about fifteen years of age, made a profound impression on him, and a desire to quit home to seek his fortune elsewhere took possession of him” He attended the district school and spent one term at Deerfield Academy; he also studied Latin under Isaac B. Barber, a Colrain lawyer. His parents respected education, and some of his brothers became teachers in the district school; three of them studied medicine.

At age nineteen, with permission from his father, Deane went to Boston to try his fortune, but soon returned home and, presumably, to farm work. He left home definitively when he was twenty-one and moved to Greenfield. There he became clerk to Elijah Alvord, Clerk of the Court and Registrar of Probate; he boarded with the Alvords. He was able to send some money home to aid his family “and to pay for the education of a younger sister,” writes Bowditch.¹⁸ In 1827, while still working for Alvord, Deane began studying medicine with Greenfield doctors Amariah Brigham and his partner Amasa Barrett, and then went on to New York’s Columbia College School of Physicians and Surgeons.¹⁹ After receiving his M.D. in March 1831, he settled in Greenfield. In May he applied to the colonel in charge of a regiment stationed in Shelburne for the post of Surgeon’s Mate.²⁰ He announced his availability to the town’s residents, and began his practice.

Brigham (1798-1849) was doubtless his principal mentor in medicine.²¹ In 1831, about the time Deane received his M.D., Brigham moved from Greenfield to Hartford CT, and the next year began writing on mental health. Also in 1832 he published a book on cholera, which suggests that he had a role in Deane’s journey that year to Montreal to investigate an epidemic of that disease. In the *Greenfield*

¹⁸ Elsewhere Bowditch writes that James was the youngest Deane, so perhaps here he meant to write “older” sister, who could still be young.

¹⁹ For Deane’s life and activity, Dame (*Dame notebook*) canvassed newspapers and apparently had access to some medical records. A more secure chronology is found in Deane’s student file at Columbia, kindly copied for me by Jennifer McGillan, Archivist at the Columbia University Medical Center, from which the following dates are derived. Certificates in his student file show the following: He studied with Barrett from Oct. 12, 1827, to September 1, 1829, and with Brigham (who went abroad for a year beginning in October 1828) from Oct. 13, 1827, for six months. He resumed study with Brigham in October 1829 for one year, who also certified that Deane completed “the full term of three years” at Columbia with him and Barrett. He also studied there with Dr. A. W. Ives who declared on July 27, 1829, that Deane had been his pupil for four months. For the award of his M.D. in March 1831, the essential attestation of having attained the full age of twenty-one years was signed by John Deane in New York on February 21, 1831. (John, perhaps an older brother, has not yet been identified.)

²⁰ Letter to Col. David Wells at Shelburn, May 2, 1831. Kindly communicated by Nicolas G. McDonald.

²¹ Ebenezer K. Hunt, *Biographical sketch of Amariah Brigham, M.D., late superintendent of the New York State Lunatic Asylum, Utica, N.Y.* (Utica 1858), and “Amariah Brigham (1798-1849),” in Howard A. Kelly, *A Cyclopedia of American Medical Biography: Comprising the Lives of Eminent deceased physicians and surgeons, from 1610-1910* (Baltimore 1912), pp. 144-45.

Gazette & Courier Deane wrote an article on the epidemic—700 deaths—stressing its spontaneous appearances that no superstitions or false beliefs could allay. It was not transmitted person to person, so doctors and others in contact with patients did not get the disease. His purpose was “to banish all unnecessary apprehension and alarm, if we must be visited by this universal pestilence . . .”²² Brigham was an unusually progressive physician and a worthy mentor for the young doctor; he had strong democratic views that Deane shared. He helped found the New York State Lunatic Asylum in Utica (now the Utica State Hospital) and was its superintendent from 1843 to his death in 1849. One of the founders of the American Psychiatric Association, he believed in treating mental illness rather than simply confining patients. Deane owned his major book.²³

Established in Greenfield, Deane advertised that he provided vaccination for smallpox, urging revaccination for those already inoculated, and saying that those unable to pay would be provided “gratuitously by calling at my office.”²⁴ A month later he gave a lecture at the Greenfield Lyceum on Kine Pox (cow pox), following an eruption of smallpox in nearby Adams.²⁵ These communications to the public did not mean that he was well established in a town that already had several doctors. He contemplated leaving Greenfield, and must have said so to several townspeople because in 1833 when he changed his mind, he advertised that he had “relinquished his intention of leaving town, and again offers his PROFESSIONAL SERVICES to the Public.”²⁶ He kept his name before the public, because in October that year, he composed a hymn that was sung at the autumn exercises at the town’s “meetinghouse.” It had a conventional Protestant outlook, offering thanks for the harvest, and ending: “Great God, still opens wide the door / That swells our treasures and our store / And at the final harvest day / To Thy fair garners speed our way.”²⁷ According to Bowditch, music and art were forward in his life. “After his marriage he made an organ that was so perfect, that it was purchased of him.” Among his household possessions was a piano, which he apparently played. Bowditch said that he loved Beethoven, Mozart, Handel, and Hayden, but not “the lighter music of the

²² *Gazette & Courier*, July 17, 1832.

²³ *An Inquiry into Diseases and Functions of the Brain, Spinal Cord and Nerves* (New York 1840). Deane also owned J. C. Spurzheim’s *Observations on the Deranged Manifestations of the Mind, or Insanity* (Boston 1833).

²⁴ *Gazette & Franklin Herald*, Nov. 22, 1831.

²⁵ *Gazette & Franklin Herald*, Dec. 13 and 27, 1831.

²⁶ *Gazette & Franklin Herald*, April 16, 1833.

²⁷ *Gazette & Franklin Herald*, Oct. 29, 1833. The name and the location of the meetinghouse was not specified.

day.” This conforms to the “very serious demeanor before his patients and [he] would not give placebos or let the imagination have a role.”²⁸ With his colleagues, however, he was a notably funny man who entertained with jokes and witty sallies.

In 1834 and 1835 Deane formed a curious partnership with Thomas O. Sparhawk, described in several deeds as a “druggist” and a “merchant.”²⁹ They jointly owned a piece of land in central Greenfield, the exact location unclear from the charming words of the deeds listing a stake and a chestnut tree. Druggist and doctor seems a likely association, but nothing is presently known about their relationship. Town deeds show that the two men had adjacent properties, in which Francis Russell was for a time a part owner. The latter was a younger brother and partner of John Russell (1797-1874) who in 1833 had formed the cutlery business in Greenfield later known as the hugely successful John Russell Cutlery Company. The spotty town tax lists offer little help in clarifying these transactions and none at all to show when and where Deane formed his household.

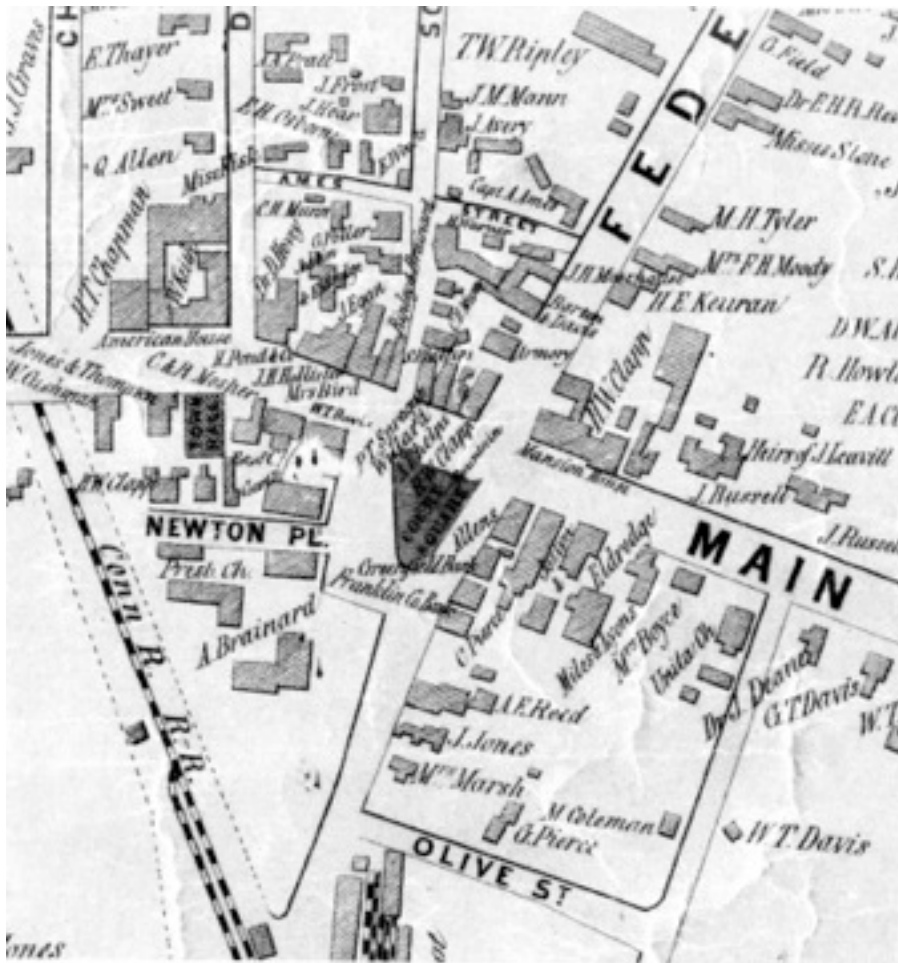
Deane began his family at the relatively advanced age of thirty-five. On October 3, 1836, he married Mary Clapp Russell (1811-1871), youngest sister of John, Nathaniel and Francis. Her brother Francis’s involvement with Sparhawk and Deane suggests that the latter benefited from the Russells before his marriage, perhaps because of an acknowledged engagement. No property deeds have survived that tell where the Deanes first set up their household. Tax records of 1835 and 1836 list “Building Lot \$200” for Deane, but in 1837 and 1838 his only listing is for the poll tax. We have to await 1847 before his home is mentioned in the town’s incomplete tax records: “1 House 1000 1 Barn 100.” In a map of Greenfield published in 1855, his name is printed on a house on the southwest corner of Main and Hope streets (fig. 2). Sad to say, no deed for the house has been found that links it to Deane. It was built in 1830-1831 by Martin Smith (1798-1879), a gunmaker. In 1836 he sold his gun business and shop to William J. Clements, who went bankrupt in July 1838 and was obliged to turn over all his property to his creditors.³⁰ Perhaps it was then that Deane acquired it, but the only fact known comes from the tax record of 1847. From 1850 to Deane’s death in 1858, his “Home & Lot” were valued at

²⁸ *Bowditch 1858*, pp. 34-35.

²⁹ In the Franklin County Registry of Deeds, the deeds are in Book 92, two deeds dated Oct. 30, 1834, one dated April 22, 1835, and two more dated August 10, 1835.

³⁰ For Clements’ bankruptcy, see the town’s register of grantor deeds, July 20, 1838. For Smith, see F. Allen Thompson, “Worcester County Gunsmiths 1760-1830,” *The American Society of Arms Collectors, Bulletin* No. 44, 1981, pp. 15-44. Smith built a house and shop at 497 Main St. in 1827-28, and then two years later built a shop and second house (the future Deane home) a few blocks west on Main and Hope, and moved his gunmaking there.

\$2000 rising to \$2500, and his piano at \$150. Before the end of the century, his house belonged to the Grand Old Army, as shown in fig. 3.



The Deanes had three daughters of whom virtually nothing is known: Mary Edwards Deane (1839-1873), Alice Russell Deane (1842-1926), and Grace Deane Hunt (1854-1907). None of their correspondence or private papers has come to light; only Grace, the youngest, married, becoming Mrs. David B. Hunt.³¹ We are therefore in the dark about Deane's family life. The probate inventory gives tantalizing glimpses of the home, but doesn't permit sensible conjecture about what went on there. Caleb Clesson Field (1810-1881) studied

medicine with Deane in 1836 to 1837;³² maybe the young doctor had other pupils. In 1838 Deane "removed his office to the ground rooms of Mrs. Clapp's new building, second door on Federal Street."³³ It was described as well furnished, including "books, superb drawings & illustrating [sic] the subjects of medicine and surgery, for the accommodation of students, whose studies he would be happy to direct." To enhance his reputation, he could have told potential students of the first of his many articles on surgery that appeared in the *Boston Medical and Surgical Journal* in

³¹ On July 21, 1894, the *Gazette & Courier*, identifying Mrs. David B. Hunt as Deane's daughter, reported her visit to Greenfield from Mexico where her husband worked for the railroad.

³² Amherst College archives, list of graduates (Class of 1836).

³³ *Greenfield Gazette*, Nov. 27, 1838.



1837.³⁴ In “Congenital fissures of the palate” he gave a brief history of surgery to unite such fissures. Dr. J. C. Warren had successfully closed a fissure a few years earlier. Deane’s surgery on a young man done “recently” was equally successful. In addition to giving details of this operation he told of re-attaching two fingers of another young man that had been severed in an accident; one digit was successfully attached, the other not. In following years, prowess in surgery became Deane’s distinction in the medical world, although in Greenfield he was known for treating all manner of illness and accidents.

Sandstone discoveries, 1835-1841

It was in March 1835 that Deane made a discovery that was to prove momentous in his life and in the history of paleontology. His neighbor Dexter Marsh (1808-1853), a Greenfield workman, while laying paving stones noticed the footprints of an animal pressed into a slab of old sandstone. He showed it to Deane who was immediately fascinated; he bought two such slabs, examining them closely. Using his own drawings and casts, he got in touch with the Amherst geologist Hitchcock, telling him that they were tracks of prehistoric birds “probably of the

³⁴ Vol. 16 (1837), p. 333, article signed June 18, 1837.

turkey species.”³⁵ This excited Hitchcock (fig. 4), the foremost geologist of Massachusetts, because no traces of birds had ever been found that far back in the geological record. Within weeks he sought out sandstone tracks in quarries and exposures along the Connecticut River from Gill to South Hadley. Deane, meanwhile, sent a paper describing his find to Benjamin Silliman, editor of the *American Journal of Science*, who informed Hitchcock of it. In response Hitchcock told Silliman that he was drafting a paper about the fossil tracks which he urged the editor to publish before Deane’s; “I shall give to Dr. Deane the credit of having put me upon the *track* after these relics.”³⁶ The Yale editor favored Hitchcock whom he knew intimately as a well-qualified geologist, so he set aside Deane’s paper.

Hitchcock’s epochal article on bird tracks was published in Silliman’s journal in April, 1836. Although he thanked Deane for calling attention to the tracks, he didn’t mention that the Greenfield doctor had told him they were made by turkey-like birds, and he took credit himself for identifying the animals as ancestors of wading birds. He gave close descriptions of a number of tracks he had acquired for Amherst College, including the two of which Deane had made the casts that spring. He proudly named and identified a new science: *Ornithichnology*, “study of stony bird tracks” (later shortened to *Ichnology*). The animals’ feet were impressed on muddy sand or clay that was hardened by the sun; in the following wet season this layer was covered over by the return of soft material. The process was repeated, forming successive strata of sandstone. The tracks of heavier birds would push through the top layer and impress the next ones, still ductile enough to receive its marks.

In engraved illustrations (figs. 5 and 6) and text, Hitchcock compared the fossil tracks of these three-toed bipeds with those of living wading birds (not turkeys) to substantiate his avian analogies, and coined Linnaean binomials for several species of the prints. Many of these have been retained in the scientific literature because Hitchcock still stands as the originator of this branch of paleontology. The footprints varied in length from an inch to that of “*Ornithichnites giganteus*” (now *Eubrontes giganteus*), sixteen inches long, which meant that a bird-like animal of outsized proportions once walked across sandy or clayey mud of prehistoric time (now known as the early Jurassic age) preserved in sandstone. This was still in the early years of great excitement over the revelations that the prehistoric world had been peopled by

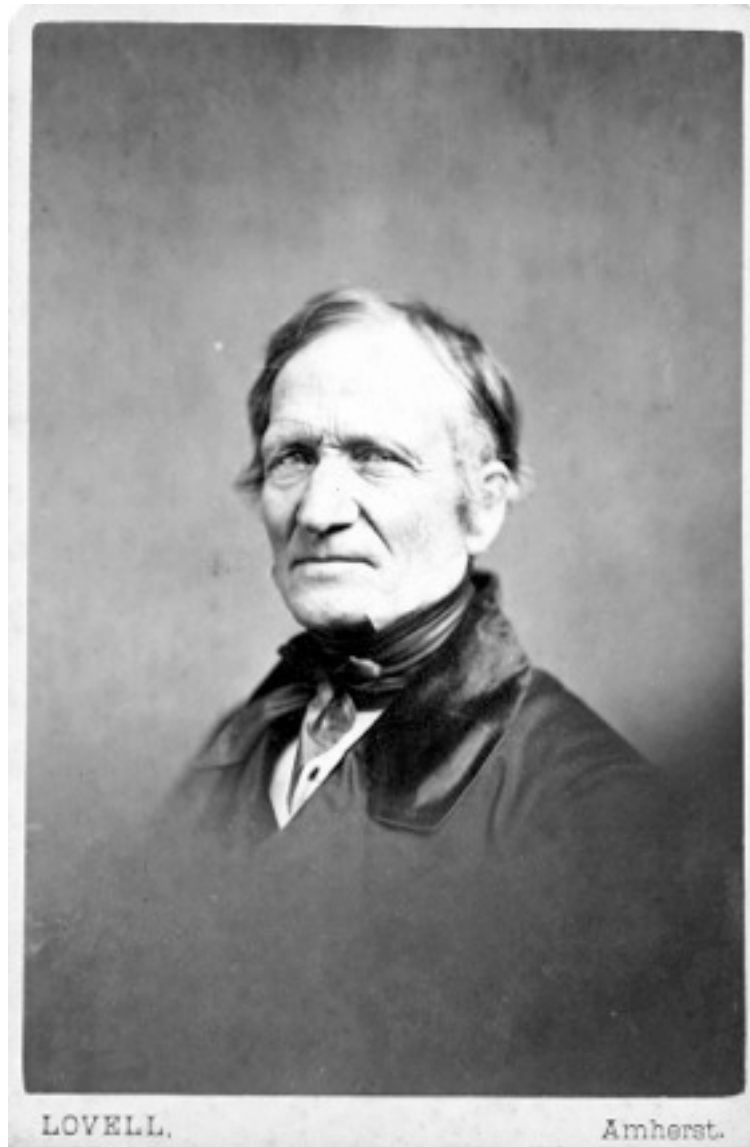
³⁵ I’ve recapitulated in detail the story of the first dinosaur tracks ever discovered in *The Complete Correspondence of Edward Hitchcock and Benjamin Silliman, 1817-1863* (see Bibliography). I refer the reader to this publication’s documentation so in the present essay I’ll not footnote these except for quotations and a few salient references. In two separate monographs, I’ve published the previously unknown roles of Dexter Marsh and Roswell Field (Bibliography).

³⁶ Hitchcock to Silliman, July 30, 1835. See *The Complete Correspondence*.

monstrous creatures. Hitchcock's article and its large engraved plates became well known in Europe—Silliman's journal had an international circulation—so Hitchcock's bird tracks loomed up suddenly in the rapidly expanding field of paleontology in Great Britain, France, and Germany.

From 1836 to 1841 there's no evidence that Deane was working on sandstone fossils while Hitchcock was busy with them and eager to make his new work well known. From 1836 to 1840 Hitchcock expedited specimens of the tracks and a number of casts to scientific institutions and individuals in London, Paris, and Heidelberg as well as to natural history societies in Boston and New York. The British geologist Charles Daubeny visited him in 1837, eager to examine the sites of the fossil impressions near Amherst. Hitchcock's international standing was some compensation for the attacks he was suffering from fellow ministers and Biblical purists who could not accept the idea of deep time and of life before Genesis.³⁷

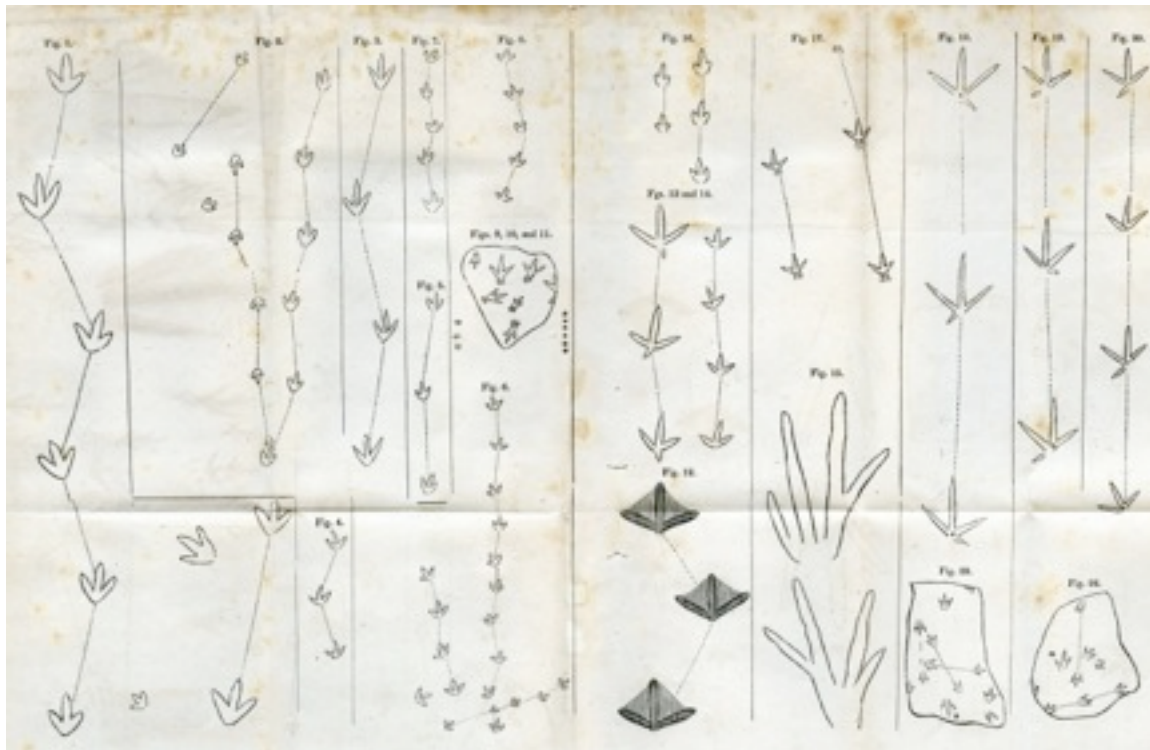
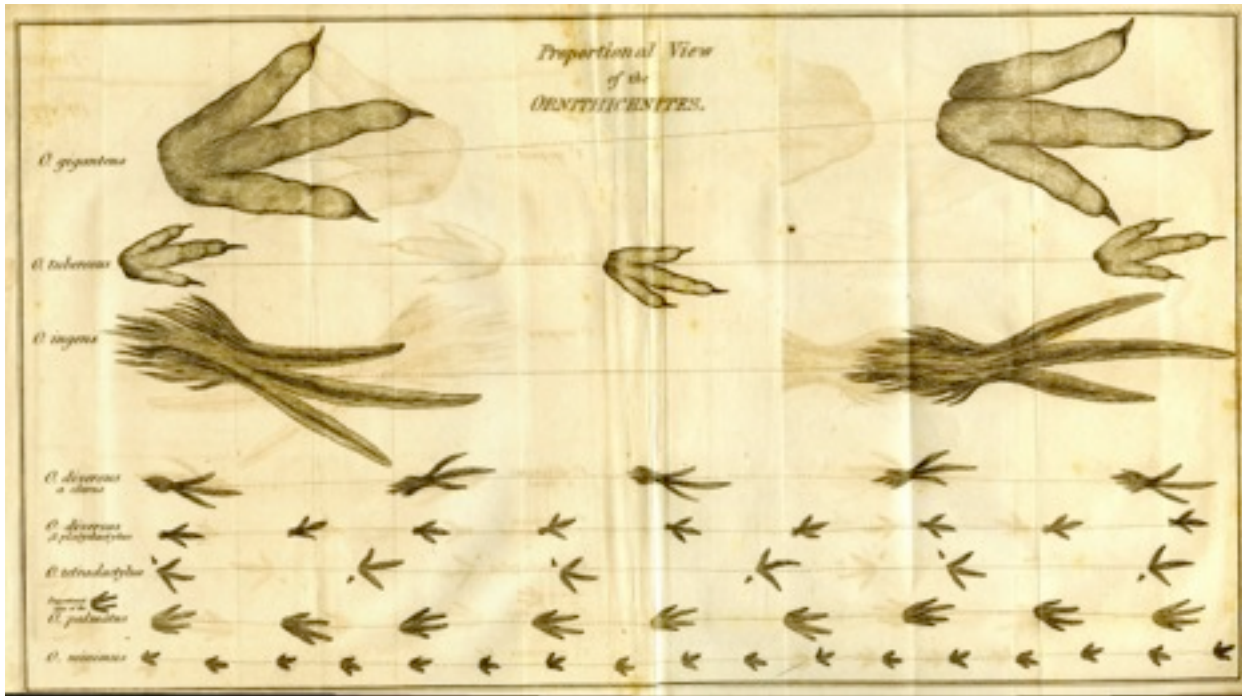
In modern parlance, Hitchcock was a workaholic. In his own day, one would have said "No moss grows on his feet!" In addition to teaching and preaching—he was an active Calvinist minister—he published several articles and two books on geology and on religion, and continued to examine Massachusetts geology for a new handbook, *Elementary Geology*, which he published in 1840.³⁸ He was also preparing a new and expanded edition of his report on the state's geology, which he



³⁷ See "The Mosaic Controversy, 1837-1839" and "Science and the Bible, 1842-1863" in *The Complete Correspondence*.

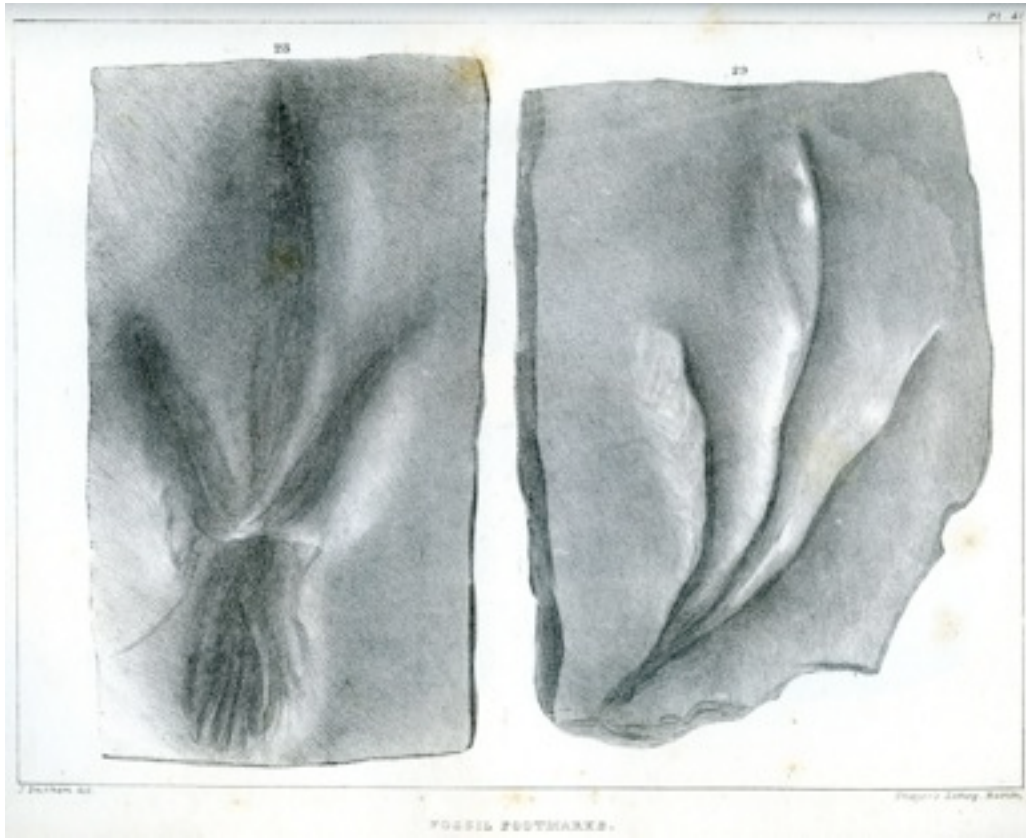
³⁸ *Elementary Geology* went through twenty-one editions, frequently revised, over two decades.

published in 1841 as *Final Report on the Geology of Massachusetts*. It held many



illustrations by his wife and collaborator, Orra White Hitchcock, who had also illustrated the first *Report* (1833) and *Elementary Geology*.

For his *Final Report*, he had been revisiting the sites of the “bird tracks,” exploring new ones, and acquiring

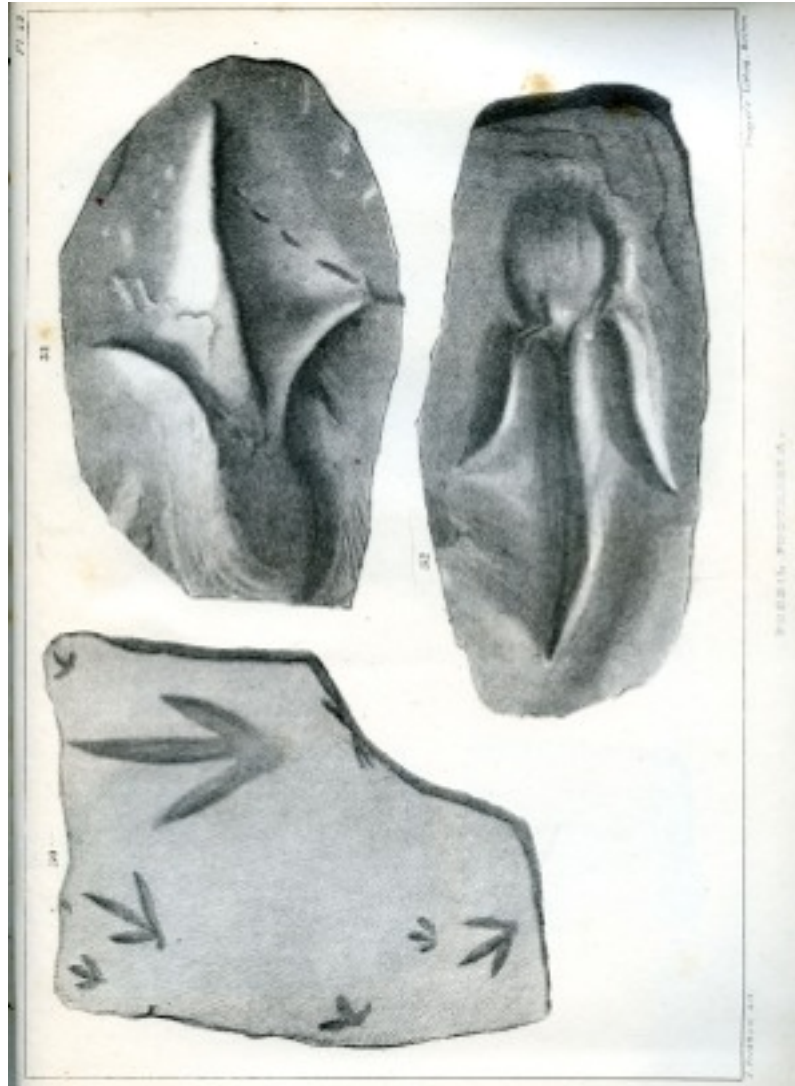


sandstone slabs from Dexter Marsh and other quarriers, as well as from his own exertions. In devoting sixty pages of his massive report to fossil tracks, Hitchcock greatly added to his 1836 article, renaming some species. He now divided the expanded number of tracks into ten species of

Sauroidnichnites (resembling tracks of a saurian or lizard) and seventeen species of *Ornithoidichnites* (resembling tracks of a bird). Each is named and described, with reference to the many engraved and lithographed plates. The length of the stride of larger specimens, he points out, show legs too long to support a body like present saurians, “but only a body like that of birds.”³⁹ Deane is twice referred to. One slab (fig. 7) “containing the *O. elegans*, from the southwest part of Montague [. . .] is the first specimen of fossil footmarks that ever fell under my notice; having been pointed out to me by Dr. James Deane of Greenfield .” This was one of the two that Deane informed him about in 1835 and which he had then purchased. He named one new species, *O. Deanii* (fig. 8) for Deane, “who first called my attention to the subject of fossil footmarks.”⁴⁰

³⁹ Hitchcock, *Final Report*, p. 517.

⁴⁰ Hitchcock, *Final Report*, pp. 492, 494.



Raising Silkworms, 1839-1842

In 1839 came a surprising turn in Deane's life: he began to raise silkworms in addition to conducting his medical practice; this new venture seems to have distracted him from the bird tracks. In view of the nationwide economic depression that began in 1837, the government of Massachusetts encouraged the silk industry by offering subsidies both for raising the cocoons and for reeling the silk. It was an industry ideally suited to families—unpaid labor!—and didn't require substantial capital investment. In 1834 the *Greenfield Gazette* reprinted an article boosting silk production as a family enterprise that could contribute to national prosperity.⁴¹ In the summer of

1839, the *Gazette* announced that James Deane was apparently the first in Greenfield to raise silkworms. "Some of this brood have spun their cocoons, a part of which have been reeled, and made into very beautiful raw silk. The reeling was performed on a common reel, by a young gentleman, as a temporary amusement."⁴² The "curious" were invited to visit his enterprise. A month later, the newspaper wrote that Deane had already produced "very beautiful raw silk" on a reel he had ingeniously designed himself. The *Gazette* continued to favor local silk growers, mentioning that Isaac Morse of North Sunderland fed 1,000 worms from his white mulberry hedge,

⁴¹ *Greenfield Gazette*, Nov. 11, 1834. The piece was reprinted from the *New York Daily Advertiser*.

⁴² *Greenfield Gazette*, July 23, 1839.

the leaves gathered by “two girls about eleven years of age.” Their labor of six to eight weeks produced silk valued at \$175.⁴³

On September 10, Deane posted an advertisement.

Persons wishing to procure Silk Worms eggs can be supplied by the Subscriber with any quantity of the two best varieties, the large six weeks, brown worm, with sulphur cocoons, and the large white worm, with *white peanut* cocoons. The latter surpasses all others in length, strength, and fineness of silk, and facility of reeling. The silk of this variety from his own reel commands \$7.50 a pound in Philadelphia.⁴⁴

Deane was a Johnny-come-lately despite the fact that he was the first in Greenfield to raise the worms. He began his venture at the end of a decade that was then and later known for its “mania” of planting a recently cultivated mulberry, *Morus multicaulis*, called the Chinese mulberry. Its boom owed to the fact that its leaves could be used in its first year of growth, unlike the *Morus alba* that it supplanted, which needed five years’ growth before harvesting. It also responded readily to cuttings, so entrepreneurs made young plants available to the rapidly growing numbers of farmers who engaged in silk production. Reminiscent of the Tulipomania of seventeenth-century Holland, the price of multicaulis trees rose exponentially from the late 1820s until it crashed in 1839 through overproduction.⁴⁵ Deane had to be aware of this downturn but joined others and the *Gazette* in having faith that low-cost production of silk would survive.

We know quite a bit about Deane’s silkworms because he wrote two letters to the state Commissioner for the Agricultural Survey, Henry Colman, who published them in 1841.⁴⁶ Colman preached that despite the crash in prices of the multicaulis, silk making would still be of value to farmers, “especially to the farmers’ wives and daughters.” Unpaid women’s labor was a staple of the rural economy and frequently, as we see here, of the lower and middle classes of towns and cities. Deane’s first letter, dated January 5, 1841, is a long one detailing the previous year’s successful production of silk. It’s the letter of a booster who may well have anticipated its publication. Deane ends it by saying that “the enterprise of cultivating silk in the

⁴³ Greenfield *Gazette*, Aug. 20, 1839. The reel was made by Joseph Frost, a local cabinet maker.

⁴⁴ Greenfield *Gazette*, Sept. 10, 1839. The ad is signed “James Deane, Greenfield, September 2, 1839.”

⁴⁵ See, for example, Nonotuck Silk Company, *Silk, its Origns, Culture, and Manufacture* (Florence MA 1902), pp. 8-10.

⁴⁶ Colman, *Fourth Report of the Agriculture of Massachusetts, Counties of Franklin and Middlesex* (Boston 1841), pp. 480-89.

United States will speedily make its way against the tide of prejudices and derision which now sets so strongly against it . . .” In this and the second letter, dated October 10, 1841, Deane documents the whole enterprise in such minute detail that he provides a splendid source for anyone wishing to learn how silk was produced by New England families. He writes about the special subdivided wood shelves (“hurdles”) that he built for the first three “ages” the worms undergo. In charming language he reports that when the worm ceases to eat, “for the first time in its life [it] manifests a disposition to ramble. Its desire to ascend as far as possible” up to the ceiling is met by the provision of frames of mulberry brush that rise above the hurdles; here the worms make their cocoons.

At first glance Deane’s letters read like those of a fully qualified biologist writing out his experiments, using ruled tables to post his findings. However, there were a number of books and magazines that used similar charts to lay out the process in comparable detail.⁴⁷ Deane’s tables outline the daily temperatures in the “hatching room” in August, after having held the eggs on ice since March until the summer warmth was steady. He increased the temperature in calculated increments for ten days and then held it steady for a month at the ideal 77⁰. We read for each day the weight of chopped leaves and the hours of labor required. For the first two ages, “one lad, 16 or 17” is required at \$3 a day, then progressively more boys at that pay until five are needed for the fifth age. “The sudden and enormous demand of labor in the fifth age, is the great barrier to an unlimited production of silk. It in a great degree prohibits the application of capital . . .” It was certainly a labor-intensive production over a period of about six weeks. At the end, reeling thirty-five pounds of silk cost \$25. However, if a farmer’s daughter performed the reeling, that expense would be deducted.

In 1841, perhaps because he had more ambitious plans, Deane rented land and a “corn-house” from Benjamin Barton of Gill, across the Fall River from Greenfield.⁴⁸ He credits Barton with “a very successful experiment in raising silk,” but the details of his two letters show that he himself was in control of the whole process.

The silk worms were reared by an invalid member of the family, and the silk beautifully reeled by his daughter, whose smallest daily product was one and

⁴⁷ Among them J. H. Cobb, *A Manual Containing Information Respecting the Growth of the Mulberry Tree* . . . (Boston 1831), and issues of *The Silk Grower and Farmer’s Manual* of the 1830s. The state distributed free 2000 copies of Cobb’s book.

⁴⁸ Barton’s house, which still stands in Gill, appears in an undated advertisement: “It was at one time a tavern during the logging days, the accommodation of boatmen on the CT River. Later mulberry trees were planted and a silk industry carried on . . .” (communicated by Pamela Shoemaker).

one quarter pounds of superb silk of the peanut variety. This fact may forever settle the question of reeling, concerning the difficulties of which so much has been said, by those who know nothing of the art. Miss Barton is a young lady of intelligence, energy, and ingenuity, and will reel without difficulty in a perfect manner, two pounds of silk of twenty fibres in a day.

Were the two women not paid for their labor? The costs that Deane listed seem to have been out of pocket, because they were included in the final statement of expenditures totaling \$114.74 for 1840, with a net income of \$77.76. Perhaps Barton's daughters were paid the recorded sums, and Deane's suggestion that farmers' daughters needn't be paid assumed that other farmers would use free family labor. Commissioner Colman made this assumption because the state would gain production of a valuable commodity without worry about large investments; modest subsidies would suffice. Deane or, rather, Miss Barton showed the way. "Reeling silk is a beautiful process that never fails to excite admiration, yet it is accomplished with ease, and with a little practice and steady perseverance, a young woman will reel a bushel of cocoons, yielding a pound or more of silk, in a day."

In his letters to Colman, Deane decried the false claims of mulberry dealers who promised too large a harvest, hence the crash. To counter this, Deane said he had made careful observations, perhaps basing them on publications he owned (see above). He was also anxious to allay fears stemming from the growing evidence of disease in the mulberry trees. That he was aware of these worries is evident because he owned Harris's *A Report on the Insects of Massachusetts, Injurious to Vegetation*, published in 1841, as well as several volumes of *Massachusetts Agriculture Papers*. "Good land," Deane wrote, "with a warm rich mellow soil, will contain from 10,000 to 15,000 plants of the multicaulis variety, and they may be computed to yield 5,000 lbs. and upward of foliage. For this amount of fodder five ounces of eggs will be required to hatch, producing full 100,000 cocoons, a quantity at least sufficient to reel 35 lbs. of pure silk." Deane placed this optimistic account against "the paroxysm of the multicaulis insanity" (Colman's phrase), which he felt had exaggerated the predation of mulberry by invasive insects. He ended his second letter by writing that "there is such a degree of prejudice, hostility and ignorance displayed by some leading organs of communication, that facts are either studiously suppressed or converted into contemptuous ridicule and sarcasm, but truth will triumph still."

In 1842, at the New England silk convention, Benjamin Barton reported an even better production of silk than the previous year's.⁴⁹ Barton was apparently the

⁴⁹ *Centennial Gazette*, 1892, p. 66.

owner of the silk produced in his corn-house, guided by Deane. Nonetheless, at the same convention, another neighbor pointed to a devastating loss because of a disease afflicting mulberry. He was more justified than Barton, because a surge of the disease in 1844 put an end to raising silkworms in Massachusetts. 1842 was probably Deane's last year of involvement in the silk business. Processing silk with imported cocoons, however, became a major enterprise in nearby Northampton, which from the early 1840s to nearly the end of the century, was known as the "Silk City."⁵⁰

The Deane-Hitchcock rivalry, 1841 to 1844

In 1841, while his silkworm venture had its last months, Deane returned to the sandstone footprints. His renewed attention might have been provoked by reading Hitchcock's newly published *Final Report*. There Hitchcock wrote that Deane "first called my attention to the subject of fossil footmarks." The Greenfield doctor took umbrage because this phrase downplayed his initial role: he was not credited with telling Hitchcock that the tracks were made by birds. Preoccupied by silkworms since 1839, he had put aside the sandstone fossils, leaving the field to Hitchcock. Now in 1841 he decided to assert his place as first discoverer by returning to the fossil impressions. By 1842 he was advertising in Silliman's journal.

The residence of the undersigned being in the vicinity of many localities of the New Red Sandstone of the Connecticut River, in which exist the perfect Tracks of Birds and also the Fossil Impressions of Fishes, he is enabled to secure them as they are quarried, and will furnish them to Geologists whenever it is practicable, for a reasonable compensation. As it will be only possible to obtain a limited supply, he will furnish as a substitute Plaster Models of all the varieties of Ornithichnites and Sauroidichnites, of which there are nearly forty, to all who may apply. These models will be cast in plates of uniform size, colored to conform to nature, and neatly packed in a box. They will be accompanied with a Descriptive Catalogue and sent according to direction for \$10. Greenfield, Mass., October, 1842.⁵¹

Silliman added this statement to the advertisement: "I owe much to the kindness and zeal of Dr. Deane in procuring for me and my friends suits [sic] of these interesting fossil foot-marks, and I repose full confidence in Dr. Deane's discrimination of

⁵⁰ See the "Northampton Silk Project," involving several institutions in the city in 2003.

⁵¹ Advertisement in the *AJS*, October 1842, kindly communicated by Nicholas McDonald.

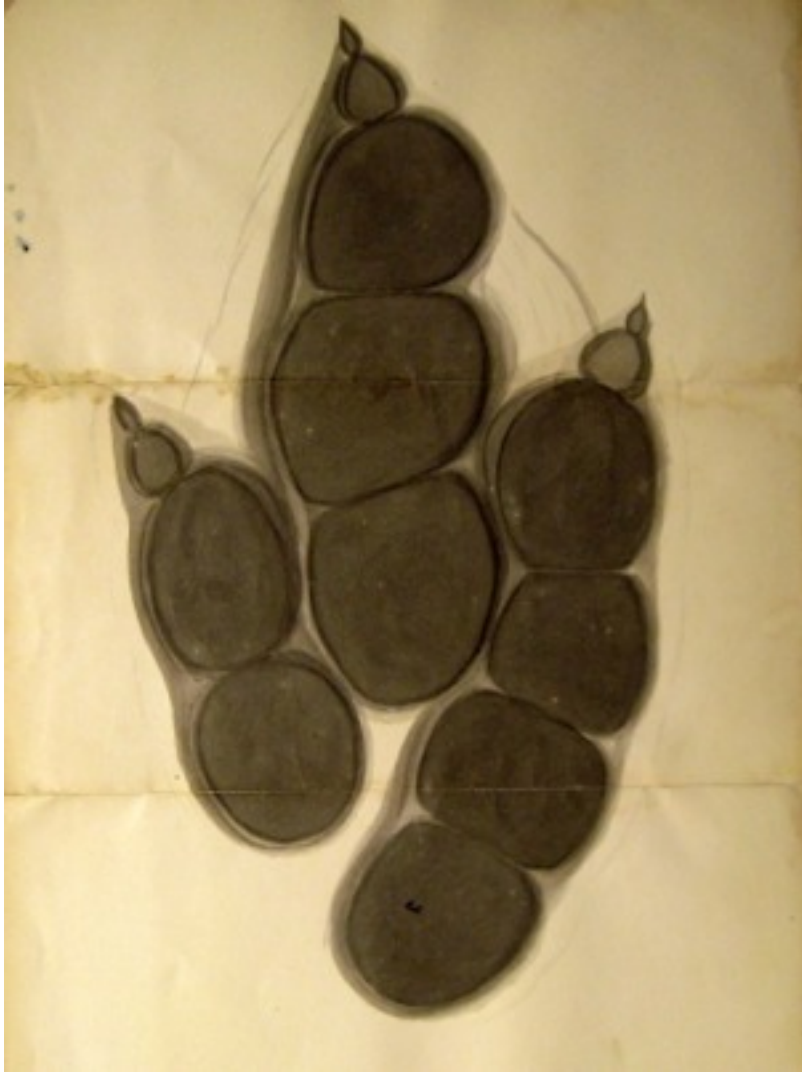
fidelity.” Deane had been communicating with Silliman (the letters are lost), who was about to take a role in the bitter controversy between Hitchcock and Deane. From Silliman’s remarks, we see that Deane had been providing the Yale professor and some of his friends with sandstone specimens, for which he had learned how to make casts, which he colored appropriately. Whether or not he hired help for making and packing them is unknown, nor is it known how many casts were sold.

Deane and Hitchcock had an amicable exchange early in 1842, of which only one letter of Deane’s survives, dated March 20. (A).⁵² He enclosed an ink drawing (fig. 9) of a footmark, “to see how this style of shading is calculated to illustrate these impressions.” The bold drawing—Deane was a skilled draftsman—is shaded as though in anticipation of a lithographic crayon. He asks Hitchcock to lend him one of his specimens, *O. tuberoii*, or a cast of it, so that he can make an accurate drawing, his own specimen being less perfect. “I intend to make drawings of all new varieties and append them to your plates.” He means the plates of Hitchcock’s *Final Report*, for an eventual publication of his own. Meanwhile, “If an accurate drawing of the specimen in my possession will be of any service to you in preparing your paper for Silliman’s Journal, I will make it with great pleasure.” This offer means that he was abreast of Hitchcock’s current work (Hitchcock’s next paper for Silliman [J] was published in 1844).

A month later Hitchcock gave more evidence of the two men’s collaborations. He read a paper on sandstone tracks at the third meeting of the Association of American Geologists and Naturalists (AAGN), held in Boston on April 24th, 1842. (C). “With one exception, new species here described are from specimens supplied by Dr. James Deane,” the slabs taken from Gill and Turner’s Falls. He can now “further differentiate the species *O. Tuberosus*.” Deane had divided one specimen so that half was in Hitchcock’s possession, but the latter was sorry to learn that the other half had been destroyed. (Fossil slabs were easily damaged; making casts of them required delicate handling.) Further, Deane had recently found “a new locality of *Ornithichnites giganteus* in the northeast part of Deerfield, at a small quarry half a mile south of the bridge over Connecticut river.”

In fact, Deane was embarked on his own investigations. Without telling Hitchcock, Deane sent a long letter (D) to the British paleontologist Mantell on September 20, 1842, to accompany the shipment of a series of sandstone impressions that Silliman had gathered from Deane over the preceding year. Included was *O. tuberosus*. “In exploring the bed of the river at low water in 1841, I was gratified with the discovery of several new species of these imprints, exquisitely

⁵² For capital letters in parentheses, see the Bibliography.



perfect.” Hitchcock, Deane writes, had long suspected the exact construction of the foot’s joints, but only with this specimen was it perfectly displayed. Deane recapitulated his role in the initial discovery, pointing out that it was he, before Hitchcock, who had identified the makers of the tracks as birds. (However, he now faultily claimed as his own the deduction by Hitchcock that the tracks were from wading birds.) In several paragraphs he describes in detail all features of the tracks and their strides, and why they are analogous to those of living birds.

The relations between the two men seemed to have been cordial up to now, but Deane’s letter to Mantell was the cause of their association receiving a poisonous thorn during the same Boston conference in the spring of 1842. Silliman had been kept abreast of Deane’s recent work

on the fossil prints, and in an address (B) he said that “the trifid tracks and impressions on the new red sandstone of the valley of the Connecticut, so zealously explored by Dr. James Deane of Greenfield, and both explored and figured and described by Prof. Hitchcock, leave no reasonable doubt, that they are, at least in part, due to the feet of birds, some of them of colossal dimensions.” Hitchcock paid little attention to these remarks at the time, but by January 1843, when Silliman published his address in his journal, he felt that he was made to trail behind Deane.

In October, 1843, Silliman further exacerbated Hitchcock when he published an article (E) announcing Richard Owen’s identification of the extinct *Dinornis* (now the Moa), a huge bird that seemed to support the ascription of the Connecticut valley tracks to birds. Again Hitchcock felt he was placed second when Silliman referred to Deane as “the original observer of the Ornithichnites (so well and boldly described by Prof. Hitchcock).” Furthermore, Silliman reproduced letters written by Deane,

Gideon Mantell, Owen, and portions of a paper by Roderick Murchison in which Deane is given a far bigger place than Hitchcock thanks to the recent arrival in London of Deane's specimens which were sharper in definition than Hitchcock's sent earlier.

In his article Silliman reproduced Mantell's reply to Deane of February 13, 1843, telling him that he had shown his specimens to the Geological Society of London, and had there read aloud Deane's letter. Charles Lyell agreed that birds had made the impressions which he had seen in April 1842, when he visited Hitchcock. Silliman also reproduced in his article a letter that Owen wrote him on March 16, 1843, agreeing that birds made the tracks. Finally, Silliman quoted from an address by Murchison to the Geological Society of London on February 17, 1843, referring to Deane's recent letter. The *Dinornis*, Murchison said, removes doubts that a gigantic bird could have made large imprints.

I am prepared to admit the value of the reasoning of Dr. Hitchcock, and of the original discoverer, Dr. James Deane, who, it appears by the clear and modest paper lately brought before us by Dr. Mantell [i.e., Deane's letter], was the first person who called the Professor's attention to the phenomenon, expressing then his own belief, from what he saw in existing nature, that the footmarks were made by birds. Let us now hope, therefore, that the last vestiges of doubt may be removed by the discovery of the bones of some fossil *Dinornis*; in the mean time let us honor the great moral courage exhibited by Prof. Hitchcock, in throwing down his opinions before an incredulous public.

One might think that both Deane and Hitchcock would be flattered by this paragraph. Deane, certainly, but Hitchcock did not want to concede that his colleague was the "discoverer." His letters to Silliman disclose how wounded he felt. In public, however, he remained the polite professional. In April, 1843, at the fourth session of the AAGN (F), it was reported that "Prof. Hitchcock then exhibited casts of nearly all the varieties of bird-tracks hitherto discovered in the Connecticut sandstone. These casts had been skillfully prepared and grouped by his friend Dr. James Deane of Greenfield, the original discoverer of the tracks." From this we learn that Hitchcock had benefitted greatly from Deane's recent preparation of a series of casts, but the reference to him as "the original discoverer of the tracks" was the editor's phrase, not his. Indeed, Hitchcock had informed Silliman that he was preparing a "reclamation," a paper claiming his own priority as discoverer. Silliman wrote him in September (G) that his "reclamation" was unnecessary "since you are on all hands,

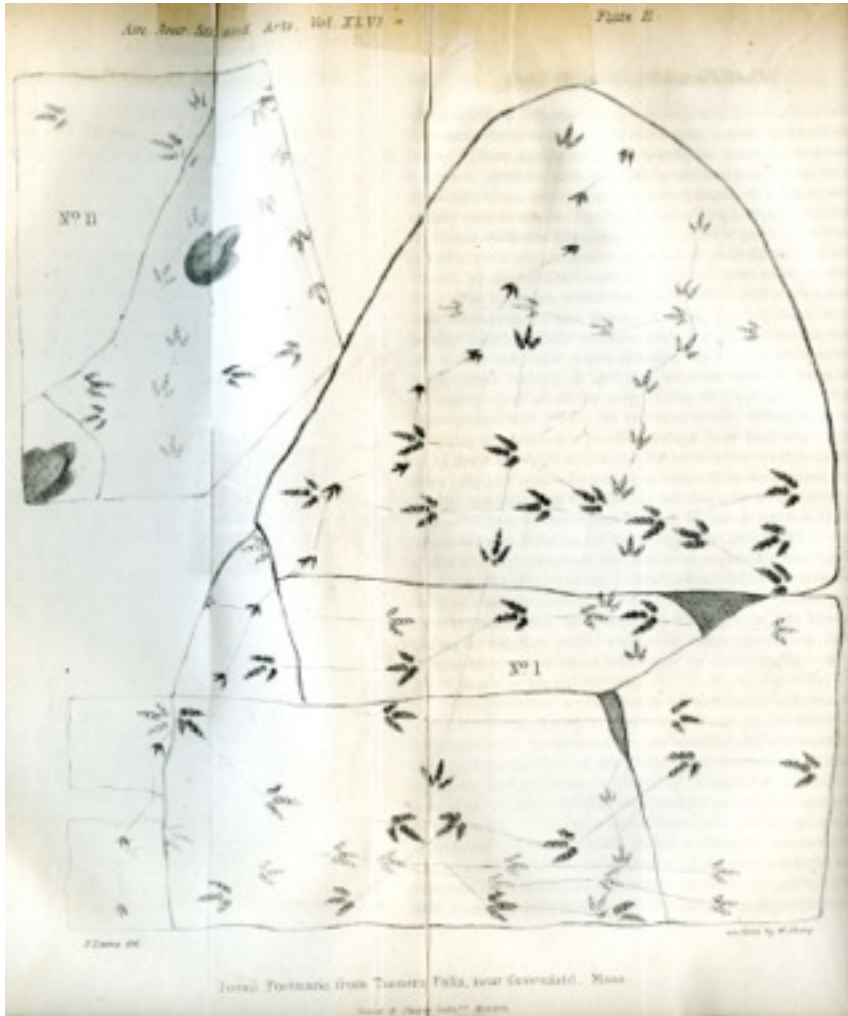
as far as I am informed, regarded as *the author & founder of the ornithichnology of the earliest bird ever & no one can deprive you of this honor.*”

Meanwhile, Deane had been making new discoveries which he showed Silliman and Hitchcock when they visited him in Greenfield in October, 1843. (H). He described his new finds in an article he sent the Yale editor the following month (I). Illustrated by two lithographs from his own careful drawings (figs. 10 and 11), his paper described footprints of several species of *Ornithichnites Fulcoides* more perfect than any hitherto found. They revealed the separate phalanges of the toes



with unusual clarity, as well as the patterns of the animals’ strides. He used Hitchcock’s nomenclature, but limited himself to patient physical descriptions without assessing the tracks in relation to others. “These magnificent specimens have been inspected by Prof. Hitchcock and by Prof. Silliman; to the former properly belongs the technical and complete description of them as his peculiar province. I therefore most willingly decline this difficult performance in respect to him, for to his successful labors, the subject of fossil footmarks owes its claims as an essential element of the science of organic geology.”

Hitchcock was nothing mollified by this acknowledgment, and in a lengthy article he sent Silliman in May, 1844, he spent several pages on the controversy with Deane. (J) He had to agree that Deane had first noticed the tracks in 1835. In “a popular sense” the one who first finds a specimen “may be called the original discoverer,” but “If to prove by long and laborious investigations, what is the true



nature of these impressions, may properly be regarded as their discovery, in the sense in which that term is understood by scientific men, then I lay claim to it.” Silliman took Hitchcock’s distress to heart, and brokered an exchange of defensive essays by the two men which he published together in an issue of his journal in October, 1844. (K, L, M) To all except Hitchcock, this settled the issue: Deane was the discoverer, and Hitchcock the first and chiefest interpreter. Present in the Amherst professor’s mind, however, was that he alone had founded the science of

Ichnolithology, so to him Deane’s contribution was on a lower level. Imagine Hitchcock’s veritable trauma, when Gideon Mantell, one of his heroes, in a new book that appeared in 1844, *The Medals of Creation*, credited Deane with both the discovery of the sandstone fossils and their identification as the tracks of birds. (N) To compound Mantell’s sin, he quoted extensively from Deane’s recent article (I) rather than from Hitchcock. The latter was furious when he read that Deane “communicated his discovery and opinion to Professor G. [sic] Hitchcock, who followed up the inquiry with a zeal and success that have led to the mostly interesting results.” Silliman, agreeing with Hitchcock that this was not fair, wrote Mantell to correct the record (O), whereupon the British paleontologist wrote Hitchcock that he would modify his words if there were another edition.⁵³ Hitchcock

⁵³ Mantell to Hitchcock, July 11, 1845 (EOH).

had to leave the dispute there—at least in the public realm—although his letters to Silliman over the coming months show that the wounds still rankled.

Deane's medical career 1841-1851

In 1841, when Deane had returned to the stony foot tracks, he was made a Fellow of the Massachusetts Medical Society (MMS), perhaps on the basis of his 1837 article (see above), but more likely on contacts he had with Boston medical people. From now until his premature death in 1858, his activity as physician was paralleled by his work with the sandstone fossils. Each career reinforced the other, because the Boston medical men he met were also key members of the Boston Society of Natural History. Some were collectors whom he supplied with specimens of sandstone tracks and with whom he corresponded about the fossils. Foremost among them in this connection were the physicians John Collins Warren (1778-1856), who published a book on fossil impressions in 1854, and Jeffries Wyman, whom he consulted about the identification of some sandstone tracks; both will be discussed shortly.

Deane's first article in the *Boston Medical and Surgical Journal* in 1837 has already been mentioned. In 1845 appeared his second,⁵⁴ and several more were to follow. He recounted how he manoeuvred a magnetized sewing needle on the skin of a female patient to determine the location and orientation of an embedded needle. He extracted it with "a very moderate crucial incision." In 1847, only a year after J. C. Warren had pioneered the use of ether, Deane successfully amputated a finger, a forearm, and a thigh with the aid of ether. Interestingly, he did not use ether in the amputation of a breast nor in the treatment of a fractured cranium for fear of "cerebral disturbance."⁵⁵ Deane was also among the earliest to use chloroform. On December 24, 1849, with chloroform administered by "Dr. Seymour," he removed an ovarian tumor in an operation witnessed by "a large number of physicians."⁵⁶

Despite his publications and his success as a surgeon, Deane felt isolated from the Boston-based MMS, and he knew why. In an angry letter to the society in 1848, he denounced its exclusivity and demanded reforms that would release doctors in

⁵⁴ "On the treatment of hydrocele by retained injections of iodine, and by the seton," *Boston Medical and Surgical Journal*, vol. 33 (Dec. 1845), pp. 361-63.

⁵⁵ "Respiration of ethereal vapor," *Boston Medical and Surgical Journal*, vol. 37 (Dec. 1847), pp. 354-56. Signed "Greenfield, Nov. 22, 1847." Reports on these operations were published in the *Greenfield Gazette and Courier*, July 27 and Nov. 16.

⁵⁶ *Dame notebook*, exact source not given. The Scotch physician James Young Simpson made the first surgical use of chloroform in 1847.

western Massachusetts from outmoded and expensive charges.⁵⁷ Without reform, few in Franklin County would sign up with the society. In one “repugnant” rule, doctors with degrees from other states were excluded from membership in the MMS unless they agreed to its regulations and paid a supplemental tax.

I believe I speak the mind of the profession here, generally that a great State Society should settle its organization upon the most liberal & accommodating basis, leaving the details of revenue & expenditure entirely to local societies. It should conform to the progressive spirit of investigation & discovery that distinguishes this age above all others the world has ever seen; and instead of being merely conservative, its regulations should receive their force from the necessities & circumstances of the times.

Deane went far in his objections. Without substantial reform he would refuse to collect the onerous dues for which there was little return to Franklin County practitioners. Too much money is spent on “expensive festivals” that are too distant and costly for his local colleagues. The MMS might better emulate the Association of American Geologists and Naturalists which relies only on voluntary contributions. Instead it plods along “year by year [in] the same listless routine; an annual tax, an annual book & an annual dinner. It does not infuse into this movement any vital comprehensive schemes for the true advancement of rational medical science.” If the Society doesn’t fundamentally reform, it might as well dissolve itself.

Reform is the only remedy that can resuscitate a superannuated body & endow it with vigor & comeliness. We may patch up as much as we please, the existing cumbrous machinery, still without *radical* reform, it can never be brought into the swift & deep current in which the philosophy & enlightened spirit of the age has its life giving movements.

From this letter we readily deduce that Deane was a particularly progressive doctor anxious to bring the MMS up-to-date in its science as well as to be fair to medical practitioners west of Boston. The Enlightenment faith in rationality lives on in Deane, who had adopted the latest forms of anesthesia and who, as we shall soon see, decried popular but unworthy surgical devices.

⁵⁷ Deane to Jerome Van Crowninshield Smith, Jan. 29, 1848. Countway Library of Medicine, Harvard University, H MS, C 75.2. Deane asked Smith to read his communication to the next meeting of the Society.

More rivalry with Hitchcock, 1845-1849

Deane and Hitchcock seldom met after 1844, but they appeared together, in a manner of speaking, at the sixth annual meeting of the AAGN in April, 1845. Hitchcock gave his own address (Q) but Deane's paper (R) was presented by Silliman and subsequently published. Hitchcock's address was not then published, but was summarized in two pages in the *Proceedings* of the AAGN for that year. "This paper," wrote the editor, "was accompanied with descriptions of each of . . . sixteen genera and thirty five species, founded on a new set of measurements of all the specimens in the author's cabinet. Drawings were also given of each species, as they were restored by a comparison of all the specimens, instead of giving the figures, as has been hitherto done, from individual specimens." In other words, Hitchcock pulled together the characteristics of a number of specimens of one species of footmark so as to produce a composite, a typical specimen. In this fashion he was inserting the tracks into a rational structure of his own devising that was far more important to him than any of its individual pieces. In 1848 the text of his presentation was incorporated in his book-length article (W) that will be considered shortly. In effect, at the 1845 meeting he was putting his classification on the record to guarantee his priority in the new scientific nomenclature,

Deane, for his part, in a surprising burst of activity published three articles in 1845 on the fossil prints (R, S, T) as well as the medical article already mentioned. He could not escape from Hitchcock in his publications on fossils despite his wish to stake out a place for himself, because he had to draw steadily upon the Amherst professor's writings. In the first of these (R), Deane wrote that he had closely examined the sandstone strata bearing the fossil impressions, in one instance admitting that after he broke off one specimen, he was unable to find the same stratum again. It's clear that he sometimes sought out the rocky sites on his own, but he also referred to "the quarrymen in my employment," and to obtaining "with Mr. Marsh" an enormous footmark of *Ornithichnites giganteus*. He had remained close to Marsh after the initial 1835 discovery—he lived only a block away—and, like Hitchcock, Deane continued to acquire stony slabs from Marsh throughout the 1840s.⁵⁸

In his article he recapitulated the reasoning that identified many tracks with birds, but he also made the first positive identification of the marks of a quadruped among the sandstone fossils. (Hitchcock had assumed that one day quadrupeds would be found.) He had already shown one such specimen to Hitchcock who

⁵⁸ See Herbert, *Dexter Marsh*.

concluded that it was a four-footed track, not that of a bird. Now, Deane wrote, there are several prints of the same species from adjacent localities that provide conclusive evidence of a quadruped. On a composite lithographed plate (fig. 12) he grouped several such tracks from individuals of different sizes, frog-like creatures (batrachians) with stubby four-toed hind legs and smaller five-toed forefeet which he described in great detail. In his discursive paper he recapitulated Hitchcock's explanation of the formation of sandstone impressions, and showed a similar enthusiasm for the sublimity of these images of a remote era. "To see upon the smooth stratified rock the successive steps of extinct animals, indisputable and imperishable, sunk like a die, more perfect and inconceivably more enduring than the proudest achievements of human skill, is a sublime spectacle, because it creates the sentiments of sublimity and awe."

Deane began his second article of 1845 (S) by quoting from Mantell's *Medals of Creation* the enthusiastic reception of the bird tracks Deane had sent him. Curiously, despite his own recent proof of a quadruped's track, Deane now vigorously defended the customary identification of three-toed prints with birds as though quadrupeds needn't be considered. "It was contended that they [bird tracks] might have been produced under adventitious circumstances, or be assigned to huge biped reptiles, inasmuch as quadrupedal monsters existed in this remote era . . . But these evasive objections could not resist the force of facts and were successively overthrown." We'd love to know who made that contention—it was later borne out by the identification of dinosaurs!—but Deane persisted in extended accounts of three-toed footmarks. Lithographs on one plate made from his drawings bear close-up views of three-toed footmarks. Amidst his precise observations is one of a heavy footmark he had sent Mantell "the joints of which were thoroughly flattened by the resistance of the stiffened mud to the enormous pressure. Its middle toe was eight and one-half inches in length exclusive of the claw. . ."

Only at the end of the article did he mention very briefly the quadruped tracks his previous article had featured. Otherwise he presented a thoroughgoing defense of Hitchcock's bird tracks, although he takes his distance from the Amherst professor with a not too subtle gibe: "The utility of artificial nomenclature based upon modifications of a single organ of animal economy, appears to me to be questionable; it is by the eye alone that we judge of distinctions, it is the form and not the substance that we investigate." Many tracks can't be distinguished from one another and "cannot be separated and arranged by mere methods of classification, however ingenious." He nonetheless drew from Hitchcock's publications to explain the geological formation of the sandstone strata, and he accepted and deployed Hitchcock's classifications and "artificial nomenclature."

In his much shorter third article of 1845 (T), Deane returned to a sandstone specimen bearing large posterior feet and smaller forefeet of five toes each, which he represented by an outline drawing. He deduced that this quadruped was like a batrachian who moved forward by leaping. Its footmark was readily distinguished from nearby bird tracks on the same slab. He didn't mention that eight years earlier, Hitchcock reported finding on New York City flagstones "the tracks of a marsupial quadruped that moved by leaps."⁵⁹ In this sequence of articles, Deane didn't mention his rival's writings since he was determined to establish his own record as a well-informed specialist.



Two years later Deane introduced new fossil impressions (U). He described tracks using Hitchcock's comparisons with wading birds but he made his own observation that bespeaks a doctor's forensic training: "the *superior* surfaces of the strata upon which distinct impressions occur, are incrustated with a thin glazing, differing in character and often in color from the principal mass. This crust is formed of finely comminuted materials, such as is deposited from turbid water in a state of comparative rest." He brought forward a new species of quadruped "discovered by Mr. Marsh, and is now deposited in his magnificent collection of sandstone fossils." (This is the first published reference to the little museum Marsh had established the previous year in

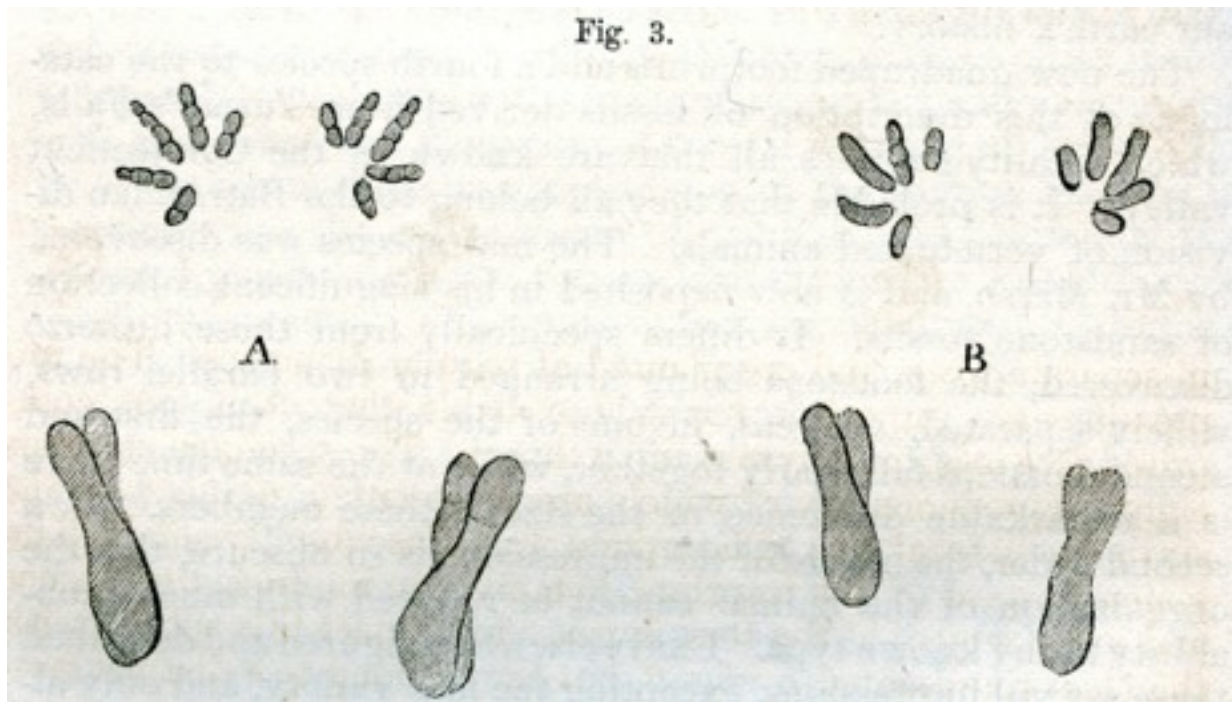
⁵⁹ Hitchcock, Preface and editorial footnotes, in Henry T. De la Beche, *Researches in theoretical geology* (New York and Philadelphia, 1837), p. 272.

his Greenfield house.) Several woodcuts show this and other quadrupedal prints (fig. 13). Some of these animals progressed by leaping, rather like frogs, others were ancestors of turtles. Altogether, this new article adds “three distinct orders of quadrupeds” to Deane’s corpus of original contributions. Also in 1847, Deane sent to Silliman a short note (V) and a woodcut to announce yet another new species of batrachian quadruped on a slab recently uncovered at Turner’s Falls.

In 1848, Hitchcock gathered together all his work on sandstone fossils in an article of 127 pages in Silliman’s journal, also published separately as a book, “An attempt to discriminate and describe the animals that made the fossil footmarks of the United States, and especially of New England.” (W). Here he returned to the classifications he had announced in 1845 (Q), this time accompanied by elaborate descriptions and remarks and twenty-four lithographed plates bearing several dozen figures. These are mostly outlines that he made on sheets of mica placed over the tracks, then copied on thin paper atop the mica (fig. 14). It’s here that Hitchcock takes a poke at Deane—without mentioning him—for two reasons. One is in order to oppose his colleague’s method of drawing and the other is to return the gibe he had received from him in 1845 (S) that tracks “cannot be separated and arranged by mere methods of classification, however ingenious.” Precise outline drawings, Hitchcock asserts, are better “for the discrimination of species . . . than full-shaded drawings of individual specimens, because they present more distinctly the essential characters.”

The two men are poles apart. Deane made drawings of individual specimens so near to life that fellow scientists could determine their places in the paleontological record. For him the closely examined individual slab was the very basis of the science. For Hitchcock this was merely the substratum, the visual facts that needed to be consolidated to form archetypes, perfect examples that can fit into a well-reasoned scheme of classification. Most of his 1848 text is devoted to close descriptions of each specimen, but his attached remarks offer some supplemental information. He listed twenty-one localities from which his specimens came, a valuable repertoire when today one wishes to locate these historic quarries. He had obtained twenty specimens from Dexter Marsh and others he sketched from specimens that Marsh had in his museum. In his earlier publications Hitchcock had not mentioned Marsh, but this time he was more forthcoming. The species *Herpystezoum Marshii* “was discovered at Turner’s Falls, by Mr. Dexter Marsh, who, by indefatigable industry and tact, has obtained a very rich and valuable collection of the footmarks and other fossils of the Connecticut valley. Hence I have attached his name to this animal. This paper will testify, also, that he has discovered several other species described in it.”

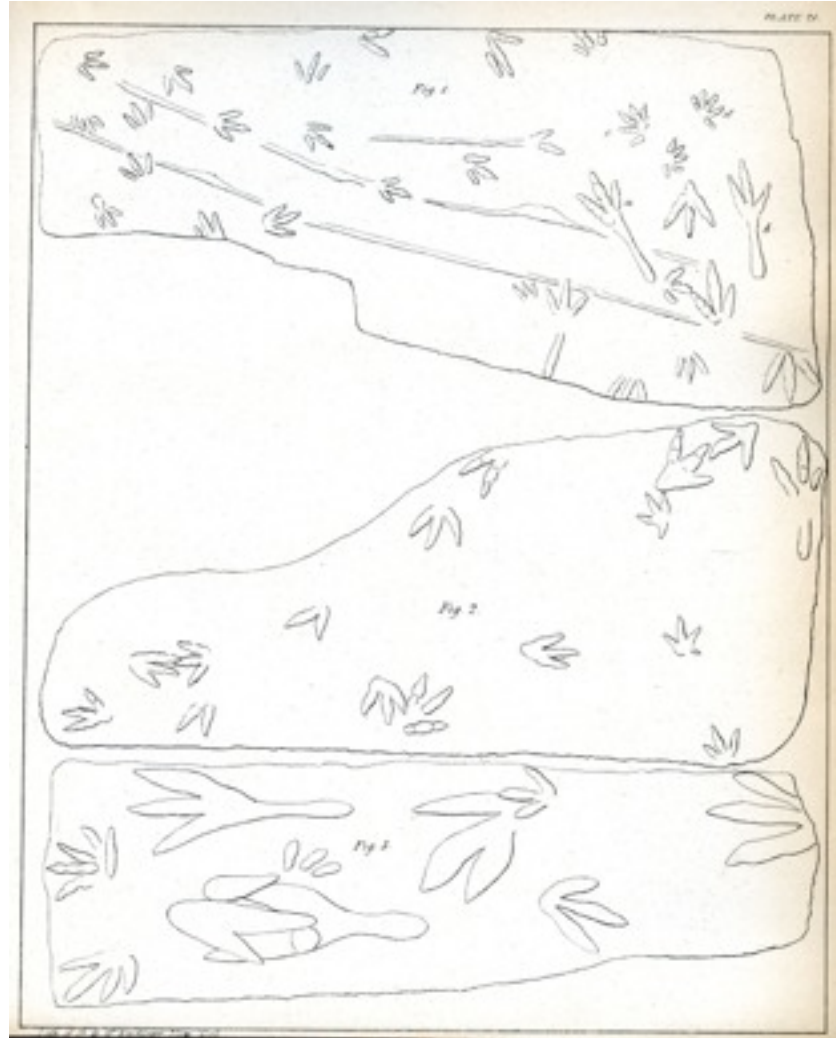
Deane also figures among Hitchcock’s remarks, but in ways that confess his discomfort. He referred one specimen of *Anomoepus scambus* (fig. 13) to



publications of 1845 and 1847 without revealing that Deane was the author of these (T and U), surely a deliberate means of demoting his rival's significance. It's true, he mentioned Deane favorably in other instances. Twice he noted that the Greenfield doctor had "presented" him with specimens. He appropriately dedicated *Ornithoidichnites Deanii* "to Dr. James Deane, of Greenfield, who first called my attention to the subject of footmarks, and who subsequently investigated it with much success." He credited Deane with the first identification of a quadruped in 1845 (T) but said that in his own earlier *Final Report* he had written that this specimen, which was a gift from Deane, might have been a quadruped. He now names the animal *Anisopus Deweyanus*—Deane never provided Linnaean names—and writes that the specimen he drew for his current paper was a better one of his own which "gives a clearer insight into the character of the animal, especially as to its mode of progression; . . . it must have advanced by regular steps, like a common mammiferous quadruped." It should be said that although Hitchcock's entries are suitably dry as bones, he had not lost the Romantic origins of his fascination with the tracks. In his conclusion he admitted that "I have experienced all the excitement of romance, as I have gone back into these immensely remote ages, and watched those shores along which these immensely heteroclitic [abnormal] beings walked."

A year after Hitchcock's *omnium gatherum*, Deane published a lengthy illustrated article that constitutes a barbed response to Hitchcock's paper and an overview of his own work to date. (X). Again he assaulted Hitchcock's principles of

classification. From footprints alone, he wrote, which anyway are greatly varied in size and condition, we cannot “with anything like certainty, restore the anatomical organization of the animals,” hence “any system of nomenclature must be both artificial and arbitrary.” Worse, “any detailed methodical arrangement . . . can, at best, be little more than an arbitrary invention, tending in no degree to advance our knowledge, but rather to involve a most simple subject in inextricable confusion.” Deane therefore used lithographs “put on the stone by myself” to present the reader with the raw evidence of individual specimens, each provided with a full description that together



comprise the bulk of the article. The lithographs form an album of incomparable beauty—he was self-taught but immensely talented—that makes Hitchcock’s outlined specimens seem crude. Deane’s tracks have a shallow but pulmonary volume, rising from a granular surface that captures the appearance of sandstone. Four of the specimens were “discovered” by Marsh, but he added “Wherever the discovery is not directly credited to others, it has invariably been made by myself.” This confirms the broad extent of his own quarrying: about twenty-five of the specimens in this article. Besides Marsh, the only other discoverer whom Deane named is Hitchcock, who had presented him with slabs bearing two species.

Deane used his nine lithographs, bearing twenty-eight images, to present the full range of tracks that he wrote about. They figure in detail the varied formation of the tracks, seen singly and in rows that traverse some of the slabs to disclose the nature and distances of the animals’ strides. Four plates represent single tracks, the other five house twenty-four impressions. Three of these show bird tracks (fig. 15),

and two, quadruped tracks (fig. 16), the latter recording the smaller forefeet and the larger posterior feet. He demonstrates how to distinguish various stages of growth of the same species, and how to separate bipeds from quadrupeds. Often he brings the reader's eye close to the specimen as it was being formed in the primeval ooze. "The rolling up of the mud anterior to the lateral toes, and a prolonged depression posterior to the heel, suggests the idea of the slipping of the feet, which often

happens." So acute were his observations that in one case—a huge slab he had sent to the British Museum—by examining the first prints he uncovered from a thin layer of micaceous sandstone, he could predict where the next prints would be found and use his chisel to remove the covering layer. By mentioning his chisel, he gave further proof that he was a "hands-on" investigator.

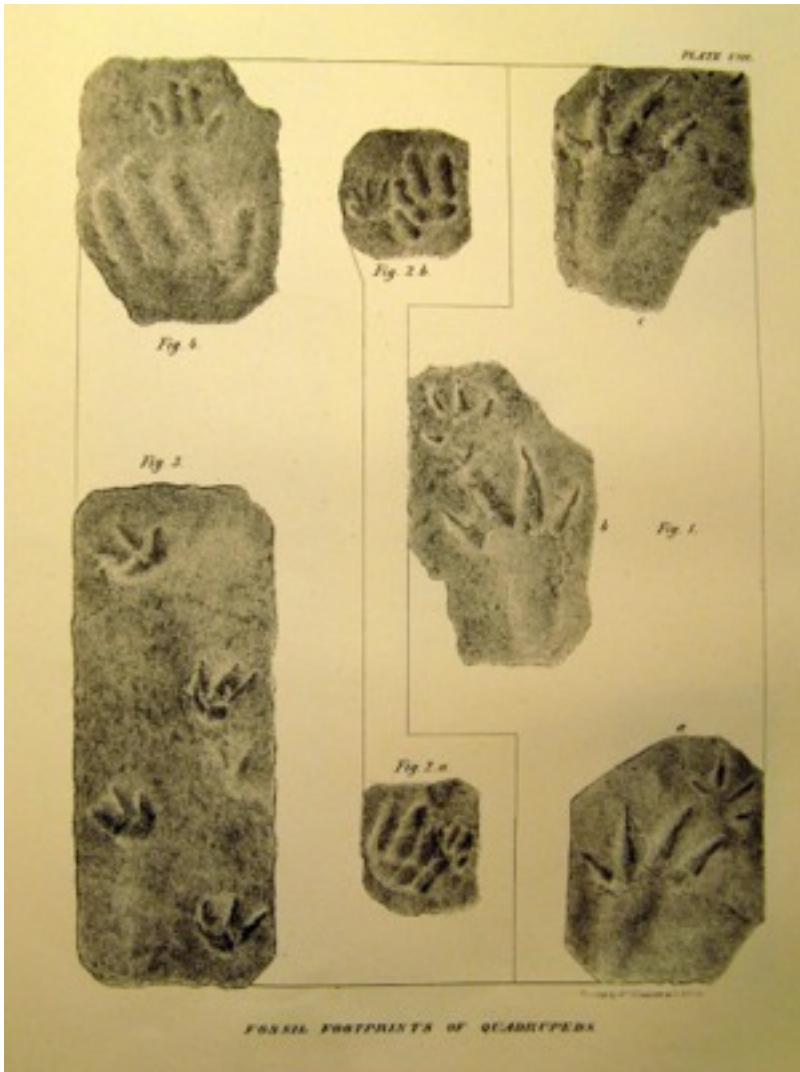


Deane's medical associations

Deane's persistent studies of sandstone impressions did not interfere with his medical career. By January 1851, he must have been satisfied that the Massachusetts Medical Society had undergone reform, because he participated in the organization of the affiliated Franklin District Medical Society (FDMS).⁶⁰ He

was named its secretary-treasurer, and a year later also became the Society's librarian. His leading role was confirmed when he was elected delegate to the national conventions of the American Medical Association (founded in 1847) in 1853 and again in 1855. He nonetheless kept up his agitator's role in the MMS, for in 1852

⁶⁰ See online "franklincountyhistory.com/everts/09.html"



he told the organization that he wouldn't collect all the delinquent dues from MMS Fellows because it would cause hardship to some of them.⁶¹ He sent dues from only six doctors in his district, adding that the list of Fellows he was given was far out of date. The MMS nonetheless forgave his sometimes obstreperous communications—or perhaps wanted to co-opt him—because in 1854 the society made him a vice-president⁶² and the next year invited him to give a paper at its Springfield meeting. He had communications with the organization's Commission on Lunacy,⁶³ and in 1855 he was named a trustee of the new “State Lunatic Asylum” built in Northampton the following year. His mentor Amariah Brigham, foremost pioneer in care of the

insane, must have often come to his mind. In Greenfield Deane continued to be a leading member of the FDMS until his death.

Over the previous decade Deane had become well known regionally through his many contributions to the *Boston Medical and Surgical Journal*. Following his article on ether in 1847, he published eight more from October 1848 to January 1854, on subjects varying from the removal of tumors and reattachment of torn leg arteries to surgical removal of a stone in a woman's urinary bladder.⁶⁴ In February

⁶¹ Deane to Augustus A. Gould, Feb. 3, 1852. Countway Library of Medicine, Harvard University, B MS, C 75.15.

⁶² Massachusetts Medical Society, *A Catalogue of the Officers, Fellows and Licentiates 1781-1983* (Boston 1894).

⁶³ Edward Jarvis to Deane, May 25, 1855: Countway Library of Medicine, Harvard University, Edward Jarvis letter book.

⁶⁴ *Boston Medical and Surgical Journal*, vol. 46, 1852.

1854, he delivered a major address on bone fractures before the FDMS; it was published that same month in the *Boston Medical and Surgical Journal*.⁶⁵ This was no mere description of a surgical intervention, but an argument for rational procedures based on experience and a willingness to ignore precedent. He stated that “the doctrine of maintaining extension of the fractured thigh by the action of screws, rackwheels and other equivalent means is unphilosophic [unscientific] in theory and dangerous in practice.” He singled out for opprobrium two devices that were among the instruments listed in the inventory of his office, the Jarvis Adjuster and the double inclined plane. Perhaps he acquired them in order to test them, and then learned to distrust them. The former was a mechanical geared device that pressed the fractured limb together. Patented by George A. Jarvis in 1846, it had become popular despite some worries about undue or misaligned pressure. Deane roundly denounced it in favor of splints applied by hand with even pressure that could be broadly distributed.

The double inclined plane was an older device but was equally rejected by Deane. It was an instrument suspended from above that formed a V with two slanted pieces that mechanically pressed the fractured limb together. “The great danger,” he wrote, comes from “being blinded by the conceptions of specious and complex machinery,” whereas “The indications of treatment in simple fractures of the femur consist merely in preventing motion at the seat of injury, in restraining muscular action, and in preserving the axis of the bone.” This is best done “with a firm, elastic covering [that] should conform to the body instead of being rigidly straight.” He has succeeded with “individuals of all ages, from 90 years down to 8 months. . .” Upon reading this short treatise, one is convinced that Deane was not some kind of anti-modernist, but a rational scientist who valued experience and common sense.

A year later Deane published an article on the removal by abdominal incision of uterine and ovarian growths.⁶⁶ It became his best known medical article. He drew upon the methods and apparently some of the findings of several books on statistics that were in his library, including “Mortality Statistics 1850.” This publication was closely related to the U.S. census of 1850, the first in which mortality statistics were reported. He offered a brief history of ovariectomy, a relatively new procedure. Hostility to the operation was widespread because it raised the agonizing issue of the risk of death vs. not operating at all. Statistically, however, it showed increasing success over the previous three decades. By 1850, it had been performed on 222

⁶⁵ See pp. 5-6 and footnote 3.

⁶⁶ “On the hygienic condition of the survivors of ovariectomy,” *Medical communications of the Massachusetts Medical Society*, vol. IX, 2d series, vol. 5, 1855, pp. 57-67. Signed “Greenfield, June 1855.” Published also as an eleven-page booklet by John Wilson & Co., Boston, 1855.

subjects of whom 146 recovered, a ratio of two successes in three operations. This proportion, Deane noted, was about the same as for other “capital operations,” including amputations. Deane was therefore very much the forward-looking wielder of statistics that favored the use of abdominal incisions, a conclusion no doubt reinforced by confidence in his own prowess as surgeon. In addition to looking at statistics, Deane corresponded with several doctors or medical researchers whose favorable results he quantified.

Deane’s secular life: Masonry and anti-slavery

Deane’s numerous articles on medical subjects and surgery are entirely free of any references to Christianity, and so are his several publications on sandstone fossils. He did not even use the common phrases alluding to God. His biographer Bowditch, himself a deep believer who often invoked God, was unable to assess Deane’s religious beliefs. “In his religious views, he was simple and true; but his precise opinions in regard to specific doctrines, I have been unable to learn, except that one who knew him well assures me that he believed in the saving influence of Christ’s death. Another, equally well acquainted with him, says, ‘he was a decided Unitarian.’ . . . He believed that no *profession* compared with *a life of goodness*.”⁶⁷ His only recorded reference to Christianity is the conventional Protestant harvest hymn he wrote in 1833 (see above). He was a Freemason but this doesn’t argue with Christian belief. Catholics, Free Methodists, and some individual Protestants openly opposed the fraternal organization, but Freemasonry was so widely followed by Massachusetts men, particularly in the commercial world, that it tells us relatively little about Deane. It suggests his predominately secular outlook, seconded by the fact that his library, as far as it’s known, was singularly free of all religious publications.

In Greenfield, the Masons raised money for a new Masonic Hall, dedicated in 1856.⁶⁸ The “Freemason’s Manual,” and a “Masonic Trestle Board” were in the library inventoried after Deane’s death. The latter was used by Freemason Masters to sketch the symbols for their meetings. We can’t be sure that Deane was a Master although it seems likely. For the dedication in 1856 nearly two hundred “brethren and ladies” filled the new Hall, then “Bro. James Deane, M. D., arose and addressed the Grand Master as follows: ‘Most Worshipful. -- Having been entrusted with the

⁶⁷ Bowditch 1858, pp. 37-38.

⁶⁸ “Masonic Festival,” *Franklin Democrat*, Feb. 18, 1856.

superintendence and management of the workmen employed in the construction of this edifice, and having, according to the best of my ability, accomplished the task assigned to me, I now return my thanks for the honor of this appointment, and beg leave to surrender up the instruments committed to my care.” After the Grand Master thanked Deane, there were odes and a grand procession “around the Lodge, in the centre of the Hall, upon which stood one golden and two silver pitchers, containing corn, wine, and oil, which are emblematical of ‘health, plenty, and peace.’”

To Deane’s Masonry there can be added some more evidence of a busy secular life. His public roles included a place on the “Committee on manures” at the Franklin County Agricultural Society fair in 1852.⁶⁹ Also in 1852 he was among those who formed a library association, each member to give one or two dollars’ worth of books. Then on April 6, 1855, at the first annual meeting of the Greenfield Library Association, he was chosen vice-president and served in that capacity for the last years of his short life.⁷⁰ Perhaps he gave the new library some of the books we know he owned, such as Hitchcock’s geological publications, that are missing from the probate inventory.

Among other tokens of communal involvement is Deane’s attendance at a temperance meeting in 1844 which places him among a huge number in Western Massachusetts who opposed alcohol, including Hitchcock.⁷¹ The American Society for the Promotion of Temperance was founded in 1826, and prospered especially in New England because it also favored the abolition of slavery. A Massachusetts law of 1840 allowed towns to forbid the sale of liquor, and Greenfield joined more than 100 to do so.⁷² Greenfield was also a center for anti-slavery activity. In 1848 the *American Republic*, an anti-slavery paper, was founded there by Charles J. J. Ingersoll who withdrew from the *Gazette* where he had been a co-publisher, because of disagreement with its Whig policies. In the fall of 1850, Ingersoll’s paper reported that Deane was chosen as one of three Greenfield delegates to the state convention of the Free Soil party.⁷³ Free Soilers took their name from opposition to slavery in the

⁶⁹ Noted in the *American Republic*, Aug. 23, 1851 (*Dame notebook*). However, the published *Transactions* of the agricultural fairs from 1852 to 1857 show no appearances there by Deane, and only in 1856 was he listed as an “Honorary Life Member . . . by the payment of ten dollars.” Among books he owned were several on agriculture, including a subscription to a journal of agricultural papers (see above).

⁷⁰ *Centennial Gazette*, 1892, p. 54.

⁷¹ The meeting took place in Greenfield on July 9, 1844 (*Dame notebook*). The wine glasses noted in the probate inventory of Deane’s home (see above) may have been a conventional middle class possession that need not imply regular imbibing.

⁷² See Ernest H. Cherrington, *American Prohibition* (Westerville OH 1926), passim.

⁷³ *American Republic*, Sept. 30, 1850 (*Dame notebook*). The other two delegates were Albert H. Nims and T. B. Eldridge. See also *Thompson History*, p. 338.

new Western Territories. In the presidential election of 1842, Greenfield members had cast a minority “conscience vote” for John P. Hale, the Free Soil candidate, but Franklin Pierce easily won the town. Four years later the anti-slavery vote in Greenfield was much stronger. John C. Fremont won with 355 votes, to James Buchanan’s 148 and Millard Fillmore’s 21. For that matter, Deane’s friendship with Henry Bowditch was all the warmer because the Boston doctor was a famously outspoken abolitionist. In his 1858 obituary address, Bowditch wrote that it was “with a thrill of delight that, years ago, I saw the name of James Deane at the head of a petition from Greenfield in behalf of the poor runaway, claiming that the jails of the old Bay State should not be opened at the haughty bidding of the slave catcher.”⁷⁴

No more bird tracks?

Deane and Hitchcock continued their work on sandstone tracks from 1850 onward, using new photographic aids to enhance their lithographs. Their rivalry was less obvious than previously, but a knowing reader would realize that each man looked over his shoulder at the other, without naming him; their publications were antiphonal. For the modern observer, aware that tracks of “birds” were made by theropod dinosaurs, the special interest of the two men’s publications and letters of these years lies in charting their rising doubts about whether the impressions were made by bipeds or quadrupeds. If the latter, of course, there would have been no birds. In 1868 Thomas Huxley declared definitively that the sandstone tracks had been made by dinosaurs, not by birds.⁷⁵ This settled the issue, but it’s well worth the while to recapitulate Deane’s and Hitchcock’s reasoning, a fascinating piece of intellectual history.

To investigate this crucial turn from birds to dinosaurs, a third person must be introduced, a man known to both of them, Roswell Field (1804-1882) of Gill, a rural township east of Greenfield. Ideas exchanged among the three men rattled the terrain of paleontology in western Massachusetts, and foretold the rapid evolution of the science elsewhere. Field, a gentleman farmer from Gill, across the river from Greenfield, was fifty when Dexter Marsh’s private museum of “bird tracks” was auctioned in Greenfield in 1853. Field was already conversant with the fossil

⁷⁴ *Bowditch 1858*, p. 33. The “poor runaway” was perhaps Anthony Burns, captured in Boston under the Fugitive Slave Act in 1854, and the subject of statewide vehement protests.

⁷⁵ Huxley, “On the animals which are most nearly intermediate between birds and reptiles,” *Annals and Magazine of Natural History* 2 (1868), 66-75. In 1876 Huxley came to Turner’s Falls to see the fossil tracks.

business.⁷⁶ He had sold sandstone fossils to Marsh from the late 1840s, mostly from Lily Pond, the quarry on his land. The good prices fetched by Marsh's auction inspired him to take over his late neighbor's role as supplier of sandstone specimens to institutions and collectors, including Deane and Hitchcock. Indeed, we shall see that Deane was his mentor; the two were in constant communication from 1854 until Deane's death. Field also knew Hitchcock; the Amherst professor visited him often and bought "collections" of fossils from him until shortly before his death in 1864. Amherst College's Beneski Museum is rich in sandstone slabs obtained from Field.

Many mid-century scientists had not agreed that birds made the tracks because no avian bones had been found. It's true that Hitchcock entertained doubts throughout the 1850s but he couldn't give up birds whose tracks he had identified as his singular professional achievement. Deane was more open with his puzzlement, shifting back and forth between birds and quadrupeds. At his death in 1858 he still clung reluctantly to birds as the makers of some of the tracks. It was Field, the amateur, having less of a stake in birds, who announced in 1859 that there had never been any bird tracks.

It's best to begin with Field's announcement and then go back to the beginning of the decade. In August, 1859, Field addressed the annual meeting of the American Association for the Advancement of Science in Springfield, Massachusetts, with a sensational claim. It wasn't birds that made the "bird-tracks," but four-legged reptilian animals!⁷⁷ He didn't use the word "dinosaur," coined in 1842 by Richard Owen; that awaited Huxley's pronouncement in 1868. His address was Field's only publication, one that gives him a special, if minor place in the history of paleontology. In his presentation he reasoned that sandstone impressions often were limited to the marks of the larger hind feet of a quadruped, because the shorter, lighter forefeet either hadn't touch the mud or else made slight traces that didn't penetrate the underlayer from which many specimens were taken. On some other specimens these quadrupeds left impressions of smaller forelegs as well as traces of tails unlike those of birds. Impressions of the hind legs of these undoubted quadrupeds are remarkably like those of birds, hence the understandable errors of classification. There were no sandstone birds, only the impressions of the posterior legs of reptilian creatures! Field's assertion didn't arise *ab ovo*, which is why we must look to prior years' reasoning by Deane and Hitchcock.

⁷⁶ Herbert, *Roswell Field*.

⁷⁷ "Ornithichnites, by Roswell Field, of Greenfield, Mass.," *Proceedings of the American Association for the Advancement of Science*, vol. 13 (Cambridge 1860): 337-40 (from the annual meeting in Springfield, MA, Aug. 1859). The address was published shortly afterwards in Silliman's journal, *AJS*, n.s. 29, 57 (1860): 361-63.

What about Deane's view, birds or lizards? In 1850, he sent a short article to the *Journal of the Academy of Natural Sciences of Philadelphia* (Y) in which he recapitulated the reasons for concluding that ancient birds made the Connecticut River Valley sandstone prints. By the following year, he was consulting Jeffries Wyman (1814-1874), the Boston comparative anatomist. In October 1851, after seeing Wyman's anatomical specimens in Boston, he sent him two "photographs" (probably daguerreotypes) asking him if he could identify the tracks as either from birds or reptiles.⁷⁸

Wyman's reply, alas! has disappeared, along with any documents that tell us about Deane's work on the tracks between 1851 and 1856. We have to jump to March 1856, when Deane sent another article to the Philadelphia Academy's journal (published in November, Z). He began by identifying himself as the 1835 discoverer of bird tracks and reproduced one of these in a lithograph (fig. 18, right). "Naturalists may, if they prefer it, explain the origin of these impressions upon the hypothetical existence of such monsters as bipedal reptiles, but by the unerring laws of comparison, I have never hesitated for a moment to ascribe these footprints to birds. In this opinion I am sustained by a distinguished comparative anatomist [doubtless Wyman], who in relation to fig. c [fig. 18, right], remarks, 'that some naturalists would call it reptilian . . . , but I call it the footprint of a bird, cosmogony or no cosmogony.'" The remainder of the illustrations were dedicated to four-toed reptiles (fig. 18, left), turtles, and vertebrate amphibians such as frogs and toads, altogether fifteen relief lithographs and three sets of outlined tracks. He described each lithograph "on stone by J. Deane, M.D." (lithographs by "T. Sinclair, Phila."), admitting some doubts as to identification—he frequently writes "probably"—when the impression is not crisp and clear. He pointed out that these quadrupeds (fig. 19), ten never before described, had posterior feet four times larger than anterior feet. His illustrations form a most beautiful album, each one given a careful description. To help identify them, he asked several scientists for their opinions, which he recorded: Joseph Leidy, Asa Gray, Wyman, W. B. Rogers, and James Dana. He ended with acknowledging his neighbor Roswell Field "who is the discoverer of all the original specimens" illustrated. By his "sagacity and activity he has been very successful in developing the history of these sandstone fossils." All the specimens came from Turner's Falls.

⁷⁸ Deane to Wyman, Oct. 39. 1851. Countway Library of Medicine, Harvard University, H MS, C 12 .2.

On August 13, 1856, Deane wrote to Wyman or Bowditch⁷⁹ to thank him for access to the collection of the late J. C. Warren with which he was familiar. “I have not yet concluded with the Smithsonian Inst. how far it will go with the Illustrations, but if it will accede to my wishes and my life be spared, I trust the work will be both creditable to science and the American art. I think that the larger subjects will be beautifully executed by the photographic, and the minute, by the medal ruling principles. I send you a specimen of the latter . . .” This is a capital document, the proof that Deane was then in contact with the Smithsonian which indeed published posthumously in 1861 his notes for a book on the sandstone tracks that he had left unfinished.⁸⁰ (One or more of his Boston colleagues must have served as his intermediary with Washington.) As we saw, he had been making daguerreotypes of the tracks in 1851, and was taking photographs by 1856; they were found in his office upon his death. As for “medal ruling principles,” he refers to a machine perfected by Joseph Saxton (1799-1873) which mechanically produced pictures without



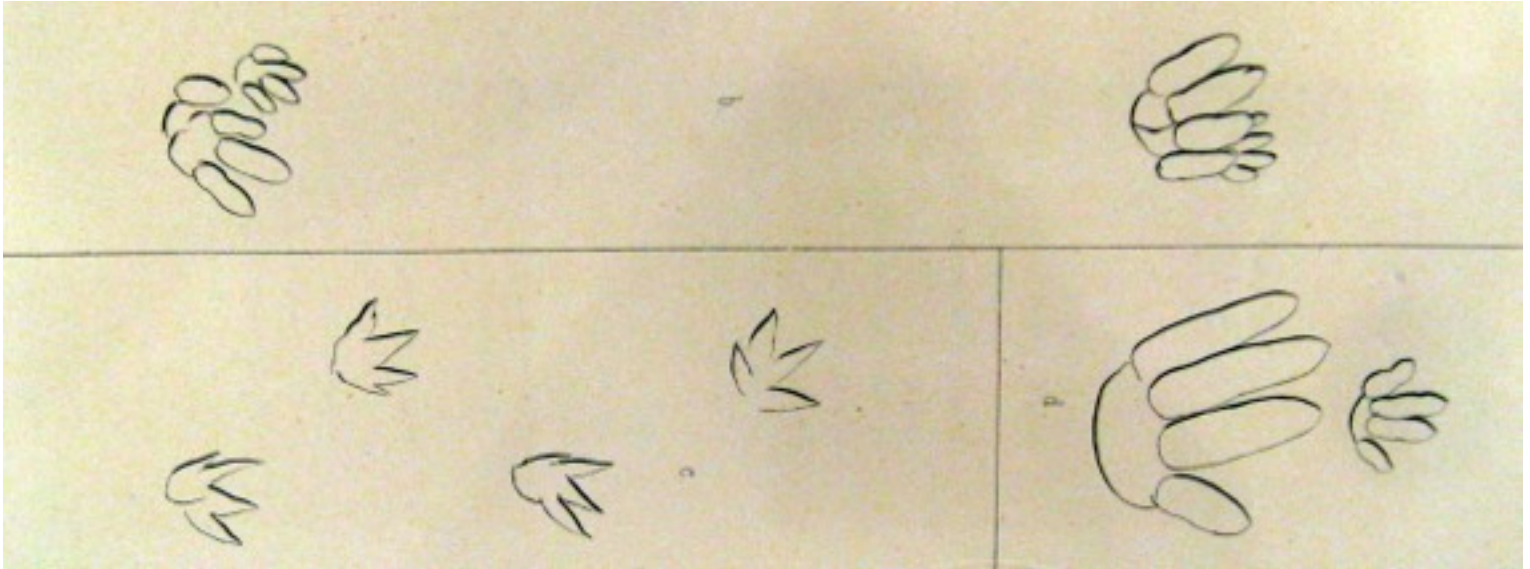
distortions from coins, medals and other objects in relief with the aid of a fine grid. (Saxton also contributed to its successor, the daguerreotype.) Apparently the fine grain, like a diffraction grating, better captured the detail of a small object.⁸¹

⁷⁹ An unaddressed letter kindly communicated by Nicholas G. McDonald; it was evidently sent to one or the other of the Boston men, probably Wyman.

⁸⁰ *Deane 1861*. A fire in the Smithsonian destroyed the correspondence of this period.

⁸¹ Arthur H. Frazier, “Joseph Saxton [1799-1873] and his Contributions to the Medal Ruling and Photographic Art,” *Smithsonian Institution Studies in History and Technology*, no. 32, 1975.

A month later Deane wrote again to Wyman (five of his letters to Wyman survive from 1856-1858, but not the photographs he enclosed), an important letter that challenged the assertions that birds made the tracks.⁸² He acknowledged receipt from Wyman of a box of footprints of an alligator and other creatures, and asked if he could also supply impressions of the cassowary and the emu. He promised to send



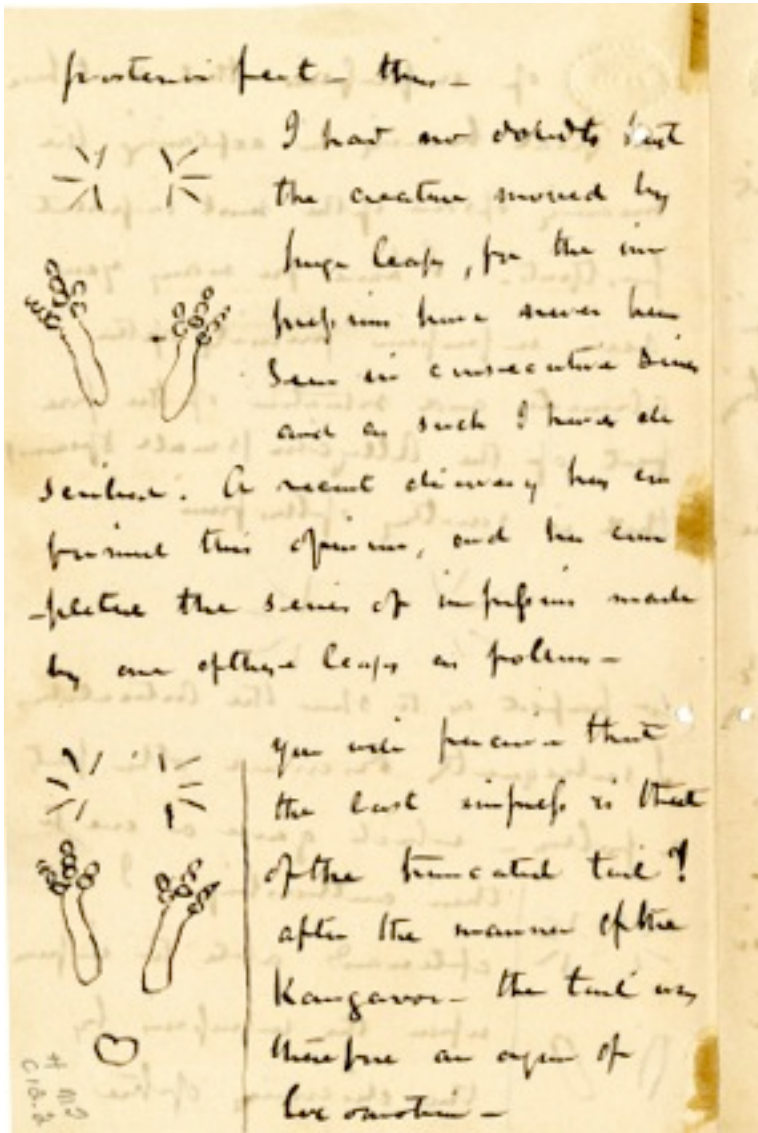
Wyman daguerreotypes of footprints of a quadruped, a creature who progressed by huge leaps and whose forefeet resembled those of an alligator. He made outline drawings of hind feet with three toes and forefeet represented by five flaring short lines (fig. 17).

“The remarkable fossil thus exhibits two fore feet of five toes each, toes a saurian type, and two posterior feet of the ornithic type with the impress of the fore arms connected with them, and also the impress of the stout muscular tail, if it can be called such, the *os coccygis*.

There never yet has been the slightest proof, or argument, to show that the ornithic footprints were really produced by a quadruped, but this discovery which has taken 15 years to perfect, will I think disturb the doctrine of ornithic origin. The creature has only to rise upon its posterior feet, and walk, and the consequence will be a row of footprints of Birds, for there is not the least difference in the posterior footprints from those of Birds.

When you get the drawings you will be able to judge for yourself. I have never regarded the hypothesis that the footprints were not of Birds as of much

⁸² Deane to Wyman, September 27, 1856, in the Countway Library of Medicine, Harvard University, H MS C 12.2.



importance, but facts cannot be disregarded, and in the present subject, are entitled to profound consideration.”

In another letter to Wyman on October 23, 1856, Deane returned to the same set of deductions. By then he was gathering plates and notes for a book that was left unfinished when he died two years later. These notes are preserved in its posthumous publication (*Deane 1861*). With this letter, he sent Wyman several photographs of sandstone impressions and lithographic copies of them (“plates”) marked with diagnostic alphabetical letters (temporary; they do not reappear in 1861). Some of the tracks made him feel that

the ornithic impressions, many of them at any rate must finally be assigned to quadrupeds of unknown types, for although I have

ever believed that from the exact comparison which the extinct impressions hew to living, these could only be due to Birds, still, the extraordinary facts I am now stating, certainly overthrow this opinion in part, and greatly disturbs it altogether.⁸³

One specimen particularly intrigued him. It showed an animal “in a sitting posture, as the dog and other quadrupeds, sits.” Its forefeet have five toes, “clearly Reptilian,” but its posterior feet “are unequivocally ornithic.” Deane concluded “that the ornithic

⁸³ Deane to Wyman, October 23, 1856, in the Countway Library of Medicine, Harvard University, H MS, C 12.2. Deane’s daguerreotypes and photographs sent to Wyman have not been found. The quadrupeds he refers to are represented in plates 31 to 36 of his posthumous book.

impressions, many of them at any rate, must finally be assigned to quadrupeds of unknown types.”

A few days later, Deane sent Wyman a photograph detailing the skin of a fossil footprint, asking if it was from a bird or a reptile.⁸⁴ Relations continued for the next two years. His last letter to Wyman shows him hard at work on his book.⁸⁵ He sent several photographs of footprints, including the largest bipedal print known, eighteen by twelve inches, and several new and perplexing bipedal impressions with tail and cleft feet. One photograph had multiple “footprints of insects, or crustaceans or I know not what.” He added

The farther we advance into these mysterious fossils, the greater the doubts and perplexities become. I incline to think that the ornithic origin of the footprints will finally have to be abandoned. The fact that several varieties of the quadrupedal impressions being constituted upon the ornithic type, that is having tridactylous bird-like feet, is certainly calculated to remain in doubt.

Hitchcock’s *Ichnology of New England*, 1858

In the meantime, what was Hitchcock thinking? He had long allowed for diverse kinds of animals who made the fossil tracks. In a major essay in 1848 on Connecticut River Valley prints (**W**), he described seventeen quadrupeds and thirty-two bipeds of which twenty-two were birds and two “perhaps bipedal batrachians; and the remaining eight may have been birds, but will more probably turn out to have been either lizards or batrachians.”⁸⁶ He was therefore far from believing all the biped tracks were made by birds. Sometime before 1854, J. C. Warren had acquired from him a specimen of an *Anomoepus* from “the red shale of Hadley.” The larger posterior feet had three toes, the forefeet, five. Warren wrote that Hitchcock, citing Deane’s agreement, posited a frog-like creature about three feet high.⁸⁷ We shall shortly return to this track, or one like it, but it’s to be noted that despite their earlier rivalry, the two men frequently communicated.

⁸⁴ Deane to Wyman, October 28, 1856, in the Countway Library of Medicine, Harvard University, H MS, C 12.2.

⁸⁵ Deane to Wyman, January 7, 1858, in the Countway Library of Medicine, Harvard University, H MS, C 12.2.

⁸⁶ *Hitchcock 1848*.

⁸⁷ *Warren 1854*, p. 35.

In 1855 Hitchcock acquired from Field an unusual slab. He wrote Silliman about this heavy specimen weighing nearly a ton, bearing four gigantic tracks of a biped and traces of a tail (fig. 20). He proposed naming it *Gigadipus caudatus* [now *Eubrontes caudatus*].⁸⁸ “My impression is that it will cast a good deal of light upon the footmarks & I am not without fears that it will weaken or destroy the proof that any of the tracks are those of birds. But I say this as yet inter nos only.” In May, 1856, half a year before Deane’s September letters to Wyman, Hitchcock published remarks about this new footprint. “Upon the whole, the evidence is very strong that this animal was an enormous biped with a very long tail!” It could not have been a bird, he wrote, and “many of these extinct animals may have belonged to a type of animal existence intermediate between that of birds and the lower classes of vertebrates.”⁸⁹ Because we now know that theropod dinosaurs were the ancestors of birds, this seems like a very prescient insight.

On September 29, 1856, four months after Hitchcock’s article and two days after Deane’s letter to Wyman, Field also wrote Wyman, by then one of his clients, to say that in view of previously unseen tracks, Hitchcock and Deane would have to “modify their theory of ornithichnites.” Many tracks showed bipeds with tails unlike those of birds, and quadrupeds who lacked tails. He described the footprint that Hitchcock had recently acquired from him—the very one the Amherst professor had just commented upon—made by a quadruped sitting “on his hind feet & legs or forearms,” that is, on his “rump.” A month after this letter of Field’s, Deane again wrote Wyman, as we saw, to describe what must be the same track. Reading Deane’s detailed observations and deductions makes it evident just how much he would have taught Field.

Hitchcock also knew Wyman and was himself one of Field’s major clients, so it’s no surprise to learn how often the same or similar ideas could reverberate among Deane, Field, and Hitchcock. When Hitchcock published his *Ichnology of New England* in 1858, a few weeks after Deane’s death, and little more than a year after Deane’s and Field’s correspondence with Wyman, he wrote about the tracks of the *Anomoepus major*, the specimen acquired from Field. It’s again the same track as the one Deane had described in his letter to Wyman of October 23, 1856, and Hitchcock makes the same observations. It seems, he wrote, “as if we almost saw a huge frog sitting upon his haunches ready for a leap; but his forefeet have five toes, corresponding well with those of the kangaroo. Yet the hind feet have only three toes,

⁸⁸ *Boston Recorder*, Jan. 3, 1856, p. 4: “A letter to Prof. Silliman from Prof. Hitchcock, dated Amherst, Oct. 12th, 1855.” This letter is similar to, but not identical with the letter of the same date in Amherst College’s archives: See *Hitchcock-Silliman 2012*. The sentence “My impression is . . .” comes from the archival letter.

⁸⁹ Hitchcock, “On a new fossil fish, and new fossil footmarks,” *AJS*, n.s. 21 (May, 1856): 96-100.



and the distinctness of the phalanges makes it a perfect bird's foot, with a long heel; but the shape of the caudal appendage is different from a [bird's] tail."⁹⁰ *Anomoepus minor* (fig. 22) likewise had five-toed forefeet, and three-toed posterior. Furthermore, Hitchcock described *Gigantitherium caudatum* and *Gigantitherium minus* as having birds' feet but lizards' tails.

Despite these crucial observations, Hitchcock didn't draw Deane's and subsequently Field's inferences that the prints of hind feet of such animals were so like birds' tracks that the latter couldn't be isolated to avians. Hitchcock was probably aware of Field's speculations because his book is full of references to him as the source of more than a dozen specimens he documented from Field's own collection as well as those purchased from him. Nonetheless, he probably didn't think Field's ideas were worth mentioning because he was an untrained amateur. Further, there's no known record of Hitchcock reacting to Field's subsequent disclosure at the AAAS meeting in 1859 or its publication in Silliman's journal. His whole professional pride was engaged in his own path-breaking identification and classification of "bird tracks."

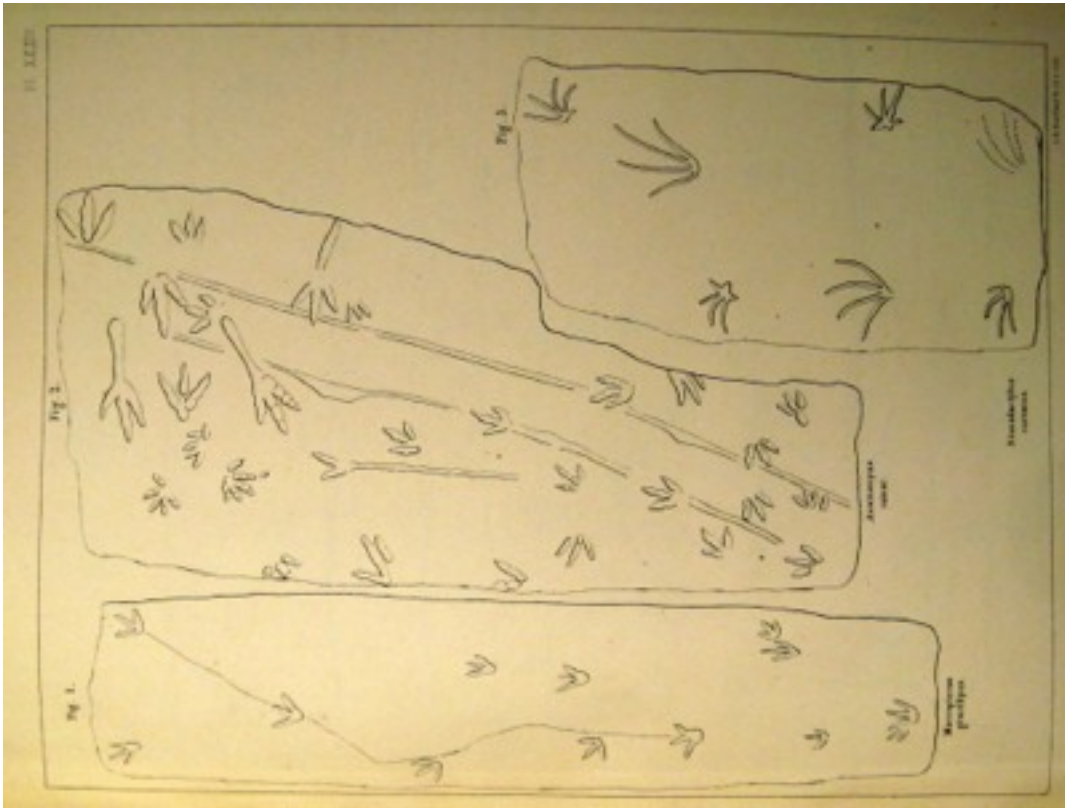
His book is a monument to his life's work, bringing up to date and amending all his prior publications. He located each of the specimens he analyzed among thirty-six quarry sites (twenty-eight in Massachusetts), although the sites are generally phrased: "along the canal, and in a quarry near the village of South Hadley Falls."⁹¹ For greater precision, Hitchcock named the

⁹¹ Plate II is a hand-colored fold-out map (35 1/2 x 10 3/4 ") of the Connecticut River valley from Turner's Falls to New Haven, with a red spot denoting each fossil site.

suppliers of many of the tracks, the largest number credited to Roswell Field, from Lily Pond, Turner's Falls, and "Mr. Field's orchard." He relied on readers to consult his plates to complete his detailed descriptions. For his lithographs, Hitchcock wrote that he traced outlines of the specimens on smoked glass, tracing paper, or cloth placed on the specimen. For some larger specimens he placed slabs on edge for photographing "ambrotype sketches" to serve as models for the lithographer (fig. 21).⁹² These handsome three-dimensional prints would look like photographs were it not for the fine-grained speckling of the process. For some large or cracked specimens, Hitchcock drew a grid over the specimen and transferred it to paper (fig. 22). As before, he instructed the lithographer (L. H. Bradford & Co.) to eliminate whatever was unrelated to the prime impression.

Hitchcock's book was published shortly after Deane's death but although he honored the Greenfield doctor, he still felt that he was unfairly accused of failing to credit him adequately. To defend his actions he went over the entire chronology of their correspondence and publications on nine pages (pp. 191-99), asserting that he had given credit to Deane and others. The dispute continued to rankle him. On May

10, 1859, the *Springfield Republican* published a long letter from Hitchcock, written in response to an editorial of May 7 that was very favorable to Deane.⁹³ This article was drawn from Bowditch's 1858 obituary address, so Hitchcock's letter to the editor



⁹² An ambrotype was a photograph in the wet plate collodion process, deposited on a sheet of glass.

⁹³ "Dr. Hitchcock and Dr. Deane, Who first scientifically investigated and described the fossil footmarks of the Connecticut Valley?"

quoted the missive he had written to Bowditch in which he had repeated the gist of his defense.

Deane's posthumous *Iconographs*, 1861

As for Deane, he died of typhoid aged fifty-seven on June 8, 1858, while engaged on his book on fossil footprints. His widow survived him until 1871 but, as was said at the beginning of this biography, there is no knowledge of letters, journals or diaries by her nor their three daughters.⁹⁴ The eldest, Mary Edwards, survived her mother by only two years; her two sisters lived on until the next century. Deane's nephew, Dr. Adams C. Deane (1823-1899) moved from Colrain to take over his uncle's practice, and himself became a well respected doctor in Greenfield. If he was Deane's living memorial, his literary memorial was Bowditch's article which has figured largely in the present account.

Deane's work on his book in his final years was well known in Greenfield. On July 20, 1857, the *Franklin Democrat* published a short notice of it. "Dr James Deane . . . is preparing a series of plates, which has occupied his leisure hours for twenty years, of 'Foot-prints of the Creator from the quarries and river sides of the Connecticut valley.' The Smithsonian Institute defrays the expenses of lithographing and publication. . . . The



⁹⁴ Deane's widow left an estate to her daughters of \$3000 plus a house for \$1500 and a lot also for \$1500.

expense will be not far from \$5000, and the work entire a monument of scientific enthusiasm and suggestive geological hieroglyphics.”⁹⁵ In Bouvé’s obituary, which he read before the Boston Society of Natural History, a little more is learned about the book.

We all know that he has for some time been engaged in the preparation of a work on the footprints of the Connecticut valley, now under publication by the Smithsonian Institution; and all are undoubtedly aware, that by a process of his own invention, he was able to lithograph and photograph them, so as to produce illustrations of a singular fidelity, -- the color, even, of the stone in which they occur being exactly represented. How far he had progressed towards the completion of the text for this work is not yet known to us. The plates, I have the satisfaction of announcing, are all finished.⁹⁶

Ichnographs from the Sandstone of Connecticut River was published in Boston by Little, Brown in 1861, with lithographs by T. Sinclair of Philadelphia. It was edited by three Boston colleagues whom he knew from medical circles and from the Boston Society of Natural History. Bouvé was the principal editor; Augustus Gould wrote the introduction, and Bowditch contributed a short biography.⁹⁷ In his introduction, Gould wrote that Deane chose “the best defined and most characteristic specimens. Some of them were executed on stone . . . by himself; others were photographed from his selections, and under his direction.” The sum needed by the Smithsonian was raised by subscribers to supplement the institution’s subsidy.

Bouvé, who compiled and commented on Deane’s unfinished notes, thanked Hitchcock and Field for help in preparing the edition, Field more glowingly for “original materials and observations,” and Hitchcock perfunctorily because he was Deane’s rival. Elsewhere in the book (p. 20), Deane himself warmly thanked Marsh and Field for their close knowledge of the sandstone fossils and their assistance

⁹⁵ *Foot-Prints of the Creator* is the title of the book of 1849 by the self-taught Scottish geologist Hugh Miller; Deane himself would not have evoked “the Creator” in connection with his own researches.

⁹⁶ Bouvé, “July 7, 1858,” *Proceedings of the Boston Society of Natural History*, vol. 6 (1856-59), pp. 391-94. The Smithsonian had already published an ambitious article by Hitchcock, “Illustrations of Surface Geology,” *Smithsonian Contributions to Knowledge*, Washington and New York, April 1857 (“Accepted for publication January 1856.”).

⁹⁷ Bouvé was the Boston Society’s curator of geology and palaeontology; Gould was a conchologist, active in the Massachusetts Medical Society and the Boston Society of Natural History; Bowditch was a leading physician in the Massachusetts Medical Society. Bouvé also published a four-page obituary (*Bouvé 1858*), and Bowditch a longer biographical address in Greenfield that same year (*Bowditch 1858*). In 1859 Bowditch had asked Wyman “to be editor of the publication of Dr. Deane’s fossil foot prints? It appears that he left some of the prints undescribed—but that he prefaced all the introductory remarks that he thought necessary.” Bowditch to Wyman, September 23, 1859, in the Countway Library of Medicine, Harvard University, H MS, C 12.2.

(Field is acknowledged as the supplier of nearly all the impressions reproduced in the book). He also drew upon Hitchcock's work without, however, mentioning him.

Bouvé explained his editorial principles. He did not describe those impressions of which Deane left no description, limiting himself to "references to the stones from which they were taken, and the cabinets in which those stones are now to be found; to a determination of the species, and the works in which they are described; and more especially, to their identification with species given in the *Ichnology of Massachusetts* [*Hitchcock 1858*]; adding such other matter of general character as he judged to be of service." He reproduced several paragraphs from Deane's "Memoir"—evidently his name for Deane's unpublished notes—listing the specimens illustrated of impressions of the birds, reptiles, and insects. He included the reasoning of Deane's letter to Wyman of 1856 in which he pointed to quadrupeds with forefeet much smaller than posterior feet. "If it shall be proved by future discoveries that the animals making these complicated impressions possessed the additional power of walking upon their posterior feet alone, the ornithic theory of the footprints would be settled in a summary manner, impregnable as it now seems to be." For his part, Bouvé treated Deane's doubts as a prediction of the view that "the whole theory of the ornithic character of any of the footprints would be overthrown." Nonetheless, true also to Deane's reluctance to give up birds entirely, Bouvé retained many of Deane's manuscript descriptions of tracks that were "doubtless footprints of birds."

The most memorable feature of *Ichnographs from the Sandstone of Connecticut River* is its splendid album of lithographs and salt print photographs. That he made daguerreotypes by 1851 and photographs by 1856 speaks for his determination to make public his investigations of the stony fossils, as does his remarkable skill in lithography. In 1849 and 1850 (X, and Y) he wrote that he put drawings on the lithographic stone himself; Bouvé and Gould repeated this. It's not known whether he took lessons from one of the many lithographic printers in Greenfield or taught himself, but it was a response to his intention to reveal the original stones in the most perfect possible images. Of mid-century illustrated scientific books published in America, Deane's volume is one of the most singular. It's more beautiful than Hitchcock's compendious volume of three years earlier, although that too has its attractions. Bouvé wrote that Deane had intended to reproduce plates 16, 17, 31, 40, 41, and from 43 to 46 inclusive, in photo-lithographs, but they instead "are direct photographs the original stones, and are exquisite specimens of art." Although slightly faded in the editions I've studied, they are still thrilling to see. Because he had wished to publish lithographs based on photos instead of the photos themselves, he apparently had more trust in his hand-drawn images which he presumably felt

were the more directly registered images. Despite our modern fascination with salt print photographs, it must be admitted that his lithographs, like fig. 25, give clear images of the tracks because they don't have the play of light and reflections of the photographs which often make it difficult to find the footprints' exact edges.

The photographs were tipped in, seventeen of them on nine plates. Some are small and narrow, typically $1\frac{3}{8}$ x 5 in., others are mounted one per plate, usually $5\frac{3}{4}$ x $7\frac{7}{8}$ in. (figs. 23 and 24). It's not known just how these were done from Deane's negatives, nor exactly how many copies of the book were printed, probably around 100.⁹⁸ Altogether there are forty-six plates holding seventeen photographs and sixty-two lithographs. Because he took the photographs himself, and drew many if not all of the lithographs, as well as writing much of the text before he died, the posthumous book is a highly unusual scientific publication marked by the hands-on work of the author.



⁹⁸ Seventy-nine copies are listed in WorldCat, and three others are known to me. Even this modest number involved a considerable expenditure of time for the careful pasting of the photographs.



Conclusion: Deane and Hitchcock

Once a child I knew protested when his father referred to one of his academic associates as a friend. “He’s not your friend!” he exclaimed petulantly, “He’s your colleague!” Deane and Hitchcock were only colleagues. Linked uneasily by rivalry, neither could advance along his sandstone strata without referring to the other. Curiously, they shared certain traits which in other circumstances might have facilitated friendship. Both were good musicians who played the an instrument and taught music to their children. Deane made an organ (which he sold), and Hitchcock composed music. Each was utterly devoted to work—good New Englanders!—and pursued two careers simultaneously, Deane in medicine and paleontology, Hitchcock in religion and science; they published importantly in each of their domains. Both were active in the temperance movement and like many Massachusetts residents, both were against slavery. However, true to their different temperaments, Hitchcock was a gradualist (he was tolerant of slavery when he visited Virginia) whereas Deane was an outspoken liberal who more actively opposed slavery; he was a delegate in the Free Soil party.

Their differences are manifest in their pioneering illustrations of fossil tracks, which alone place them importantly in early paleontology. Deane’s photographs and



his illusionistic lithographs which he drew himself upon the stone, are more remarkable than his rival's illustrations.

Hitchcock didn't have an artistic hand; until about 1850 he depended upon the skills of his gifted wife Orra White.⁹⁹ He made flat tracings of many tracks on smoked glass, mica, or tracing paper, and had lithographers use them to make linear outlines; their simple forms are a far cry from Deane's subtle renderings. On the other hand, parallel to his rival's taking up photography, Hitchcock learned to use ambrotypes to have some lithographs made with a relief that stands out beautifully; he relied on the lithographer to process them for publication. By contrast, it was typical of the Greenfield doctor to learn

photography himself and to be among the first to use salt prints to represent geological objects.

When we focus on Deane, we are apt to think that his medical and geological pursuits filled his time and left little room for something else. Sad to say, we know little of his life outside his publications because he left no diary or journal and neither did his wife or children. Only two colleagues, Bowditch and Bouvé, wrote posthumous memoirs of him from which we can learn a little—but only a smattering—about his private life and temperament.¹⁰⁰ Surviving records for Deane therefore leave us impoverished, but for Hitchcock we have so much evidence of his

⁹⁹ See *Orra White Hitchcock, an Amherst Woman of Art and Science*, curated by Robert L. Herbert and Daria D'Arienzo, Mead Art Museum, Amherst College, 2011.

¹⁰⁰ The obituary by his nephew Dr. Adams C. Deane, adds nothing of note.

personal life that it's a daunting task merely to summarize it: an intimate journal, hundreds of letters sent and received, many witness accounts, writings about him during his lifetime, and his many publications in which he frequently revealed his private thoughts. Deane produced four articles from 1850 to 1856, two on medicine and two on sandstone fossils. These were substantial contributions, but they can't match Hitchcock's published work from 1850 to 1858: a number of articles and three books on his religious beliefs, alongside several articles and three books on his geological researches, culminating in the summation of his life's work in 1858, *Ichnology of New England*.

No comparison of the two men can be satisfactory given the disparity of the available evidence. Even so, we can reasonably reflect on the contrast of their lives. Hitchcock was well embedded in an academic institution which gave him a broad platform for his multifarious activities as teacher, administrator, minister, state geologist, and internationally known scientist. Deane had an altogether more parochial existence. He was well known in Greenfield and active in town politics and culture. Although he was not known throughout the state like Hitchcock, he was recognized as a leading surgeon by the Boston-based medical profession and as a significant paleontologist by the Boston Society of Natural History. Thanks to members of the latter organization, he had fruitful contacts with scientists in England, although he lacked Hitchcock's personal and professional ties there.

Although they shared a devotion to sandstone fossils—Deane sold specimens to Hitchcock, and they both frequented the fossil quarries—their conceptions and methods were so different that they engaged in a long public competition. They were opposites in many ways. Hitchcock was a Romantic naturalist as one sees in his writings about landscape, particularly in his conceptions of the sublime which he found in the hilly and riverine landscapes of his region. He was a worthy contemporary of Cooper and Longfellow. Even though his progressive geology was offensive to conservative ministers, he devoted many articles, sermons, and several books to the reconciliation of science with the Bible.

Deane was only eight years younger, but an Enlightenment man who prized experimentation. In his venture into silkworms he kept mathematical tables of chronology, weights, production and costs. He disdained ideas that couldn't be verified by secular reason. (As we saw, there are no references to divinity in any of his letters or publications.) His medical articles show a willingness to ignore precedent and to adopt procedures based on experience. Leery of theory, in his articles on medicine he insisted upon matching surgical practice to the rigorously exact observation of the patient rather than use habitual procedures. Similarly, his study of sandstone impressions was based on the examination of individual

specimens and their characteristics, as distinct from Hitchcock's search for shared features of specimens so as to fit them into his schema. Deane recognized Hitchcock as the founder of ichnology and used his nomenclature, but he eagerly ventured out on his own and found specimens not previously known. He learned daguerrotype and photography in order to present colleagues with meticulous visual evidence so that they could determine how the pieces should be classified. He could not match Hitchcock's far-reaching contributions to science, and even in Greenfield, few people today are aware that he was one of the town's leading men of the nineteenth century. At least we can be glad that his admirers among Boston scientists of his era give us good reason to honor this singular man.

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