

# Phycological Trailblazer

## No. 18

### Jacob W. Bailey

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Jacob Whitman Bailey has been called “the father of microscopical research in America” and “the Ehrenberg of North America”. Yet his professional career covered less than two decades. He arose from very modest circumstances to become a founding member of the American Association for the Advancement of Science, serving as its president in 1857 (for less than 2 months due to his untimely death).

Jacob W. Bailey was born 29 April 1811, in the town of Ward (later Auburn), Worcester County, Massachusetts. As a youth he had the habit of wandering alone in the woods gathering plants and minerals, which he would bring home and work to identify. This love of nature was inherited from both sides of his family, especially from his great-grandmother Whitman, who was recognized for her deep knowledge of botany and astronomy. Much of Bailey’s education was derived from his spending much time in a circulating library and bookstore in Providence, Rhode Island. Mr. John Kingsberry, a secretary at Brown University, recognized the young Bailey’s quest to learn, and he taught Bailey Latin, while a French teacher tutored Bailey in French.

In 1828, at the age of 17, Bailey earned an appointment to the United States Military

Academy at West Point. In 1832 he graduated from the Academy fifth in his class, with high honors. His initial duties as a second lieutenant had to do with artillery, and he was assigned to various posts. Then in March of 1834, when he was stationed as Post Commander of the Bellona Arsenal near Richmond, Virginia (Edgar, 1981), he received an appointment which was much more compatible with his studious nature, namely, as an assistant professor of chemistry at West Point. So it is important to appreciate that Bailey’s interests in microscopy and phycology were more that of an enlightened “amateur” (Stafleu & Mennega, 1992) and tangential to his fulltime duties as a professor of chemistry at West Point. Yet Bailey was able to make important contributions both in his study of micro-algae (diatoms and desmids) and of

macro-algae (in collaboration with William Harvey). His interests in botany at West Point were greatly fostered by the influence he received from the botanist John Torrey, who had taught at West Point from 1824 to 1828. For his first year at the Academy Bailey overlapped with William Mather, another instructor in the sciences and a person who had a major impact on Bailey’s training. By an Act of Congress in 1838 the Department of

Chemistry, Mineralogy and Geology was established at the Academy, and Bailey was promoted to Professor in charge of the new Department.

Bailey’s interest in diatoms started when Torrey turned over to him a sample of diatomaceous earth from Germany transmitted from Prof. Daubeny at the Univ. of Oxford. He soon found fossil diatoms in the West Point area and published his first paper on these “infusoria”



Jacob Whitman Bailey (1811-1857)

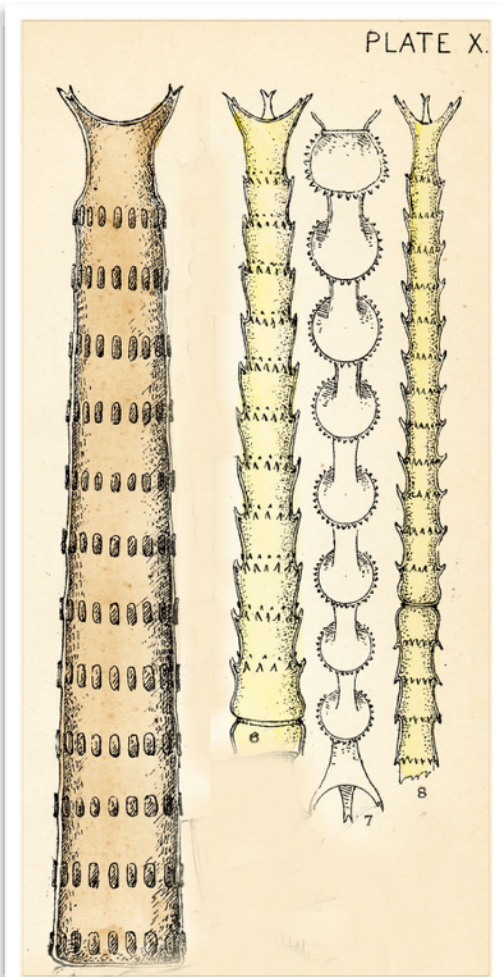


Fig. 1. *Triploceras verticillatum* (Ralfs) Bailey and *T. gracile* Bailey. [from Wolle, 1884, pl. X, as *Docidium verticillatum* (fig. 1) and *D. gracile* (figs 6-8).]

in 1839. He observed “a deposit of eight or ten inches thick and probably hundreds of yards in extent, which is wholly made up of the siliceous shells of the Bacillariae, etc. in a fossil state”. But he did not regard diatoms and desmids as genuine algae but formed “the connecting links between the animal and vegetable Kingdoms [appearing] to possess characters belonging to both” (1841). At first he relied on the works of C. Agardh and R. K. Greville in his identifications and only later obtained works by C. G. Ehrenberg, and the two corresponded (Patrick, 1984). Bailey is also remembered for his serving as a catalyst to motivate Charles A. Spencer to manufacture the first American microscopes. Some of Bailey’s papers (1851c) used diatoms as

test objects in microscopy. Bailey was one of the first to compile lists of algal species occurring in the USA, his tallies totalling 172 taxa (1847, 1848). He also published regional surveys (1846, 1851b). His interest was both in recent and fossil forms (1854b). He received samples made by deep-sea “soundings” from remote localities and published on the composition of these far-flung samples (1851a, 1854a, 1856b, 1856c, 1856d, 1857). Bailey was the first to recognize that coal originated from plants (Gould, 1858).

In 1835 Bailey married Maria Slaughter of West View, Virginia, and they had two sons and a daughter. The older son, Loring Woart Bailey (1839-1925), became a professor at the University of New Brunswick and published on diatoms. The other son, William Whitman Bailey (1843-1914), became a professor of botany at Brown University.

On the morning of August 29th, 1849, Bailey accompanied the visiting William Harvey from Trinity College, Dublin, on an excursion to the eastern end of Long Island, New York. They departed from Brooklyn on a ferry, and next they went by railway out to Greenport, the 94-mile distance taking five hours. Bailey and Harvey stayed several days at a country inn on Peconic Bay, which served meals to 40-50 visitors at a sitting. Harvey (Anonymous, 1869) wrote in his journal that the “the charges were moderate...a dollar and a half covered all the day’s expenses, and nothing extra to servants, or expected of them.” He also wrote: “After three days of making *messes*, with water and seaweeds, I tendered the chambermaid half a dollar, which evidently impressed her with my liberality. We had a good day’s dredging, and returned on Friday to New York.” Bailey and Harvey parted company, but later on his way to visit relatives at Hyde Park, Harvey stopped off at West Point to visit Bailey. Harvey found Bailey “now an invalid, only beginning to mend”. Bailey was confined to “his bed, where he was lying weak and exhausted” from their dredging trip on Long Island. Harvey nonetheless used his few-day stopover at West Point to examine and name their recent collections of algae. Harvey described the West Point Academy as

“exquisitely beautiful, and the surrounding scenery like the softest of Italian landscapes—the climate under which it was seen most splendid, cool, yet bright and sunny.”

One of Bailey’s contributions was his involvement with the algal collections made by the U. S. Exploring Expedition of 1838-1842 under the command of Charles Wilkes. This expedition was contemporaneous with other great scientific

expeditions as those being conducted by the French (*L’Astrolabe* and *La Zélée* under the command of Dumont d’Urville) and the British (the *Erebus* and the *Terror* under the command of Ross). It was at a time when American scientists were coming into their own. A major goal of Wilkes was to have the scientific results published not by Europeans, which had been largely the practice up to that time, but to be carried

out by “home-grown” American scientists. The numerous pressed plants and algae had been collected by botanists William Rich and William Breckenridge and zoologist Charles Pickering. Asa Gray, then in his late 20’s, had originally signed on for the expedition but reneged when a job was offered to him by the University of Michigan. This would have been the first professorship in botany in America (Eyde, 1985). Because a suitable lab had not yet been built for Gray at Michigan, his first year in their employ was spent in Europe buying books. On his return, Michigan was still not ready for Gray, and so he accepted a professorship from Harvard, although the library he had amassed in Europe was turned over to the Univ. of Michigan. By 1847 it was clear that Rich had failed to work up the plant collections from the Expedition, while Breckenridge’s

contribution was limited to a report on the ferns. Torrey agreed to work up the plants from California and Oregon but not those from tropical regions. Wilkes remained adamant in having the results of his Expedition produced by American scientists. In his mind the publication of the Expedition results wholly by Americans would signal “a sort of a scientific declaration of independence” from Europe” (Bartlett, 1940).

Gray was next approached, and Wilkes finally relented in allowing Gray to take the plants to the major herbaria in Europe for comparison with plants in their collections (Eyde, 1985). Gray convinced Wilkes that there was no American qualified to work up the algae from the Expedition solo. Wilkes again relented to the compromise of having Jacob Bailey at West Point and Gray’s good Dublin friend Harvey, the foremost phycologist of the time, to collaborate on working

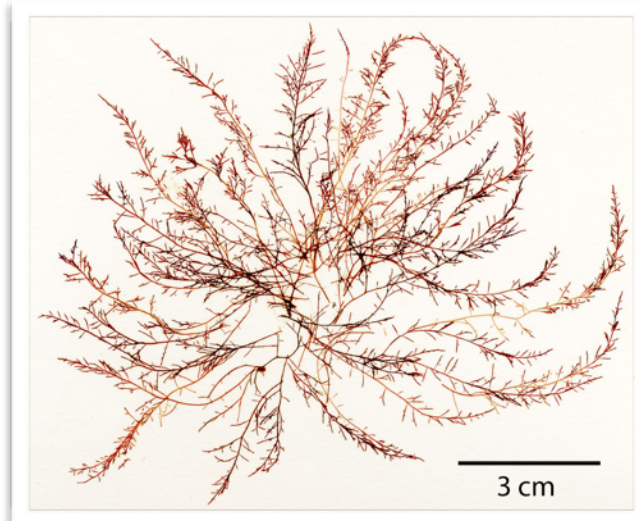


Fig. 2. *Chondria baileyana* (Mont.) Harv. Naushon Island, Dukes County, MA. 10 July, 1962. Coll. M. Wynne. In MICH.

up the algal collections, which included both macro-algae and diatoms. The latter were seaweed-associated samples and samples collected by James Dana, the Expedition’s geologist. The fact was that Bailey’s phycological library and herbarium for comparison were “meager” (Edgar, 1978), and so he repackaged the macro-algae and sent them off to Harvey. Bailey did remove seaweed-associated diatom samples, which he was capable of determining. With Harvey’s involvement, reports on the algae from the Wilkes’ Expedition were published (Bailey & Harvey, 1862; Harvey & Bailey, 1851, 1853). Collins (1912) would later say that papers by Bailey and Harvey on the algae of the Wilkes Expedition were largely “forgotten” partly because their official publication was long delayed and due to the very limited number of

copies produced for many of the volumes of the scientific results of the Expedition.

A major tragedy in Bailey's life occurred in 1852. In July of that year, Bailey, his wife, and two of his children were passengers on the steamer 'Henry Clay' in the Hudson River in the vicinity of Yonkers. Fire suddenly broke out, and Bailey worked quickly to lower his wife and daughter to apparent safety in the water. Just when they assured him that they were safe, sheets of flame and heavy smoke blocked them from his view, and they perished. It was only by a miracle that Bailey and his son Whitman managed to survive. This traumatic incident was an event from which Bailey never really recovered (Coulter, 1888).

Bailey described the desmid genus *Triploceras* (1851b)(Fig. 1) and several diatom genera: *Eupodiscus* nom. cons., *Podocystis* nom. cons., and *Toxarium*. Numerous diatom taxa were named in his honor by Ehrenberg, Grunow, H. L. Smith, and others. He is remembered by such desmid taxa as *Aptogonum baileyi* Ralfs, *Micrasterias baileyi* Ralfs, and *Cosmarium baileyi* Wolle, and such macroalgal taxa as *Lomentaria baileyana* (Harvey) Farlow and *Pterosiphonia baileyi* (Harvey) Falkenberg (Harvey, 1853), and *Chondria baileyana* (Montagne) Harvey (Fig. 2), which was based on a Bailey collection made in Rhode Island (Montagne, 1849). *Rhabdonia baileyi* Kützing (1866) is now known as *Agardhiella subulata* (C. Agardh) Kraft & M.J. Wynne.

Tributes to the life of Bailey were provided by Gould (1858) and Coulter (1888). Edgar (1977) compiled a detailed bibliography of Bailey, including not only his publications but also much of his correspondence. A tour of the southern states is referred to by Edgar (1977) as connected to Bailey's being an invalid, but Bailey (1851b) still managed to publish a paper reporting 275 taxa of diatoms, desmids, and infusoria, both fossil and recent. Upon Bailey's death, his algal collection as well as his library, notes, and correspondence were left to the Boston Society of Natural History. In 1941 the Society donated the Bailey Collection to the Farlow Herbarium at Harvard University. Robert

Edgar has prepared an on-line site with much information on Bailey's diatom collection at the Farlow [[http:// www.huh.harvard.edu/diatom/bailey.htm](http://www.huh.harvard.edu/diatom/bailey.htm)]. Patrick (1984) credited Bailey with having stimulated many people in New England to work on diatoms, and this interest in diatoms flourished in the latter part of the 19th century. Bailey's reputation as one of the first native-born American phycologists remains intact.

Anonymous. 1969. *Memoir of W. H. Harvey, M.D., F.R.S.* vi + 372 pp., Bell and Daldy, London.

Bailey, J. W. 1839. On fossil Infusoria, discovered in peat-earth, at West Point, N. Y., with some notices of American species of Diatomae. *Am. J. Sci. Arts* 35: 118-124, pl. II.

\_\_\_\_\_. 1841. A sketch of the Infusoria, of the family Bacillaria, with some account of the most interesting species which have been found in a recent or fossil state in the United States. *Am. J. Sci. Arts* 41: 284-305, pl. III.

\_\_\_\_\_. 1842a. A sketch of the infusoria, of the family Bacillaria, with some account of the most interesting species which have been found in a fossil state in the United States. *Am. J. Sci. Arts* 42: 88-105, pl. II.

\_\_\_\_\_. 1842b. A sketch of the infusoria, of the family Bacillaria. *Am. J. Sci. Arts* 43: 321-332, pl. V.

\_\_\_\_\_. 1843. On microscopic fossils from the infusorial stratum of Virginia. *Am. J. Sci. Arts* 45: 313.

\_\_\_\_\_. 1845. Notice of some new localities of Infusoria, Fossil and Recent. *Am. J. Sci. Arts* 48: 321-343, pl. IV.

\_\_\_\_\_. 1846. On some new species of American Desmidiaceae, from the Catskill Mountains. *Am. J. Sci. Arts, ser. 2, 1*: 126-127.

\_\_\_\_\_. 1847. Notes on the algae of the United States. *Am. J. Sci. Arts, ser. 2, 3*: 80-85; 399-403.

\_\_\_\_\_. 1848. Continuation of the list of localities of algae in the United States. *Am. J. Sci. Arts, ser. 2, 6*: 37-42.

\_\_\_\_\_. 1850. Discovery of an Infusorial stratum in Florida. *Am. J. Sci. Arts, ser. 2, 10*: 282.

- \_\_\_\_\_. 1851a. Microscopical examination of soundings, made by the U. S. Coastal Survey off the Atlantic coast of the United States. *Smiths. Contr. Knowl.* 2(3): 1-15, 1 pl.
- \_\_\_\_\_. 1851b. Microscopical observations made in South Carolina, Georgia and Florida. *Smiths. Contr. Knowl.* 2(8): 1- 48, pls. 1-3.
- \_\_\_\_\_. 1851c. Miscellaneous notes. *Am. J. Sci. Arts*, ser. 2, 11: 349- 352.
- \_\_\_\_\_. 1853. List of Diatomaceae, collected by the United States Exploring Expedition under Capt. Wilkes, U.S.N. *Proc. Phila. Acad. Nat. Sci.* 6: 431-432.
- \_\_\_\_\_. 1854a. Examination of some deep soundings from the Atlantic Ocean. *Am. J. Sci. Arts*, ser. 2, 17: 176-178.
- \_\_\_\_\_. 1854b. On some new localities of fossil Diatomaceae in California and Oregon. *Am. J. Sci. Arts*, ser. 2, 17: 179-180.
- \_\_\_\_\_. 1855. Notes on new species and localities of microscopical organisms. *Smiths. Contr. Knowl.* 7(3): 1-15, 1 pl.
- \_\_\_\_\_. 1856a. New mode of cleaning Diatomaceous deposits. *Am. J. Sci. Arts*, ser. 2, 21: 145-146.
- \_\_\_\_\_. 1856b. Letter from J. W. Bailey, U. S. Military Academy, at West Point, relative to the characteristics deducible from specimens of bottom, brought up in sounding the Florida section of the Gulf Stream. *Rep. Supt. Coast Survey for 1855.* 360.
- \_\_\_\_\_. 1856c. On some specimens of deep sea bottom, from the sea of Kamtschatka, collected by Lieut. Brooks, U.S.N. *Am. J. Sci. Arts*, ser. 2, 21: 284-285.
- \_\_\_\_\_. 1856d. Notice of microscopic forms found in the soundings of the Sea of Kamtschatka. *Am. J. Sci. Arts*, ser. 2, 22: 1-6, pl. 1.
- \_\_\_\_\_. 1857. Report upon the results of microscopic examinations of the Soundings made by Lieut. Berryman, of the U.S. Navy, on his recent voyages to and from Ireland in the Arctic. *Am. J. Sci. Arts*, ser. 2, 23: 153-157.
- \_\_\_\_\_. 1871. Fresh water sketches. *Am. Nat.* 5: 334-340.
- Bailey, J. W., & W. H. Harvey 1862. *Algae*. Pp. [153]-192, pls. 1- 9. In [Gray A., ed.] *United States Exploring Expedition during the years 1838-1842; Under the Command of Charles Wilkes, U.S.N.* Vol. 17. Botany. I. Lower Cryptogamia. II. Phanerogamia of the Pacific Coast of North America. C. Sherman, Philadelphia. [1874, official issue date] [Botany III, reprinted in 1971 by J. Cramer, Germany.]
- Bartlett, H. H. 1940. The reports of the Wilkes Expedition, and the work of the specialists in science. *Proc. Amer. Philos. Soc.* 82: 601-705.
- Collins, F. S. 1912. The botanical and other papers of the Wilkes Expedition. *Rhodora* 14: 57-68.
- Coulter, S. 1888. Jacob Whitman Bailey. *Bot. Gazette* 13: 118- 124.
- Ducker, S. C. (ed.) 1988. *The Contented Botanist. Letters of W. H. Harvey about Australia and the Pacific.* xvi + 413 pp., Melbourne University Press at the Miegunyah Press.
- Edgar, R. K. 1977. An annotated bibliography of the American microscopist and diatomist Jacob Whitman Bailey (1811- 1857). *Occas. Papers Farlow Herb., Harvard Univ.* No. 11: 1-26.
- \_\_\_\_\_. 1979. Jacob W. Bailey and the diatoms of the Wilkes Exploring Expedition (1838-1842). *Occas. Papers Farlow Herb., Harvard Univ.* No. 14: 9-33.
- \_\_\_\_\_. 1981. The origin of diatom biology in America. *Occas. Papers Farlow Herb., Harvard Univ.,* No. 16: 43-58.
- Eyde, R. H. 1985. Expedition botany: the making of a new profession. In: *Magnificent Voyagers: the U.S. Exploring Expedition.* (H. J. Viola & C. Margolis, eds.). Pp. 25-41. Smithsonian Institution Press, Washington, D.C.
- Gould, A. A. 1858. An address in commemoration of Professor J. W. Bailey, late President of the Association for the Advancement of Science. *Am. J. Sci. Arts*, ser. 2, 25: 153- 158.
- Harvey, W. H. 1853. *Nereis Boreali-Americana.* II. Rhodospermae. *Smithsonian Contr. Knowledge* 5(5): 1- 258, pls. 13-36.
- Harvey, W. H., & J. W. Bailey. 1851. Descriptions of seventeen new species of algae, collected by the United States Exploring Expedition. *Proc. Boston Soc. Nat. Hist.* 3: 370- 373.

- \_\_\_\_\_ & \_\_\_\_\_. 1853 New species of Diatomaceae, collected by the United States Exploring Expedition, under the command of Capt. Wilkes, U.S.N. Proc. Phila. Acad. Nat. Sci. 6: 430- 431.
- Kützing, F. T. 1866. *Tabulae phycologicae*.... Vol. 16. iii + 35 pp., 100 pls. Nordhausen.
- Montagne, C. 1849. Sixième centurie de plantes cellulaires nouvelles, tant indigènes qu'exotiques. Décades III à VI. Ann. Sci. Nat., Bot., ser. 3,11: 33-66.
- Patrick, R. 1984. The history of the science of diatoms in the United States of America. Proc. International Diatom Symp. 7: 11-20. (D. G. Mann, ed.).
- Smith, H. L. 1872. The Bailey Collection of Diatomaceae in the Museum of the Boston Society of Natural History. The Lens 1: 288. [Mo. Mic. J. 9: 78 (1873)]. 5
- Stafleu, F. A., & E. A. Mennega. 1992. *Taxonomic literature*. 2nd ed. Suppl. I: A-Ba. Koeltz Sci. Books, Königstein, Germany.
- Viola, H. J., & C. Margolis (eds.). 1985. *Magnificent Voyagers: the U.S. Exploring Expedition*. 303 pp. Smithsonian Institution Press, Washington, D.C.

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