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# A Return to our Roots: Countering Epidemic Disease with Plant-Derived Medicine

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“*Statice caroliniana* [*Limonium carolinianum*] (Marsh Rosemary) original illustration (seq. 24),” Jacob Bigelow botanical illustrations, approximately 1813–1819. gra00002. Botany Libraries, Gray Herbarium Library, Harvard University

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From late July to early September, the soft purple pastels of the marsh rosemary flower dot the green-brown landscape of salt marshes up and down the coast of the New England and Middle Atlantic states. At other times of the year, the stems of the marsh rosemary plant stand out. Their reddish hues mirror the sore throats of colonial and early American patients to whom a decoction of the plant’s roots provided relief during epidemic afflictions of the throat. With its pleasing pastels, feathery branching pattern and soft curving leaves, this illustrated marsh rosemary plant—most likely completed by the Philadelphia wine merchant John Vaughan for the Harvard physician and botanist Jacob Bigelow—makes it easy to affirm the statement of one 19th-century physician that the marsh rosemary “is a very beautiful plant.”<sup>[1]</sup> But for all its fluid naturalness, it is curious that Vaughan’s illustration, destined for the second volume of Bigelow’s compendium of *American Medical Botany* (1818), barely depicts the plant’s roots. As the “official part of the Marsh Rosemary,” the roots were known by early American physicians as an astringent and antiseptic remedy for treating pain in the mouth, from canker sores and swollen tonsils to

ulcerated sore throats brought on by infectious disease.[2] The roots were so commonly known as the plant's operative part that the marsh rosemary was sometimes known simply as marsh root, the synecdoche a tribute to just how common the knowledge of marsh rosemary roots' therapeutic powers was at the turn of the 19th century—even among those not trained in medicine.

Vaughan's illustration is one of many botanical images that Dr. Jacob Bigelow's grandson, William Sturgis Bigelow, donated to Harvard's Gray Herbarium in 1913.[3] Unlike the marsh rosemary illustration, most of the drawings in the collection were executed by the senior Bigelow himself. During his tenure at Harvard, Dr. Jacob Bigelow held a variety of professional appointments, including Professor of Materia Medica at the medical school. In 1816, he was named the Rumford Professor and Lecturer on the Application of the Sciences to the Useful Arts, a position he obtained in part because of his work to further develop the aqua-tint method of reproducing color prints—a method he would use to reproduce a modified version of Vaughan's marsh rosemary illustration for the second volume of *American Medical Botany* in 1818.

*American Medical Botany* marks something of a midway point between herbal remedies of the early modern period and the chemical synthesis of pharmaceuticals in the late 19th and early 20th centuries. It is both a pharmacological and a botanical text, and reflects the increasing efforts by early-19th-century physicians to chemically isolate therapeutic compounds from plants known to treat disease. In his section on marsh rosemary, Bigelow described the chemical analyses he carried out on a decoction of the roots—experiments that consisted of adding iron sulphate and gelatin to the boiled solution to precipitate the tannic and gallic acid contained in the roots. The “copious” presence of these acids, explained Bigelow, made sense of the marsh root's known astringent properties—attributes that made it so successful at drying out canker sores and mouth ulcers.[4]

By explaining the chemical properties of the marsh root, Bigelow was, in some ways, just telling early Americans what they already knew. “Lavender thrift, for sore throat” (as the marsh rosemary plant appears in the index of Dr. James Ewell's popular and oft-reprinted *Medical Companion*) was prevalent among the many popular home remedies found in North America at the turn of the 19th century.[5] It was unique, however, in being endorsed as an efficacious therapy in the medical writing of credentialed physicians like Bigelow, and the Harvard-educated physician Dr. William Baylies whom Bigelow cited in his entry on marsh rosemary. Reflecting on outbreaks of sore throat that occurred in the neighborhoods of his Massachusetts county of Bristol in 1785 and 1786, Dr. Baylies reported that “Among the many medicines in high estimation with the common people, and used by them without the advice of the

physician, I know of none worth the least consideration, excepting the marsh rosemary, or, as it is commonly called, marsh root. . . . It is undoubtedly of great efficacy, and deserves a more thorough investigation.”[6]

In the early 19th century, when Vaughan’s illustration was completed and Bigelow’s book published, knowledge of the chemical elements that comprised marsh rosemary had changed little of how the plant was gathered and administered. A decoction of the roots was gargled or drunk “with success” by patients suffering in an “apthous state of fever” up and down the East coast of the early United States.[7] The native presence of a plant whose roots could soothe the painful ulcerated throat brought on by the *Streptococcus* (as in the case of scarlet fever) or *Corynebacterium diphtheriae* bacteria (as in diphtheria) must have induced gratitude in patients suffering from swollen tonsils “corroded and speckled with white,” a throat “much inflamed” with “eating ulcers,” “laborious breathing,” and “an eruption of red, fiery, itching pimples” across their bodies.[8] Children and women were more vulnerable to being ravaged by these bacteria. Dr. Baylies noted that they were most likely to suffer (adult women being more susceptible to the disease than men, perhaps because of their role in child care). In the case of the 1780s epidemic in southeastern Massachusetts, the affliction was, “evidently contagious,” but perplexingly so, and Baylies reported that “many were seized who had not been in the way of infection.” Further, the bacteria spread at its own pace, “commonly seized three or four families in a neighbourhood, and then leaped over into a very different one, returning back again perhaps in the space of two or three months.”[9]

The relationship between environment, health, and disease was a widespread concern for early Americans.[10] In a report to the Massachusetts Medical Society, Dr. Baylies does not speculate on the cause of the contagion, though contemporaneous accounts of scarlatina epidemics (likely scarlet fever) in Philadelphia from 1783–84 indicate that some physicians suspected an environmental component. Dr. Benjamin Rush wrote that the disease “became epidemic among adults as well as young people” in September, just as the last of the marsh rosemary’s delicate purple flowers faded and fell. Rush noted that the season was “cool and dry” and the disease spread so rapidly that “the slightest occasional or exciting cause, and particularly cold, seldom failed of producing the disorder.” While the cold weather could precipitate an attack by the streptococcus bacterium on the human body, Rush recorded that other environmental occurrences—for example, an earthquake on October 29—failed to produce any change in those afflicted with the disease.[11] A medical school dissertation on the medical properties of *Statice limonium* (the Linnaean scientific name for marsh rosemary), by a young physician in New York State, cited the Philadelphia doctor Charles Caldwell. Trained under Benjamin Rush, Caldwell suggested that botanical remedies might be found in the United States for the very

diseases these climes were thought to inflict: “Though we do not mean to assert that such is the balance between physical good and evil, that diseases and their antidotes uniformly spring from the same soil, yet perhaps the sentiment ought not to be too hastily rejected.”[12] Whether such an arrangement was considered providential depended upon whom you asked in early America. But regardless of their philosophical or theological stance, in the late 18th century most people understood that resources like the marsh rosemary plant did not spring eternal from the salt-saturated coastal soil.

Colonial Americans had drained thousands of acres of East Coast salt marsh in order to create more farmland. This was sometimes considered beneficial from a health perspective, as miasmatic air arising from swampy marshland was thought to cause disease; however, the remaining shoreline plants, such as the marsh rosemary, faced the risk of being decimated by grazing cattle. Unrestricted livestock grazing was a continual problem in colonial America, and early Massachusetts statutes fined owners for allowing cattle to graze on beach grasses. The late 18th century actually witnessed the implementation of laws “requiring local inhabitants to plant grasses on their beaches yearly,” and The Massachusetts Acts and Resolves prohibited the cutting down of “any bushes, shrubs or trees under the dimensions of six inches in diameter, growing on [said] beach or marsh.”[13] These statutes were put in place with the goal of preventing coastal erosion and shifting sand, but they also served to preserve plants like marsh rosemary of which, Bigelow noted, “larger quantities are sold” by Boston apothecaries “than of almost any indigenous article.”[14]

Historians of medicine in the 19th century United States often portray herbal medicinal remedies as the domain of Thomsonian botanists who offered populist alternatives to the traditional therapeutics of credentialed physicians in Jacksonian America.[15] Although at times derisive of “common remedies,” Bigelow’s three volumes of attention to medical botany, along with the publications of his contemporaries, suggest that credentialed physicians far from discounted the possibility of deriving therapeutics from plants. In the early years of the 19th century, American medical schools still taught scientific botany as a part of their curriculum. Bigelow himself studied botany under the Philadelphia physician and botanist, Benjamin Smith Barton. By authoring *American Medical Botany*, Bigelow was following in a much longer intellectual tradition of ancient and medieval *materia medica* texts detailing the effects of plants on the human body. By noting the commercial importance of marsh rosemary among Boston apothecaries, he nodded to the ongoing incorporation of American flora into a system of resource extraction and capitalist exchange.[16]

Looking to native plants to soothe the painful symptoms of epidemic disease is a

practice with deep roots in the American continent. The earliest Europeans in North America paid careful attention to the knowledge that Native Americans possessed about plants that might serve as medicinal remedies.[17] The English author John Josselyn's 1683 natural history text *New England Rarities* contains an ink illustration of the *Sarracenia purpurea*, the hollow-leaved lavender plant which, like the marsh rosemary, grows in the salt marshes along North America's Atlantic coast. Josselyn described *S. purpurea* as "good for all manner of fluxes." [18] Although the bodily fluxes brought on by 17th century smallpox epidemics were especially threatening to indigenous communities in Northeastern America, later generations of Native Americans were not entirely defenseless against this affliction. When the French botanist Michel Sarrazin presented the medicinal uses of the *Sarracenia purpurea* to his European colleagues in the 19th century, he informed them that members of the Iroquois confederacy living along the St. Lawrence River used the plant to treat smallpox cases in their community, providing evidence of prior and ongoing investigation into the medicinal properties of plants among communities of Native Americans.[19]

More often than not, European and American botanists in the early national period subsumed existing knowledge about the flora of the continent into scientific treatises without explicitly crediting indigenous sources of information. While indigenous peoples living along the Atlantic prior to and during the early colonial period had undoubtedly had some knowledge of the marsh rosemary plant and its benefits to humans, their expertise has gone unrecorded in Euro-American botanical treatises. Bigelow's *American Medical Botany* references only European authors, notably the British colonist Thomas Walter's 1788 Latin text, *Flora Caroliniana*. Listing the marsh rosemary's morphological characteristics, Bigelow compares it to the European variety of *Statice limonium* in an attempt to fit the American plant into an extant classificatory scheme. The attention paid to classification and morphology in Bigelow's medical botany text reflects the growing autonomy of botany as a field of natural history inquiry with a focus on abstracted naming, classification, and plant morphology, a development that some scholars have termed "decontextualizing botany." [20] At the same time that it demonstrated continuity between old and new ways of understanding plants, Bigelow's entry on marsh rosemary reveals some of the ways that natural history study was changing. In a process analogous to the stiffening of Vaughan's original and more naturalistic illustration to better display the marsh rosemary's anatomical features, botanical classification schemes were reified and plants broken down into constituent chemical parts that could be incorporated into a capitalist system of exchange. Just as the upper roots of Vaughan's more naturalistic illustration are cut off in Bigelow's adapted illustration, mid-19th-century

developments in the field of botany cut off early American physician-botanists from the science's roots in Native American knowledge of the continent's plants.[21]

Returning, however, to the original illustration of marsh rosemary that Vaughan sent to Bigelow, we can see continuity between old and new approaches to the treatment of epidemic disease. The “distinct and copious” acids which, according to Bigelow, could be chemically isolated from marsh rosemary roots, may have been responsible for the soothing effects of the marsh rosemary plant on the painful throats of scarlet fever or diphtheria patients, but Vaughan's illustration of the whole plant evokes a more holistic ecological and environmental context within which early Americans understood the marsh rosemary plant in relation to their surroundings and their bodies.

In the past year, there have been published botanical and biochemical studies of plant compounds suspected to effectively counter symptoms of the SARS CoV-2 virus at the root of the current COVID-19 pandemic.[22] In the context of an Anthropocene environmental crisis, scholars increasingly emphasize the importance of a holistic approach to the environment and traditional ecological knowledge that preserves biodiversity—including the plants that scientists looking to treat COVID-19 now draw upon. The methods of extracting these remedies are different than they were in Bigelow's day, but the concept of looking to plant compounds to treat epidemic and infectious disease is surprisingly similar. Might this indicate a return to our roots?

## Notes

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[1] John Vaughan was a wine merchant and member of the American Philosophical Society. The illustrated marsh rosemary is found in Bigelow's papers in the Gray Herbarium Library Archives: “*Statice caroliniana* [*Limonium carolinianum*] (Marsh Rosemary) original illustration (seq. 24),” Jacob Bigelow botanical illustrations, ca. 1813–1819. gra00002. Botany Libraries, Gray Herbarium Library, Harvard University. The quote is from Valentine Mott, *An Experimental Inquiry into the Chemical and Medical Properties of the Statice Limonium of Linnaeus* (New York: T&J Swords, Printers to the Faculty of Physic of Columbia College, 1806), 18–19.

[2] Jacob Bigelow, “*Statice Caroliniana*, Marsh Rosemary, Plate XXV,” *American Medical Botany: Being a Collection of the Native Medicinal Plants of the United States*,

*Containing Their Botanical History and Chemical Analysis, and Properties and Uses in Medicine, Diet, and the Arts, With Coloured Engravings*, vol. II (Boston: Cummings and Hilliard, 1818), 55.

[3] “Card with Provenance (seq. 3),” Jacob Bigelow botanical illustrations, ca. 1813–1819. gra00002. Botany Libraries, Gray Herbarium Library, Harvard University. See also “Jacob Bigelow (1787–1879) Papers,” Harvard University Herbaria, last updated June 2002.

[4] Bigelow, *American Medical Botany*, 55. Bigelow also describes chemical analyses carried out by Dr. Mott in his dissertation on the *Statice limonium*. For a more modern explanation of these chemical reactions, see Peter Calderon et al., “Factors Influencing the Formation of Precipitates and Hazes by Gelatin and Condensed Hydrolyzable Tannins,” *Journal of Agricultural and Food Chemistry* 16, no. 3 (May–June 1968) and John D Hem, “Complexes of Ferrous Iron with Tannic Acid,” Geological Survey Water-Supply Paper 1459-D, U.S. Department of the Interior, United States Government Printing Office, Washington, D.C. (1960).  
<https://doi.org/10.3133/wsp1459D>

[5] James Ewell, *The Medical Companion, or Family Physician; Treating of the Diseases of the United States, With Their Symptoms, Causes, Cure, and Means of Prevention &c.* (Baltimore, Printed for the proprietors by B. Edes, 1822), index and p. 581. “Lavender thrift” was another common name for the marsh rosemary plant.

[6] William Baylies, “Article II: An Account of the Ulcerated Sore Throat, as it Appeared in the Town of Dighton, County of Bristol, in 1785 and 1786,” *Medical Communications of the Massachusetts Medical Society* (1790).

[7] “Apthous state of fever” refers to a fever associated with sores or pain in the mouth. James Ewell, *The Medical Companion*, 56.

[8] The disease described by Baylies may have been either scarlet fever or diphtheria. The etiology of these diseases was uncertain up until the end of the 19th and beginning of the 20th century, when the unique bacterial strains implicated in each disease were recognized. The overlapping symptoms produced by the strep and diphtheriae bacteria means that early 19th century physicians could have been describing either disease, and, in cases where scarlet fever and diphtheria appeared concurrently, often conflated the two. See for example, “Diphtheria as a Complication of Scarlet Fever,” *JAMA* XXXIX, no. 14 (1902): 844–5. Although some have argued that given the accompanying description of symptoms, the “Ulcerated Sore Throat” Baylies refers to was most likely an epidemic of scarlet fever caused by the infectious bacteria *Streptococcus pyogenes*. Watson, in *The Boston Medical and Surgical Journal*, asserts



that the disease Baylies terms “cynanche maligna” and the 19th century scarlet fever designation “scarlatina” are one and the same disease. See Thomas Watson, “Scarlet Fever,” *The Boston Medical and Surgical Journal* XXVII, no. 11 (1842) and Alan R. Katz and David M. Morens, “Severe Streptococcal Infections in Historical Perspective,” *Clinical Infectious Diseases* 14, no. 1 (Jan 1992).

[9] The symptoms and progression of the disease are described in great detail by Dr. Baylies in his 1790 “Article II: An Account of the Ulcerated Sore Throat, as it Appeared in the Town of Dighton, County of Bristol, in 1785 and 1786,” in *Medical Papers Communicated to the Massachusetts Medical Society*, no. I (Boston: Published by the Society, 1790): 44–48.

[10] See Conevery Bolton Valencius, *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York: Basic Books, 2004).

[11] Benjamin Rush, “An Account of the Scarlatina Anginosa, as it Appeared in Philadelphia, in the Years 1783 and 1784,” *Medical Inquiries and Observations*, 102–106, <https://quod.lib.umich.edu/e/evans/N17140.0001.001/>.

[12] Valentine Mott, *An Experimental Inquiry*, 12–13. Although Mott referred the marsh rosemary to the genus *Statice*—a grouping created by Linnaeus for many coastal plants— scientists today know the Eastern North American marsh rosemary by the Latin binomial *Limonium carolinianum*. See P. Pablo Ferrer-Gallego, Josep A. Rosselló, Emanuele Del Guacchio, and Duilio Iamónico, “Typification of the Linnaean name *Statice Limonium* (Plumbaginaceae),” *Taxon* 67, no. 1 (2018): 191–195. Note that in Bigelow’s *American Medical Botany*, the plant is referred to as *Statice Caroliniana*, the name given it by the English botanist Thomas Walter, who first described the American species of marsh rosemary in his 1788 *Flora Caroliniana*.

[13] Yasuhide Kawashima and Ruth Tone, “Environmental Policy in Early America: A Survey of Colonial Statutes,” *Journal of Forest History* 27, no. 4 (1983), 174; *Acts and Resolves: Public and Private, of the Province of Massachusetts Bay*, 21 vols. (Boston, 1869–1922), vol. 2 (Wright & Potter, 1874), 994. In May 1991, marsh rosemary—which in the 20th century was subject to over-picking for decorative purposes—was designated a protected plant in Rhode Island, making it illegal to pick the plant on public lands. See Donna M. DeForbes, ed., *Save the Bay’s Uncommon Guide to Common Life of the Narragansett Bay and Rhode Island Coastal Waters*, 2nd ed. (Sheahan Printing Corporation, 2008), 37.

[14] Bigelow, *American Medical Botany*, 56.

[15] Charles E. Rosenberg, “The Therapeutic Revolution: Medicine, Meaning, and Social Change in 19th Century America,” in *Explaining Epidemics and Other Studies in*

*the History of Medicine* (1992), 22. See also Ursula Miley and John V. Pickstone, “Medical Botany Around 1850: American Medicine in Industrial Britain,” in *Studies in the History of Alternative Medicine*, ed. Roger Cooter and Rémi Piet, St Antony’s Series (London: Palgrave Macmillan, 1988), 140–54, and Alex Berman, “The Thomsonian Movement and its Relation to American Pharmacy and Medicine,” *Bulletin of the History of Medicine* 25 (1951): 519–38. Dr. Mott’s dissertation on the properties of the marsh rosemary plant is a good example of the type of close attention credentialed physicians paid botany.

[16] In this entry on marsh rosemary, Bigelow also notes the more global commercial importance of other seaside salt-tolerant (barilla) plants used in the production of sodium carbonate.

[17] Colonial authors and European travelers interested in recording and publishing this knowledge included Thomas Hariot, John Lawson, and John Josselyn. See also Christopher M. Parsons, *A Not-So-New World: Empire and Environment in French Colonial North America* (Philadelphia: University of Pennsylvania Press, 2018).

[18] John Josselyn, *New England Rarities Discovered in Birds, Beast, Fishes, Serpents, and Plants of that Country together with the Physical and Chyrurgical Remedies wherewith the Natives constantly use to Cure their Distempers, Wounds, and Sores &c.* (London: Printed for G. Widdowes at the Green Dragon in St. Paul’s Church Yard, 1672; Reprinted in *Archaeologia Americana* and the American Antiquarian Society, 1860), 190.

[19] Farrah Lawrence-Mackey, “Medical Appropriation in the ‘Red’ Atlantic: Translating a Mi’kmaq Smallpox Cure in the Mid-Nineteenth Century” (PhD diss., University College London, 2018), 52.

[20] Lawrence-Mackey adopts this from Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge: Harvard University Press, 2007).

[21] For more on this, see Schiebinger, *Plants and Empire* and Sharon Kingsland, *The Evolution of American Ecology, 1890–2000* (Johns Hopkins University Press, 2008).

[22] Priya Mondal, Jagadish Natesh, Abdul Ajees et al., “Traditional Medicinal Plants Against Replication, Maturation, and Transmission Targets of SARS-CoV-2: Computational Investigation,” *Journal of Biomolecular Structure and Dynamics* (July 2020): 1–18, <https://doi.org/10.1080/07391102.2020.1842246>; Sonia Garcia, “Pandemics and Traditional Plant Based Remedies: A Historical-Botanical Review in the Era of

COVID-19,” *Frontiers in Plant Science* 11 (August 2020): 1–9,  
<https://doi.org/10.3389/fpls.2020.571042>.