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ARTS & HUMANITIES

Podophyllum Peltatum and Observations on the Creek and Cherokee Indians: William Bartram's Preservation of Native American Pharmacology

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Historians have examined the significant contributions John and William Bartram made to 18th- and 19th-century knowledge of indigenous North American flora. However, the Bartrams' contribution to medicinal botanical knowledge, particularly William Bartram's compilation of Indians' knowledge on the preparation and use of medicinal botanicals, is not well-known. In addition, while William Bartram's contemporaries relied on his accounts of medicinal botanicals, they rarely acknowledged Bartram or Indians in their own works. Contemporaries plagiarized Bartram's writings and used his exquisite illustrations to ornament their own publications. This paper reconstructs William Bartram's careful collection and recording of medicinal botanical knowledge that became part of late 18th- and early 19th-century American pharmacology, as well as provides evidence for 54 Bartram-identified indigenous species and the pirating of William Bartram's work by contemporaries.

INTRODUCTION

William Bartram was particularly passionate regarding the documentation and preservation of Indians' medicinal botanical knowledge, because he believed this knowledge would be lost as their technologically unsophisticated culture was overcome by white society. His unique illustrations accurately and beautifully document indigenous flora, including medicinal botanicals. His singular formal publication, *Travels through North and South Carolina, Georgia, East and West Florida, the Cherokee Country, the Extensive Territories of the Muscogulges or Creek Confederacy, and the Country of the Chactaws, Containing an Account of the Soil and Natural Productions of those Regions; together with Observations on the Manners of the Indian*, was internationally recognized and translated into several European languages. The foundation of William's passionate insight, artistic talent, and comprehensive botanical understanding can be found in his father, John. Born in April 1739, William grew up surrounded by his father's intellectual botanical "salon." He demonstrated an exceptional gift for drawing at an early age, and as a teenager studied at the Philadelphia Acad-

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emy, the forerunner of the University of Pennsylvania. William was particularly fortunate to serve as his father's botanical companion and benefited from his father's botanical network.

JOHN BARTRAM AND HIS PLACE IN THE BOTANICAL INTELLECTUAL WORLD

John Bartram epitomized the 18th-century Western European image of the botanist as a theological scientist. A self-educated man, he embraced aspects of Deist and Quaker philosophies and beliefs. Throughout the 18th and early 19th centuries, with "natural theology" as its predominant philosophical basis, scientific inquiry centered on natural history, "the collective study of the three major kingdoms: animal, vegetable, and mineral" [1]. In addition to its spiritual aspects, the study of natural history emphasized scientific reason and utility. Quakers also emphasized "useful and natural knowledge," and "scientific study was considered a wholesome mental recreation among the Pennsylvania Quakers" [2]. In his observation of the natural order of the remote God of the Deists, Bartram obtained great satisfaction from his work. Reflecting his Quaker background, his wanderings in nature offered quiet opportunities to commune with God [3]. Bartram was also intellectually curious and recognized the economic opportunities of botanical work, including medicinal botanical work.

Gardening was one of the leading social pastimes of the era. It was not uncommon for amateur naturalists and members of the middle class to engage in the study of natural history with recognized scientists and the wealthy. Whether authored by professionals or amateurs, natural history nonfiction writing was intended for lay audiences and, particularly in the early 19th century, "only slightly less popular than novels, though often far more expensive" [4]. Natural historians sought to understand God's design by collecting specimens of and classifying plants and animals. To participate in this process, one did have to know Latin. However, the "sex-based" Linnaean system, the dominant classification method developed by Swede Carl Linnaeus, was exquisitely simple. In essence, it allowed classification of plants "first by counting stamens and pistils, then by observing the shape and distribution of leaf, flower, and fruit" [5]. Before Linnaeus, numerous conflicting classification systems confounded universal understanding. Now anyone with resources to support the time — and labor — to gather and examine specimens could contribute to the universal understanding of the hierarchy of all life forms in the Great Chain of Being.

For natural historians, the American colonies provided a vast new theological arena. To enhance their personal lives and social standing, the middle class and wealthy of Europe eagerly sought botanicals from the New World, particularly those from the temperate zone of North America that were compatible with their own environment. Because of the general belief that God's design included natural remedies for illness, medicinal botanicals were an important component of therapeutic medicine. New World plants continuously were sought to enlarge and enhance the pharmacopeia.

John Bartram enthusiastically educated himself in Latin and the Linnaean classification system, as well as developed relationships with leading botanists and scientists in Europe and the American colonies, actively contributing to contemporary botanical knowledge. On his large Philadelphia-area farm in Kingsessing, he established an extensive botanical garden, creating natural habitats for the botanicals he took from the wild, rather than planting them in formal garden layouts. Responding to the market demand for garden and medicinal botanicals, he sold seeds and live specimens collected during his travels and, more importantly, cultivated in his garden. His knowledge of botanicals — and success in growing them — was particularly recognized as he developed relationships with James Logan (a wealthy Philadelphia merchant scientist who was William Penn's deputy and who had an extensive library), Joseph Breintnall (a Philadelphia merchant

whom Bartram assisted with his leaf collection), Samuel Chew (a Maryland physician who moved to Philadelphia and knew Breintnall) [2,6], Benjamin Franklin, and many other American natural historians.

Breintnall and Chew knew Peter Collinson, a fairly wealthy English Quaker draper, avid horticulturalist, correspondent of Linnaeus, and a member of the Royal Society of London. Breintnall sent Collinson a set of leaf impressions, and Chew specifically referred Collinson to Bartram [7-8].

Bartram corresponded with Collinson from the mid-1730s until Collinson's death in 1768. Collinson obtained reading privileges for Bartram at the Philadelphia Library Company [9-10], secured subscribers for his imported seeds and specimens, and occasionally read his findings before the Royal Society [11-13]. He also referred Bartram to Linnaeus, who is reported to have called Bartram "the greatest natural botanist in the world;" Dr. John Fothergill, a wealthy London Quaker physician who owned a large botanical garden and supported the Pennsylvania Hospital in Philadelphia and College of Philadelphia medical school [14]; and other European natural historians.

John Bartram actively pursued a place in, and contributed to, the botanical intellectual world. In addition to writing several essays and travel diaries, he compiled information from colonists and Indians on medical uses of selected botanicals. Bartram's essay, "True Indian physic, or ipecacuanha," was printed in the 1741 *American Almanac* in Philadelphia by John German and the 1741 edition of Benjamin Franklin's *Poor Richard's Almanack* [15]. Bartram's "Description, virtues and uses of sundry plants of these northern parts of America, and particularly of the newly discovered Indian cure for the venereal disease" was bound with Thomas Short's popular *Medicina Britannica* in 1751; Franklin and David Hall reprinted the *Medicina Britannica* as an American edition and added Bartram's preface "shewing the places where many of the described plants are to be found in these parts of America, their differences in name, appearance and virtue, from those of the same kind in Europe" [16-17].

In 1765, perhaps inspired by the 1764 appointment of Bartram's neighbor William Young as botanist to Queen Charlotte, Collinson secured Bartram's appointment by King George III as his royal botanist [18-21]. England recently had acquired all territory east of the Mississippi (except New Orleans) following the Seven Years' War, and there was particular interest in what resources Florida might offer. As royal botanist, Bartram could contribute to England's assessment of Florida by collecting seeds and specimens. Collinson also expected to receive seeds and specimens and provided Bartram with a few contacts in Charleston and Florida. Despite the modest £50 annual salary of his royal appointment, Bartram immediately acted to realize his dream of exploring the American southeast. He wrote his son William, who was 26 and attempting to make a living in North Carolina, and announced his plans for William to accompany him as his assistant [22-23].

WILLIAM BARTRAM AND HIS BOTANICAL TRAVELS

From July 1765 until April 1766, John and William Bartram traveled through the Carolinas, Georgia, and Florida collecting seeds and specimens, as well as documenting their environments. William Bartram also sketched a variety of flora and fauna. At various stops along the way, John Bartram sent Collinson seeds, specimens, and diary accounts. These items were intended for the king, but Collinson kept many of them for himself or gave them to people with whom he wished to incur favor [24]. Bartram presented a complete report of the trip to the Florida governor, who forwarded it to the English Board of Trade; it was subsequently edited (i.e., by deleting Bartram's negative views of Florida's agro-economic potential), added to William Stork's 1766 edition of *An Account of East-Florida*, and promoted within the English government's market-

ing campaign to encourage Florida settlers [25-28].[1] William Bartram decided to stay in Florida, but failed to make a living in the indigo business and returned to his father's farm in 1767.

John Bartram's international botanical network eventually provided an avenue for William to pursue his own dream of botanical travels. The key factor was William's illustrations. At this time, scientific illustrations — particularly illustrations of the botanicals in the Americas — were of great interest and value. Accurate botanical information was crucial for efficient management of resources, as well as optimal understanding of how to feed and provide medicine for colonists and slaves. Bartram often lamented his son's inability to find a way to make a living, yet was pleased by "Billy's darling delight" of botany and drawing, and sent William's illustrations to Collinson [29-30]. Collinson appreciated William's drawings, showed them to many natural historians, and secured several illustration subscriptions for him [31-33].[2]

Finally determined to pursue a botanical career at the age of 32, William Bartram contacted Dr. John Fothergill, who previously bought several of his illustrations. In late 1772, Fothergill, who desired his own American contact for botanicals, agreed to commission him to collect seeds and specimens, as well as draw flora and fauna. Fothergill preferred that Bartram collect in the temperate zone, because its botanicals would more likely survive in England's environment, but acquiesced to an initial plan to travel in Georgia. Reflecting his Quaker background, Fothergill told Bartram "the useful, the beautiful, the singular, or the fragrant, are to us the most material" [34-35]. Fothergill's Charleston contact, Dr. Lionel Chalmers, further instructed Bartram to "preserve seeds from some of the most beautiful flowering plants, as well as of those which may be useful in Medicine, so far as their virtues may come to your knowledge, and give me a few of each sort" [36].

From 1773 until 1777, William Bartram completely retraced his earlier journey with his father and much more, traveling throughout northeastern Georgia, Florida, the Carolinas, and Alabama, as well as reaching the banks of the Mississippi River. At this time, 4,500 Lower Creek Indians retarded colonial development in East Florida, and the Muscogulge Confederacy of Upper Creeks controlled eastern Georgia and central Alabama. British trade with Indian towns enabled Bartram to travel in this area [37-38]. In 1775, the American War for Independence limited Fothergill's contact with Bartram but, fortunately, did not seriously impair his financial support. All in all, Bartram had a great deal of personal control over his travels.

William Bartram returned to his father's house in 1777, and John Bartram died later that year. William's brother, John Jr., inherited the property, then, following John Jr.'s death, his niece, Ann. Bartram was permitted to live in the family house and assisted his brother, then his niece's husband, with their Kingsessing garden

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[1]Collinson was initially angry about the publication of John Bartram's report, perhaps because he lost control of it, but their friendship survived; enthralled when he finally read John's diary, he wrote three indices for it. [See Berkeley E; Berkeley DS. The Life and Travels of John Bartram from Lake Ontario to the River St. John. Tallahassee: University Presses of Florida; 1982. pp. 269-270. See also Darlington W. Memorials of John Bartram and Humphry Marshall: with Notices of Their Botanical Contemporaries. Philadelphia: Lindsay & Blakiston; 1849. pp 291, 293-294. See also Berkeley E; Berkeley DS. The Correspondence of John Bartram, 1734-1777. Gainesville: University Presses of Florida; 1992. pp. 679-680, 684, 688-689.]

[2]Collinson sent William Bartram's drawings to George Edwards, who edited the 1754 edition of Mark Catesby's *The Natural History of Carolina, Florida, and the Bahama Islands*, the prominent botanical illustrator Georg Dionysius Ehret, and Dr. John Fothergill, as well as secured illustration subscriptions from English and European patrons such as the Duchess of Portland. [See Ewan J., editor. William Bartram: Botanical and Zoological Drawings, 1756-1788: Reproduced from the Fothergill Album in the British Museum (Natural History). Philadelphia: American Philosophical Society; 1968. pp. 5-6.]

business. He never traveled again. Perhaps the terribly fractured leg he suffered in a fall from a garden tree contributed to his sedentary lifestyle. Bartram wrote his monumental *Travels* based upon his field diary. First published in Philadelphia in 1791 with numerous errors, it was corrected and published in 1792 in England and several other European countries. At the age of 52, Bartram drew international attention. While some reviewers criticized his seemingly fantastic experiences, his reputation soared in the botanical intellectual world.

William Bartram did not formally publish again, but continuously collaborated with botanists, physicians, and students during their constant visits to the Kingsessing garden or via correspondence, as well as drew untold numbers of illustrations for botanical and medical publications. Unfortunately, his contemporaries rarely credited him or presented his work as their own. He was elected professor of botany at the University of Pennsylvania, but he did not formally accept or decline the post. He never lectured, and the position was given to Benjamin Smith Barton. These facts may be at the root of a perception of Bartram as a spoiled, privileged boy, simply tending a garden and never forced to make a living. However, despite the lack of acknowledgment and citing references, current research is identifying Bartram's work in his contemporaries' writings, and his illustrations are signatory. It is still an open question as to why he did not follow his father's example and actively pursue a place in the botanical intellectual world. Perhaps Bartram was driven by an artistic need to create, whether justly acknowledged or compensated, or wanted "to conquer ambition, forgive his enemies, and lead a simple, virtuous life" [39].[3] Then again, perhaps his "colleagues" were guilty of intellectual dishonesty, envy, and greed.

BARTRAM'S SPECIMENS AND DRAWINGS

William Bartram sent Fothergill more than 200 dried plant specimens, 59 drawings, and his detailed *Travels in Georgia and Florida, 1773-74: a Report to Dr. Fothergill* [40-41]. Before his death in 1780, Fothergill submitted the botanical specimens to Daniel Solander, a student of Linnaeus, for classification. Before his death in 1782, Solander acknowledged that Bartram's specimens were of new genera or species, but they were not included in editions of Linnaeus' *Systema Vegetabilium* until the late 1780s [42-44]. Ownership of Bartram's specimens and drawings passed to Sir Joseph Banks, who bought Fothergill's library after his death. Banks' librarian and curator, Jonas Dryander, held them until they found a permanent home in the British Museum of Natural History in 1827.

Benjamin Smith Barton, who saw Banks' collection of Bartram's drawings while studying medicine in England, corresponded with Bartram from England and actively worked with him after returning to America [45]. Barton encouraged Bartram to publish essays and his *Travels*. After Barton's appointment to the University of Pennsylvania (i.e., the appointment originally given to Bartram), he brought his students to the Kingsessing garden. To all appearances, Barton was an unabashed fan. However, without true understanding of the information, Barton based his 1798 edition of *Collections for an Essay towards a Materia Medica of the United-States* on Bartram's unpublished manuscript "Pharmacopieia," and used 27 Bartram drawings for engravings that illustrated the 1803 edition of his

[3]Reflecting his simple, yet exemplary life, early one morning in July 1823, at the age of 84, during his daily recording of weather conditions, William Bartram died in the Kingsessing garden. [See Fishman G. Journeys through Paradise: Pioneering Naturalists in the Southeast. Gainesville: University Press of Florida; 2000. p. 41. See also Slaughter TP, editor. William Bartram: Travels and Other Writings. New York: Literary Classics of the United States, Inc.; 1996. p. 607. This Slaughter compilation contains the 1792 English edition of the Travels.]

Elements of Botany [46-48].[4] Much of the information on *Iris versicolor*, *Iris verna*, as well as "yaw-weed" or "cock-up-hat" in Barton's *Collections* is very similar to that in Bartram's 1789 manuscript *Observations on the Creek and Cherokee Indians*, yet Barton only acknowledged Bartram for the information on Iris [49-50].[5] In addition, though he pays a rare acknowledgment to Indian knowledge, there are paragraphs in Barton's *Collections* on the "May-apple" or *podophyllum peltatum*, again uncredited to Bartram, that are virtually identical to those in Bartram's *Observations* [51-52].[6]

Several of Barton's students followed their teacher's example of soliciting Bartram's illustrations for their own medical publications. It would not be difficult to identify Bartram's work among uncredited illustrations in these students' publications, as well as other late 18th- and early 19th-century medical sources. For example, in *The Poetics of Natural History: from John Bartram to William James*, Christoph Irmscher compares Bartram's illustration of the flowering tree *Franklinia alatamaha* to that of Pierre-Joseph Redouté, the "famous draftsman at the Jardin des Plantes in Paris." Redouté's "flavorless, stiffly beautiful representation" is no match for Bartram's combination of "art and taxonomy" and attention to detail [53].[7]

INDIANS AND THEIR MEDICINAL BOTANICALS

In addition to his contributions via drawings, specimens, and general botanical

[4]Hinting at the extent of his indebtedness, and Bartram's apparent hesitation to fully enter academic life, in the *Elements* preface, Barton credits Bartram for the illustrations, stating, "The greater number of the Plates, by which the work is illustrated, have been engraved from the original drawings of Mr. William Bartram, of Kingsessing, in the vicinity of Philadelphia. While I thus publicly return my thanks to this ingenious naturalist, for his kind liberality in enriching my work I sincerely rejoice to have an opportunity of declaring, how much of my happiness, in the study of natural history, has been owing to my acquaintance with him; how often I have availed myself of his knowledge in the investigation of the natural productions of our native country; how sincerely I have loved him for the happiest union of moral integrity, with original genius, and unaspiring science, for which he is eminently distinguished."

[5]With detailed botanical understanding, Bartram states, "The vegetables which I discovered to be used as remedies, were generally very powerful cathartics. Of this class are several species of the *Iris*, vix., *Ir. Versicolor*, *Ir. Verna*. And for the same purpose they have a high estimation of a species of either Croton or *Styllingia*, ... it is in great account in the medicines of Dr. Howard, of N. Carolina, in curing the *yaws*, and is called the *yaw-weed*. ... A great number of leaning, simple stems, arise from a large perennial root. ... The stems terminate with spikes of male and female flowers; the latter are succeeded by tricoccous seed-vessels, each cell containing a single seed; the capsule, after excluding the seed, contracts and becomes of a triangular figure, much resembling a cocked hat, which has given that name to the plant, i.e., the 'cock-up-hat.' ... It is common on the light, dry, high lands of Carolina, Georgia, and Florida." With obvious secondhand knowledge, Barton states, "Some of our native species of Iris, or Flag, are powerful cathartics. Such are the *Iris versicolor*, and the *Iris verna*. ... A species of Croton, or perhaps of Stillingia, is used in the southern states, as a cathartic. It enters into the composition of a medicine which has acquired much celebrity in the cure of that hideous disease the frambæsia, or yaws. This plant grows spontaneously on the dry, high lands of Carolina, Georgia, and Florida. It is called Yaw-weed, and Cock-up-Hat. ... It entered into the composition of a medicine, which was much employed by a Dr. Howard (of North-Carolina), as a cure for the yaws."

[6]With a good understanding of its preparation, Bartram states, "[T]he *hypo* or Mayapple (*podophyllum peltatum*) ... root ... is the most effectual and safe emetic, and also cathartic and equally efficacious in expelling worms from the stomach. ... The roots are dug up in the autumn and winter, and spread to dry in an airy loft, when they are occasionally reduced to powder by the usual trituration (for the roots will retain their efficacy when dried)." Barton states, "The root of the May-apple (*Podophyllum peltatum*), which I have mentioned to you, under the head of cathartics, has often been found to operate as an anthelmintic." In a footnote to this, Barton further states, "The best time for gathering the May-apple, for medical purposes, is the autumn, when the leaves have turned yellow, and are about falling off. The Indians dry it in the shade, and powder it for use."

[7]The *Franklinia alatamaha* is extinct in the wild, and the Kingsessing garden tree is reported to be the source of all surviving greenhouse specimens.

knowledge, perhaps most importantly, Bartram collected information on Indians' use of medicinal botanicals. His education and Quaker background informed his beliefs regarding Indians. At the Philadelphia Academy, he studied under Charles Thompson, who advocated equitable treatment of Indians. Also, the Academy's curriculum emphasized Scottish Enlightenment moral philosophy, which argued, counter to Hobbes' and Locke's view of "moral behavior based on reason and self-interest," that all humans "possess an innate moral sense of rights and obligations that permits every individual to appreciate benevolent behavior ... and take delight in the order and harmony of the universe" [54-55]. Bartram further believed that all humans were part of God's nature. Unlike his father, John, who was prejudiced by the fact that his father was killed by Indians, William Bartram embraced the Quaker appreciation of Indians for their closeness to nature and "inner light." Yet, he did not have a romantic "noble savage" image of Indians. Nature could be "at one moment serene and inviting, the next violent and inhospitable." Bartram believed different societies resulted from responses to particular environments and histories. Everyone did not have to live the same way to be moral and civilized, and Indians could serve as moral examples [56-61].

Bartram believed Indians, as a less technologically sophisticated society, were threatened by whites. Colonial America had an extreme shortage of competent physicians and European medicines. Indians possessed a great deal of knowledge about botanicals, particularly medicinal botanicals. Many people sought medical care from Indians or relied upon indigenous medicinal botanicals. Thus, Bartram believed it was important to learn and document as much as possible from Indians before their medicinal botanical knowledge was lost. Building upon the ante-ethnographical literature of 17th-century explorers, missionaries, and travelers, Bartram "studied Indian cultures systematically and described them accurately, always distinguishing observed fact from hearsay" [58,62-63].

Bartram's contemporaries trusted his authority on Indians' knowledge, yet did not fully understand that knowledge or acknowledge him in their work. Barton based his *New Views of the Origin of the Tribes and Nations of America* on Bartram's unpublished manuscript "Answers to Queries about Indians." In addition, Bartram's *Observations on the Creek and Cherokee Indians*, written in 1789 but "lost" until published by the American Ethnological Society in 1853, was written in a question and answer format, and the questions have been attributed to be those from Barton [64-65]. The selective plagiarism of Bartram's work has significantly hindered full understanding of Indians' medicinal botanical knowledge. Nineteenth-century medical educators and practitioners seemingly never cared to verify who really discovered the indigenous medicinal botanicals they used, nor the original source of information about how to prepare and use them.

THE BARTRAMS' CATALOG

Before 1600, Europeans only knew about six of the approximately 8,000 flora species in North America. That number had grown to 300 when John Bartram started collecting and grew to 600 by the end of the American Revolution. The Bartrams discovered 150 to 200 species [66], as well as furthered the study and practice of medicine by supplying physicians, educators, and students with seeds and live specimens. In an examination of 21 American nursery catalogs published between 1771 and 1832, John Fitzpatrick highlights the 1807 Bartram catalog. This catalog lists 1,123 herbaceous ornamental (i.e., herbs used for medicinal and seasoning purposes) plants, 68.7 percent of the entire Bartram garden inventory. No garden even approached this number until 1832, with the 957 herbaceous ornamental plants in the Thorburn catalog [67]. The Bartram garden clearly dominated the American market for at least the first three decades of the 19th century.

In the course of research on indigenous medicinal botanical species and information

about their use, I have compiled a catalog on 65 species, 54 of which are Bartram-identified. Thirty-two of the Bartram-identified indigenous medicinal botanical species continued to appear on the United States Pharmacopeia (USP) or National Formulary (NF) into the 19th and 20th centuries.[8] Key Bartram-identified indigenous medicinal botanicals available for purchase from the Bartram Kingsessing garden as of 1807 include:

1. *Chamaelirium luteum*, Blazing Star, Devil's-bit (Barton also called it *Veratrum luteum*); on the NF 1916-1947. John Bartram reported the use of its root for "grievous pains of bowels." Barton reported its use as an anthelmintic (i.e., anti-worm).

2. *Cornus florida*, Boxwood, Dogwood; dried bark on the USP 1820-1894 and NF 1916-1936. Barton reported its use as a tonic in intermittent fevers. Barton's *Collections* included an illustration of it.

3. *Eupatorium perfoliatum*, Boneset, Crosswort, Indian Paint, Indian Sage, Puccoon, Turmeric, Thorough Stem, Thorough Wort; dried leaves and flowering tops on the USP 1820-1916 and NF 1926-1950. John Bartram reported its use for "a vomit in the intermitting fevers," as well as "pains in the limbs." In a rare acknowledgment, Barton reported its use "by our Indians" as an emetic (i.e., causes vomiting) in intermittent fevers and sudorific (i.e., causes or increases sweating), as well as noted its use for "James-river Ringworm" in Virginia.

4. *Ilex vomitoria*, Cassena, Cassina Holly, Cusseena, Evergreen Cassine, South Sea Tea, Yaupon, Yopon. This botanical never appeared on the USP or NF, but was particularly noted as the key ingredient of the Indian "black drink." Barton reported its use as a diuretic (i.e., increases urine discharge).

5. *Iris verna* and *Iris versicolor*, Blue Flag; dried rhizome on the USP 1820-1895 and NF 1916-1942. William Bartram reported their use as cathartics (i.e., purges bowels). Barton similarly reported this use and actually credited Bartram for the information.

6. *Juglans cinerea*, Butternut, Butternut Walnut, White Walnut; inner bark on the USP 1820-1905 and NF 1916-1936. Barton reported its use as a stimulant, particularly applied as a blister to a snake bite, and cathartic.

7. *Panax quinquefolium*, Ginseng, Panax ginseng; on the USP 1842-1882. Collinson particularly requested this botanical and, because of the popularity of Asian

[8]Catalog information was compiled from John Bartram's "Appendix" to Thomas Short's *Medicina Britannica* (Philadelphia: sold by B. Franklin and D. Hall, at the post-office, in Market-Street; 1751); John Bartram's *Diary of a Journey through the Carolinas, Georgia and Florida, from July 1, 1765 to April 10, 1766* (Transactions of the American Philosophical Society Held at Philadelphia for Promoting Useful Knowledge, New Series 33, part I, 1942; annotated by Francis Harper; Philadelphia; c1942); letters of Peter Collinson and John Bartram (as collected in Darlington's *Memorials of John Bartram* and the Berkeleys' *Correspondence of John Bartram*.); William Bartram's *Report to Dr. John Fothergill* (Transactions of the American Philosophical Society Held at Philadelphia for Promoting Useful Knowledge, New Series 33, part II, 1943); William Bartram's "Remarks" accompanying the specimens and drawings he sent to Fothergill 1774-1776 (from Ewan's *William Bartram: Botanical and Zoological Drawings*); and William Bartram's *Observations on the Creek and Cherokee Indians* (from Slaughter's *Travels* compilation). I am in agreement with Francis Harper's assessment that William Bartram's *Report to Dr. John Fothergill* "contains beautiful descriptive passages," giving the reader a sense of William's narrative, but also has the benefit of being "almost wholly free from disturbing discrepancies that the discriminating student finds" in *Travels through North and South Carolina, Georgia, East and West Florida*. [See Harper, 123.] Thus, in the compilation of the catalog, particular attention was given to William's *Report*, with its more easily identifiable concise factual information, rather than his more narrative *Travels*. Latin and colloquial species names of medicinal botanicals initially were compiled from items in John Bartram's "Appendix" and Barton's *Collections for an Essay towards a Materia Medica of the United-States* (Philadelphia: Fry and Kammerer; 1810). This initial list was then checked against Bartram writings and the 1807 Bartram garden *A Catalogue of Trees, Shrubs, and Herbaceous Plants, Indigenous to the United States of America* (Philadelphia: Bartram and Reynolds; 1807). Finally, information on the specific use of the medicinal botanicals was gleaned from the Bartrams' writings, Barton's Collections, and Virgil J. Vogel's 1970 *American Indian Medicine* (Norman, OK and London: University of Oklahoma Press; 1970, 1990).

ginseng in Europe, hoped to establish a lucrative business with John Bartram. The Royal Society of London also was keen on developing an American ginseng trade. However, depreciated prices in the Asian trade and C.A. Meyer's 1842 identification of separate ginseng species aborted their hopes [68]. William Bartram reported its use by Cherokee and Creek Indians. Barton's *Collections* included an illustration of it, but Barton admitted to knowing little about it.

8. *Podophyllum peltatum*, Hypo-apple, Ipecacuanha, Mandrake, May Apple, Wild Lemon; dried rhizome and roots on the USP 1820-1841 and 1955-1970s; resin on the USP 1863-1942 and 1955-1970s. Ipecacuanha was listed in the 1795 Smith & Bartlett *Catalogue of Drugs and Medicine*. William Bartram described its collection and preparation for use as an anthelmintic (anti-worm). As noted above, Barton used Bartram's language in his *Collections* and reported its use as a cathartic, diuretic, and anthelmintic.

9. *Polygala Senega*, Seneca Snakeroot; on the USP 1820-1936 and NF 1936-1960. Seneca Snakeroot was listed in the 1795 Smith & Bartlett *Catalogue of Drugs and Medicine*. Barton extensively reported its use as a cathartic, diuretic, and sudorific for dropsy, croup, hives, pleurisy, and tetanus from snake bites. Barton's *Collections* included an illustration of it.

10. *Pyrola umbellata*, or *Chimaphila umbellata*, Ground Holly Phipsesawa, Pippsisseva, Prince's Pine, Wintergreen; dried leaf on the USP 1820-1916 and NF 1916-1947. Barton reported its use as an astringent (i.e., constricts tissue) and stimulant, as well as for nephritic affections. William Bartram provided an illustration of it for Barton's *Collections*, as well as one of his student's dissertations.

11. *Sanguinaria canadensis*, Bloodroot, Chelidonium, Puccoon, Red Root, Sanguinaria, Turmerick; dried rhizome on the USP 1820-1926 and NF 1926-1965. Barton extensively described its preparation and use for jaundice and as an emetic. Barton's *Collections* included an illustration of it.

12. *Sassafras officinalis*, sassafras; dried root bark on the USP 1820-1926 and NF 1926-1965; oil on the USP 1820-1955 and NF 1955-1965. William Bartram noted its use as a spring diet drink to "purify blood and juices," as well as identified it as the principal ingredient in Howard's famous cure for yaws. Barton reported the use of its bark as a tonic in intermittents, as well as its oil for wens (i.e., cysts, usually on face or scalp) and lice.

CONCLUSIONS

In addition to the significance of the indigenous medicinal botanical species discovered by the Bartrams and the Indians' medicinal knowledge William Bartram preserved, the Bartrams should be recognized for the important contributions they made to contemporary popular and formal medical literature. While promoting the classification of diseases and therapies, Enlightenment and Deist medical science questioned authority and valued empirical knowledge. Domestic medical care played a near equal role to that of the formally trained physician. Widely available medical guides and "curatives," such as William Buchan's *Domestic Medicine* and John Wesley's *Primitive Physick*, provided core information for families to care for themselves; physicians were only consulted when standard therapies failed [69-70]. Some physicians, surgeons, and apothecaries emigrated to colonial America, and the provincial environment of the colonies led indigenous students to seek education in the key medical education centers of Edinburgh and London. However, as in Europe, apprentice-trained, self-educated, itinerant, and clerical practitioners far outnumbered regular physicians in colonial America [71]. Again, medical guides provided the foundation for practice and were often appended to popular publications. As noted above, John Bartram published two medicinal botanical guides, one with Benjamin Franklin's *Poor Richard's Almanack* and the other with Thomas Short's *Medicina Britannica*. The first medical school in colonial America was established at the College of Philadelphia, later the University of Philadelphia. Also noted above, William

Bartram continuously contributed information and drawings to Benjamin Smith Barton and his university students for their formal medical publications.

The Bartrams discovered scores of indigenous medicinal botanicals and grew virtually all of these species in their Kingsessing garden on the outskirts of Philadelphia. Their garden supplied seeds and live specimens for botanists in Europe and America and obviously served as a primary purveyor for late 18th- and early 19th-century scientists, physicians, druggists, and apothecaries in America. Beyond the evidence supplied by the 1807 Bartram garden catalog, three Bartram-identified indigenous medicinal botanicals were listed in a 1795 Boston apothecary catalogue [72],[9] and more evidence surely will be found in other contemporary druggist and apothecary materials. The significance of Bartram-identified indigenous medicinal botanicals is demonstrated by the fact that at least 32 of them continued to appear on the United States Pharmacopeia or National Formulary into the 19th and 20th centuries.

John Bartram developed an international reputation for his indigenous botanical knowledge, corresponded with scientists and naturalists throughout Europe and the American colonies, and, with Benjamin Franklin, was a founding member of the American Philosophical Society. William Bartram, heir to his father's international esteem, shared his extensive knowledge of indigenous medicinal botanicals — particularly their preparation and use by Indians — with medical practitioners, educators, and students. He also continuously provided accurate and beautiful illustrations of indigenous medicinal botanicals for academic and commercial medical publications. In what appears to be a deliberate abuse of appropriate intellectual recognition, William Bartram's knowledge and illustrations rarely were credited to him, and there is clear evidence that his work was plagiarized by his contemporary, Benjamin Smith Barton. Honest acknowledgment of William Bartram may have helped maintain memory of John Bartram, and certainly would have more fully documented Indian knowledge. By revisiting the Bartrams' botanical exploration and collection work, as well as William Bartram's sensitivity to Indians' knowledge, this paper reconnects the intimate ties between Indians and early American medicine, as well as the willful suppression of those ties by early American medical practitioners, educators, and scientists.

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[9]Bartram-identified species cited in a sample Boston apothecary catalog are *Aristolochia serpentaria* (Virginia snakeroot, Serpentaria Virginia), *Polygala Senega* (Seneca Snakeroot, Serpentaria Seneca), and *Podophyllum peltatum* or *Spiraea trifoliata* (both known as Ipecacuanha).

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