In Memoriam: Lena Artz (1891–1976), a hidden figure of 20th century southeastern US botany.

Andrea Weeks, George Mason University, Department of Biology and the Ted R. Bradley Herbarium (GMUF/LFCC), 4400 University Drive, Fairfax, Virginia 22030

email address: aweeks3@gmu.edu; https://orcid.org/0000-0002-0000-4541

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ABSTRACT

The contributions of Lena Clemmons Artz (1891–1976) to southeastern US botany remain poorly known today. Recently, an archive of her professional papers was discovered in the Lord Fairfax Community College herbarium in Virginia. This publication provides an overview of her biography, botanical education, and scientific research with reference to this archive and other historical documents and serves as a memorial of her professional accomplishments. The majority of her numbered exsiccatae were located, digitized and publicly disseminated via Bionomia to aid biographical research. Artz trained as a botanist in mid-life at the College of William & Mary and the George Washington University, yet her later work occurred without the direct support of a research institution. In total, she wrote 42 publications about the natural history of Virginia, over half of which were produced while she was employed as a high school biology teacher. Ninety percent of her exsiccatae (n=2,245), which were collected between 1922–1971, document the vascular plants of the Massanutten Mountains in the Ridge & Valley physiographic province of northwestern Virginia, where she was raised and to which she retired after her teaching career. Her contributions to southeastern US botany include her detailed documentation of the Virginia flora prior to anthropogenic changes of the 20th and 21st centuries, her foundational papers about the floristics of Central Appalachian shale barrens, and her discovery of the Smokehole Bergamot, *Monarda brevis*. Curatorial improvements and botanical discoveries made during this investigation highlight the importance of biographical data for advancing collections-based research.

Keywords: Bionomia, botanical history, herbarium specimens, hidden figures, Virginia

INTRODUCTION

The contributions of Lena Clemmons[1] Artz (1891–1976) to southeastern US botany were never fully acknowledged by her contemporaries and remain poorly known among botanists today. Fragmentary details in the scientific literature offer a glimpse of her impact to the field. She was a founding member of the Southern Appalachian Botanical Society, its first female vice-president (Baranski 1986) as well as an honorary lifetime member of the Virginia Academy of Science (Anon. 1976a, Figure 1). The Flora of Virginia, in its chapter on the history of the botanical exploration of the state, mentions her dedication to studying the plants of the Massanutten Mountains in the Ridge and Valley physiographic province of northwestern Virginia (Hugo and Ware 2012). Indeed, a bibliographic investigation reveals that Lena Artz built a publication record about the Virginia flora spanning more than 50 years (Table 1). Yet, to date, no memorial of her accomplishments nor analysis of her exsiccatae and other works has been created for the public record.

Several recent events have provided the motive and means for producing a belated biography of this arguably hidden figure of southeastern US botany. In 2019, the Ted R. Bradley herbarium (GMUF) salvaged the Lord Fairfax Community Herbarium (LFCC), a collection of approximately 12,000 vascular plant specimens that document the flora of northwestern Virginia. This region, which includes Clarke, Fauquier, Frederick, Page, Shenandoah, and Warren counties and encompasses most of the Massanutten Mountains, has been under-collected historically. For this reason, the US

[1] Lena Artz used two orthographic variants of her middle name, Clemens and Clemmons, over the course of her life. The latter is listed on her application for a birth certificate (Anon. 1956) and is used preferentially in this biographical account.

National Science Foundation awarded support to GMUF to incorporate, curate, and digitize the LFCC collection as infrastructure for biological research. During research for the salvage project, I first encountered articles written by Lena Artz (Artz 1937a, 1937b, 1948a, 1962, 1964) about the flora of the shale barrens of the Massanuttens and became curious about her biography.

Artz (1937a) offered two personal details that inspired further biographical investigation, which led to an important discovery. First, she noted that her research was produced as part of a master's thesis project at the George Washington University in Washington, D.C., which was relatively unusual for a woman to do during that time. Second, she used an Arlington, Virginia address but no institutional by-line. Initial efforts to learn more about her education and career were stymied by a lack of reference material. However, soon after becoming curious about her biography I found records on Index Herbariorum (Thiers 2023) that indicated that LFCC had once held her professional papers. This archive, hereafter referred to as the LFCC Artz archive, was retrieved from Lord Fairfax Community College in 2021 and has become the central reference for uncovering her life story.

The goals of the biography are to provide a brief overview of the life of Lena Artz, her education as a botanist and her scientific contributions with reference to the LFCC Artz archive, other archival documents and her exsiccatae. Because herbarium specimens are historical documents that report a collector's whereabouts through time and are a part of their scientific legacy, locating all known herbarium specimens created by Lena Artz, digitizing those that needed it, and assisting herbaria in sharing these digital data were also objectives of this project. A critical tool for this work was the use of

Bionomia (Shorthouse 2020). This online platform allows users to evaluate the name strings of collectors and identifiers within the “recordedBy” and “identifiedBy” Darwin Core fields (Wieczorek et al. 2012), respectively, of digitized herbarium specimen data that are shared to the Global Biodiversity Information Facility (GBIF 2023a). Users of Bionomia can attribute specimens to individual collectors and append to them the unique identifiers for those individuals. In the case of deceased individuals such as Lena Artz, the unique identifier is the Wikidata Q-number for that person (i.e., Wikidata Contributors 2023a). I earlier disseminated on Wikidata and Wikipedia (Wikidata Contributors 2023a; Wikipedia Contributors 2023) preliminary biographical data about Lena Artz to facilitate herbarium specimen attribution work within Bionomia and the reassembly of her exsiccatae. This publication is a more complete account of her biography because it leverages the entirety of the LFCC Artz archive and information from the herbarium specimens that she created.

MATERIALS AND METHODS

The LFCC Artz archive that was analyzed for the project comprised ca. three linear feet of bound volumes (i.e., field notebooks, diaries, copies of her journal articles) and unbound papers (i.e., index notecards, photographs, loose-leaf plant checklists, personal correspondence). Primary references used to establish biographical details were located using genealogical research clearinghouses (i.e., Ancestry.com, Familysearch.com), regional newspaper databases (i.e., Newspapers.com), the digitized alumni records held by the College of William & Mary and the George Washington University, physical searches of courthouse records held by Warren and Shenandoah counties in Virginia and the curated collection of objects held by Fort

Valley Museum in Fort Valley, Virginia. Documentation of her professional activities was uncovered using standard bibliographic research methods in addition to searches of Biodiversity Heritage Library (Marcum 2013), Google Books, and the archives of Harvard University and the Smithsonian Institution.

Locating the exsiccatae of Lena Artz required an iterative process of examining her written records, inspecting digitized herbarium records available through the online portals of iDigBio (2023), SERNEC (2023), and GBIF (2023), assessing those uncovered by Bionomia (Shorthouse 2020) and physically searching Virginia herbaria that were known to have had interactions with her. These herbaria are located at James Madison University (JMUH), Virginia Military Institute (VMIL), and Virginia Tech (VPI).

Artz specimens and their digital data were curated as part of the discovery and review process. In some cases where written records from the LFCC Artz archive could provide missing label data (i.e., collection date, collection number) or provide more precise locality information, annotations were sent to collections' managers or added directly to collections' databases with the permission of their curators. Undigitized Artz specimens discovered during physical searches of JMUH, VMIL and VPI were imaged, transcribed and added to the SERNEC portal. For some Artz specimens discovered within these herbaria, three crowd-sourcing expeditions on the Notes from Nature online platform (Hill et al. 2012) were created to transcribe 862 labels using volunteer contributions (Weeks 2022). As collections' database information was amended, the latest database versions were shared to GBIF so that Artz specimen data could be compiled within Bionomia.

The final, compiled dataset of herbarium specimen records attributed to Lena Artz for analysis by this project were cleaned by 1) eliminating two records of taxonomic determinations of specimens that were already present in the dataset (Tropicos record number 559426 and 564235), and 2) re-verifying the absence of recorded collection dates for eight specimens.

RESULTS

Scope of Exsiccatae

Initial searches on Bionomia for herbarium specimens created by Lena Artz revealed 305 sheets held by eight collections in the US (AMES, BPI, CHRB, GH, NCU, NY, ODU, US). After discovery of specimens by this project and their integration with GBIF, the known Artz exsiccatae include 2,245 specimens held by 21 herbaria in the US [VMIL (1349 specimens), VPI (398), US (204), JMUH (158), GH (70), NY (14), PH (14), AMES (11), LYN (4), MUHW (4), LFCC (3), BPI (2), CHRB (2), NCU (2), ODU (2), WVA (2), FARM (1), FH (1)], the Netherlands [Naturalis Biodiversity Center (2)], China [PE (1)], and Sweden [S (1)] (Artz 2023; GBIF 2023b). Except for 21 specimens, all list Lena Artz as the sole collector. Discrepancies between the dates and the spelling of localities on her herbarium labels, especially between her handwritten notes and typed labels, are not uncommon among her exsiccatae. In total, 934 annotations that amend label data or provide taxonomic determinations for specimens were distributed to herbaria.

The number of unique collection events by Lena Artz represented by the 2,245 specimens cannot be determined due to her irregular use of collection numbers and inconsistent labeling of duplicate material. Artz applied collection numbers to her specimens but also produced many unnumbered sheets (303 sheets; 13% of her

exsiccatae). Throughout her life, if she assigned collection numbers to specimens, they were not necessarily in the chronological order of their collection event. For example, Artz 3 (VMIL catalog no. VMI009245) was collected on 16 November 1927, yet Artz 4 (VMIL catalog no. VMI008669) was collected on 6 September 1927. The highest numbered specimen discovered thus far is Artz 3001 (JMUH catalog no. JMUH0000391) and was collected on 16 August 1959, whereas the latest known numbered specimen was collected on 7 June 1965 (Artz 2995, JMUH catalog no. JMUH0002298). Moreover, Artz did not always use the same collection number for duplicate specimens of the same collection event. In some cases, she applied different numbers to duplicate specimens distributed to different herbaria and used slightly different wording in the locality string (i.e., Artz 470, VMIL catalog no. VMI005288 and Artz 541, US catalog no. 1634735). In other cases, she used one collection number but reported two or more collection dates and/or localities on a single sheet or within her notes, making it impossible to determine whether multiple sheets having the same collection number are duplicate material or separate collection events (i.e., Artz 74, VMIL catalog no. VMI010776; Artz 283, VMIL catalog no. VMI003399; Artz 411, VMIL catalog nos. VMI000870–VMI000873; Artz 411, VPI catalog no. VPI-V-0063897). Where handwritten collection notes in the LFCC Artz archive report these numbers, they provide clarity on the provenance only for some (i.e., Artz 111, VMIL catalog nos. VMI003320–VMI003322). Despite this uncertainty, specimens for 826 (63%) of the 1308 numbers (1–1282, 2986–3001) recorded in the handwritten collection notes found in the LFCC Artz archive were located. The 482 numbered Artz specimens not yet located are listed in Table 2.

Lena Artz recorded collection dates consistently on her herbarium labels or in her notes. Only eight sheets of her known exsiccatae are missing the year, and one sheet with a typed label (Artz s.n., VPI catalog no. VPI-V-0013221) records an incorrect date that postdates her death. The chronology of her dated specimens (n=2,236) spans 12 August 1922 to 20 October 1971, with the greatest rate of collection in the late 1920's to mid-1930's (Figure 2). For all specimens, Artz recorded the US state where she collected the specimen or included enough locality information so that the state could be inferred. The overwhelming majority of specimens were collected in Virginia (2,195 sheets, 98%) followed by West Virginia (44), Maryland (2), New Jersey (1) and North Carolina (1). Among Virginian sheets that included a county or city name or enough textual description that allowed its inference (2,174 sheets, 99% of Virginian sheets), 13 of Virginia's 95 counties and 2 of Virginia's 38 independent cities are represented (Figure 3). Four counties that encompass the Massanutten Mountains comprise 95% of the Virginian sheets identified to the level of county: Shenandoah (1,554 sheets; 71%), Rockingham (420; 19%), Page (93; 4%) and Warren (22, 1%). The other 11 counties and independent cities individually contribute 1% or less: Alleghany (2 sheets), Augusta (18), Bath (7), Bland (1), Clarke (2), Craig (3), Frederick (14), Giles (9), James City (17), Loudoun (4), Rockbridge (6) and Williamsburg City (2).

Except for two specimens of ascomycete fungi, all known Artz specimens are of land plants and are predominantly angiosperms (2,024 sheets; 90% of exsiccatae). Classes of plants in the minority within her exsiccatae include: Bryopsida (13 sheets), Lycopodiopsida (54), Polypodiopsida (105) and Pinopsida (8). Within angiosperms, 109 families are represented. The 10 most prevalent angiosperm families among her

exsiccatae are: Asteraceae (250 sheets; 12% of angiosperm specimens), Orchidaceae (110; 5%), Lamiaceae (107; 5%), Fabaceae (104; 5%), Rosaceae (80; 4%), Ericaceae (66; 3%), Ranunculaceae (64, 3%), and Rubiaceae (52; 3%).

Scope of Published Works

Lena Artz published 42 scholarly works between 1917–1974, 37 of which focused on the floristics of Virginia or general botany (Table 1, Figure 2). Many of her earliest floristic works were published in *Claytonia*, a journal that was created in 1934 by the Flora Committee of the Virginia Academy of Science that folded in 1939 (Hugo and Ware 2012) and remains unindexed today. These early papers range in form from brief field notes (i.e., Artz 1935a) to the publication of her master's thesis research (Artz 1937a, 1937b). Topics of her other papers, excluding those focused on floristics, include ethnobotany (Artz 1938a, 1948b, 1955a, 1974a), mineralogy (Artz 1938b), secondary school science education (Artz 1937c), and regional conservation policy (Artz 1955b, 1965). She published 33 of her manuscripts in peer-reviewed US botanical journals (i.e., *American Fern Journal*, *Castanea*, *Rhodora*) or other academic publications, such as her master's thesis (Artz 1935b). She placed nine other works in serial publications or edited volumes meant for non-specialist audiences (i.e., *Garden Gossip*, *Phi Delta Gamma Journal*, *Potomac Appalachian Trail Club Bulletin*, *The Guide to Nature*, *Virginia Wildlife*). These publications are written in a rhetorical style that today would be called science communication, whose purpose is to engage and educate the public.

DISCUSSION

Who was Lena Clemmons Artz?

Despite her substantial record of published research and an exsiccatae that is now distributed globally, Lena Artz did not have career typical for a mid-20th century botanist nor was she employed by an institution that supported her research. Lena Artz was a public-school teacher in Virginia for the entirety of her career, which spanned 1913–1947 (Cook and Smith 1944; Artz 1947). During this period, she published over half of her papers and created ca. 78% (1,741 sheets) of her known exsiccatae. After retiring on a teacher's pension, Lena focused her efforts more fully on regional botanical research, exploration, and outreach until her death in 1976.

Early life

Lena Artz was a Virginian by birth and established a career in education early in life. She was born 3 August 1891 and was raised in Woodstock, Virginia (Shenandoah County) on her family's farm. This region of the Shenandoah Valley is located along the North Fork of the Shenandoah River and is adjacent to the western slopes of the Massanutten Mountains (i.e., the J.P. Artz residence; Lake 1885). After graduating in 1913 from Woodstock High School first in her class and with a teaching certificate, she taught at public schools in Port Republic, which is in Rockingham County at the southern-most extent of the Massanuttens (Anon. 1913, 1914). In 1915, she began teaching high school biology (Cook and Smith 1944). She attended University of Virginia's summer Normal School in Charlottesville, Virginia for at least two sessions (Anon. 1919, 1921, 2003; Bromley 2017). By 1922, she was receiving honors as an educator (Anon. 1922) and was selected to lead a state-level summer training course for teachers.

The earliest evidence of her interest in botany coincides with her years as an early career educator. Her signed copy of The Plant Notebook (Comstock 1915) with inscriptions dated between 1916–1922 was found within the LFCC archive. This workbook is intended to teach plant identification skills, and its presence along with a letter she wrote to popular science periodical about nature study (Artz 1917) suggests that she may have taught herself botany independently. It is also possible she used this workbook in her classrooms or in the context of the agricultural club that she created for youth in Rockingham County, Virginia (Anon. 1922). Her earliest known herbarium specimens, four specimens of *Onoclea sensibilis* L. (Artz s.n., VMIL catalog nos. VMI009115–VMI009118) collected on 12 August 1922, may have been created during this period, as well. However, her accession records of specimens donated to the Virginia Military Institute herbarium (VMIL) prior to Summer 1934 suggest that the typed label data on these specimens may be mis-transcriptions of her handwriting. If these sheets are duplicates of Artz 163 as her records indicate, then she collected them on 17 August 1928.

Formal botanical education

The impetus that drove Lena Artz to pursue higher education at mid-life is unknown. In Summer 1927, she earned an Artium Baccalaureus (e.g., a Bachelor of Arts) in Biology from William & Mary College at the age of 36 (Anon. 1927). She is not listed in the freshmen roll in 1924 (Anon. 1924, p. 105) but is listed on the sophomore roll in 1925 (Anon. 1925, p. 103). The gap in enrollment suggests she was admitted as a sophomore and received credit for courses that she completed previously during summers at the University of Virginia Normal School, which would have allowed her to

complete a typical four-year bachelor's degree within three years. While enrolled at William & Mary, she was active in the Clayton-Grimes Biology Club (Anon. 1925, 1926) and took a plant taxonomy course, based on her signed notebook for this course dated Summer 1926 that was found in the LFCC Artz archive. She created her earliest and incontestably dated herbarium specimens during her undergraduate years (31 sheets; dated 24 June 1924 through 10 June 1927).

Lena's interaction with William & Mary gave direction to her subsequent botanical research. The college hosted the first meeting of the Virginia Academy of Science in 1923 (Staggers 1966). Three years later, the Academy formed the Flora Committee at their 1926 meeting, the same year that Lena took a summer course in plant taxonomy at William & Mary. The purpose of the Flora Committee was to encourage collaboration among botanists as well as promote regional floristic collections that would create the foundation for a modern, comprehensive flora of Virginia. As a member of the Clayton-Grimes Biology Club at William & Mary and an established high school biology educator, Lena would likely have been aware of the Academy and its Flora Committee. As her later actions illustrate, she became an active contributor to this state-wide effort.

On graduating from William & Mary in Summer 1927, she immediately began systematic collection of the vascular flora of Augusta, Rockbridge, Rockingham and Shenandoah counties in Virginia (526 sheets; September 1927 through 1928). These numbered collections were recorded in notebooks and were frequently made in triplicate with identical handwritten labels. Some comprise a series of flowering and fruiting material for species collected across the growing season. Her frequently noted place names, Stonewall Bend and the Kettle, correspond to her family's property in

Shenandoah County and a Massanutten mountain valley in McGaheysville, Rockingham County that is close to where she taught prior to attending college. She deposited the specimens that she created during this time in the herbarium of the Virginia Military Institute, which was one of the depository herbaria for the Virginia Academy of Science Flora Committee.

In 1928, Lena Artz began teaching biology at Washington-Lee High School in Arlington, Virginia, where she remained until she retired in 1947. It is possible that she moved to the Washington, D.C. area for the job or with the intention of pursuing a graduate degree in botany, or both. By 1930, she was living in an apartment adjacent to the campus of the George Washington University (McClellan 1930). By Summer 1932, she was conducting field research for her master's degree at the university, under the direction of plant geographer and ecologist, Robert Fiske Griggs (Cottam and Diehl 1964). Her field notebooks within the LFCC Artz archive begin recording her fieldwork on the shale barrens of the Massanutten Mountains on 10 June 1932 and a newspaper article documents her status as a student of Griggs' on 14 August 1932 (Anonymous 1932). When precisely she enrolled as a student at the George Washington University is unclear, but her focus on documenting the flora of the Massanuttens, which lie ca. 103–163 km west and southwest of Washington, D.C., was unwavering (899 sheets, 1929–1934).

Lena Artz submitted her master's thesis entitled, "Plants of the shale banks of the Massanutten Mts." in February 1935 and graduated later that spring at the age of 43 (Anon. 1935a; Artz 1935b). Her motivation for selecting her thesis topic is unknown. It is possible that Griggs recommended the topic based on his understanding of these

unique Central Appalachian ecological communities (Steele 1911) and her ready knowledge of the Massanuttens and its flora. It is also equally likely that Artz developed this topic herself based on her life-long exploration of the Massanuttens and her attention to its distinctive geology. As early as 1927, Artz noted on her herbarium labels whether plants were growing on shale substrates (i.e., Artz 176, VMIL catalog no. VMI001369). Her later publications demonstrate her continued interest in mineralogy and geology (Artz 1937c, 1938b).

After graduating from the George Washington University, Artz continued her scholarly work part-time while teaching at Washington-Lee High School. She attended evening seminars at George Washington University during the academic year, collected herbarium specimens during public-school holidays (288 sheets; 1935–Spring 1947) and participated in events held by regional professional societies (e.g., Fig. 4). In 1937, she was inducted into the Washington Academy of Science Botanical Society (McKinney 1938) and became a founding member of the Southern Appalachian Botanical Society (Baranski 1986). She took on leadership roles in the Virginia Academy of Science (Miller 1940) and was active in the Junior Virginia Academy of Science, which supported participation by high school students (Miller 1941). In the years after graduation and before retirement (1936–1946), Artz published 14 papers.

Later life

After retiring at the end of the 1946–47 school year at the age of 55, Artz moved from her Arlington, Virginia home to a cabin in the Massanuttens where she remained for the rest of her life. She built the cabin shortly after purchasing the lot in 1935 (Anon. 1935b) and used it as a vacation home and ersatz field-station for herself and other visiting

botanists for over a decade prior to establishing her full-time residence there in 1947. Located within the northern end of Fort Valley in Waterlick, Virginia and adjacent to an extensive mountain trail system, her retirement home supported her further exploration of the plants and ecosystems of the region.

In total, she collected 22% of her exsiccatae (495 sheets; Fig. 2) and created 20 publications during her retirement years. She did not assign numbers to most specimens created after 1950. A notable exception is a group of specimens that she gave to JMUH between 1963–1965 whose numbers range between 2986–3001. Specimens or notebook entries for collection numbers above 1282 and below 2986 have not been located, which suggests that she may have never been created them. Artz may have chosen these higher numbers for convenience to ensure they were unique.

Artz expanded the scope of her scholarly activities while residing in the Massanuttens. Soon after retirement, she joined the American Fern Society (Morton 1948) and the Ecological Society of America (Anon. 1949). She continued her involvement with the Virginia Academy of Science and the Southern Appalachian Botanical Society, becoming its first female vice-president in 1953 (Baranski 1986). Lena's research interests also expanded to include the flora of montane wetlands and other high-elevation communities in the Massanuttens (i.e., Artz 1949; Artz and Krouse 1967). She chose the Harvard herbaria as recipients for some of these collections (82 sheets; Artz 1947), at least in part because she wanted to obtain secondary determinations for taxa that were restricted to high-elevation areas of Virginia and West Virginia but were widespread in New England and therefore more familiar to Harvard

curators. Massanutten place names such as Mud Hole Bog and Peter's Mill Bog are common localities for specimens that she collected during this time. In the former, she discovered the state record of Black Ash (*Fraxinus nigra* Marsh.) and one of the few Virginian stations of Showy Ladyslipper Orchid (*Cypripedium reginae* Walt.). Her knowledge of these fragile montane ecosystems later inspired her public outreach articles about the local flora and regional environmental conservation (Artz 1955a, 1968) and informed her advocacy for the preservation of inland wetlands (Goodwin and Niering 1975). Her life-long commitment to the Massanutten flora is perhaps best illustrated by the last known herbarium specimen that she collected (20 October 1971; Artz s.n., US catalog no. 2740394) that documents the same montane wetland population of *Parnassia asarifolia* Ventenat that was the focus of her first scientific paper (Artz 1934).

Lena Artz died at the age of 84 on 2 June 1976 following a brief illness (Anon. 1976b, 1976c). Her professional papers were delivered to LFCC shortly after her death by Marlin Krouse (Wikidata Contributors 2023b) and were received by the original curator of the LFCC herbarium, Robert Simpson (pers. comm., R. Simpson). Krouse was a collaborator of Artz (Artz and Krouse 1967) as well as her friend and neighbor (Artz 1974b). He likely chose LFCC in which to deposit her papers because its Middletown, Virginia location was close to her home in Waterlick, Virginia.

What are the contributions of Lena Artz to southeastern US botany?

Lena Artz created a legacy of scholarly works and herbarium specimens that deeply documents the early- to mid-20th century flora in Virginia, especially that of the Massanutten Mountains. Her specimens have time-value for understanding the flora of

the southeastern US because they record the plant biodiversity in the area before ongoing anthropogenic disturbances further altered its composition later in the 20th century, such as the reintroduction and subsequent over-population of white-tail deer (VDGIF 2015; Kniowski and Ford 2018), the incursion of numerous non-native and invasive plant species (Pimentel et al. 2005; Fleming 2012), the conversion of wetland ecosystems (Goodwin and Niering 1975; Anon. 1996), and the application of broad-spectrum herbicides by land managers (Timmons 1970; Mahan et al. 2020). Some of her specimens are the only evidence that certain species once occurred in the area, such as *Arundinaria gigantea* (Walt.) Muhl. (Artz 1281, US catalog no. 2684632; McClure 1961). Her deep knowledge of the flora combined with her persistence in exploring the region into her 80's gave her the ability to spot morphological variants that ultimately increased the number of known species in the southeastern US. While exploring the Allegheny Mountains of West Virginia, she discovered a new variety of *Monarda fistulosa* L. (Fosberg and Artz 1953), which is now recognized as *Monarda brevis* (Fosberg & Artz) Floden, the Smokehole Bergamot. This species, which is endemic to West Virginia and Virginia, is critically imperiled and possibly extirpated in these states. As more herbaria become fully digitized, the remainder of the exsiccatae created by Lena Artz may be located, which would further add to our understanding of her life and intellectual contributions.

The biography of Lena Artz illustrates new horizons for collections-based research in the 21st century.

Reconstructing the biography of Lena Artz was made possible by digital resources that streamline historical research about collectors of natural history specimens and that

open new horizons for collections-based research. The enormous progress made by herbaria in digitizing specimens has made more accessible a wealth of historical documents not just about plant species but about their collectors. Exsiccatae can reveal a collector's travels, their collaborations, their research interests and the genesis of their discoveries through time that may not be apparent from any other resource and that can give context to fragmentary biographical details. The challenge of assembling voluminous and dispersed exsiccatae from both historical and extant collectors has been made more manageable with new biodiversity informatics tools, such as Bionomia. Locating obscure bibliographic records has never been easier, too, thanks to advances in library science and the availability of open-access clearinghouses, such as Biodiversity Heritage Library.

With these data, we can now uncover hidden figures such as Lena Artz and better acknowledge their intellectual contributions, which builds a more inclusive understanding of botanical history that also improves collections-based research. Data about collectors are integral to the 21st century concept of the Extended Specimen (Webster 2017). Emerging plans to leverage this concept for the next generation of biodiversity research tools envision a future network of digital specimen records that will link the constellation of ancillary and derivative data associated with each specimen and that will advance research through new insights and syntheses made possible by these linkages (BCN 2019). Data about historical collectors and their archival records must be part of this future network because they illuminate important aspects of the specimens (Groom et al. 2020). For instance, the field notebooks of Lena Artz were essential for understanding her specimen numbering system as well as for amending and correcting

herbarium label data during the review of her exsiccatae. Her notes in some cases exceeded in detail what she had written on her herbarium labels or reported in her published papers. As a direct consequence of examining the LFCC Artz archive, I was able to locate in 2022 a plant species that had been listed as possibly extirpated in Virginia (*Astragalus distortus* Torrey & A. Gray, Weeks and Poindexter 2023). This example illustrates the tantalizing prospect of the additional discoveries about the flora of the southeastern US that we might make if we were able to analyze the archival records and field notebooks from more historical collectors with greater efficiency.

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explore the property. Finally, the Fort Valley Museum in Fort Valley, Virginia, which curates the mineral collection and other personal effects that Lena donated prior to her death, provided regional context to her biography. Glenn Montague, Matthew Sheik and two anonymous reviewers provided feedback on earlier versions of the manuscript. This material is based upon work supported by the Virginia Native Plant Society and the US National Science Foundation under grant nos. 2022918 and 2247631.

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Table 2. Artz specimen numbers below Artz 1282 and equal to or above Artz 2986 that are referenced in the LFCC Artz archive and not yet located in herbaria (N=482).

Artz 13, 16, 33, 46, 47, 160, 167, 179, 184, 210, 226, 236, 252–254, 273, 278, 279, 343, 368, 375, 382, 383, 392, 404, 405, 423, 472, 482, 556, 579, 611, 612, 618, 623, 627, 628, 644, 649, 657, 660–699, 701, 712, 714, 716, 717, 723, 729, 731, 733, 734, 737–743, 747–750, 752–761, 763–765, 772, 774–778, 784–799, 802, 804–813, 827, 831, 834–837, 844, 853–855, 859–862, 864, 868–873, 875, 882, 888, 892, 895–897, 901, 906–908, 910–912, 917–919, 922–925, 927, 933–937, 939–971, 973, 974–983, 985, 986, 988–1006, 1009, 1016–1018, 1024, 1027, 1031, 1032, 1035, 1036, 1042–1116, 1126–1135, 1137–1148, 1151–1203, 1211, 1212, 1215–1222, 1233–1239, 1243–1248, 1250–1254, 1256, 1257, 1259–1268, 1271–1273, 1275–1280, 2986, 2997.

Figure Legends

Figure 1. Lena Clemmons Artz (1891–1976) was a founding member of the Southern Appalachian Botanical Society and created a legacy of floristic discoveries about the Virginian flora in the mid 20th century. Portrait of Artz from the mid-1940's discovered in the LFCC Artz archive. Credit: Wikimedia Commons; Andrea Weeks (pterygote), CC BY-SA 4.0.

Figure 2. The chronology of herbarium specimen collection and publication of scholarly works by Lena Artz.

Figure 3. County and city origin of specimens collected by Lena Artz in Virginia (N=2,174 sheets; 97% of her exsiccatae). The area of origin for 95% of her specimens encompasses the Massanutten Mountains in Shenandoah (1,554 sheets), Rockingham (420), Page (93), and Warren (22) counties. The area of origin for 5% of her specimens includes the counties and independent cities of: Alleghany (2 sheets, western Virginia), Augusta (18), Bath (7), Bland (1), Clarke (2, northwestern Virginia), Craig (3), Frederick (14), Giles (9), James City (17), Loudoun (4), Rockbridge (6), and Williamsburg City (2, southeastern Virginia).

Figure 4. Annotated photograph of the attendees of the joint meeting of the Botanical Society of America, American Fern Society, Sullivant Moss Society, and Appalachian Botanical Club held at Mountain Lake Biological Station in Pembroke, Virginia on June 15–18, 1939 (Anon. 1939). Lena Artz (1) is shown standing, at left. Credit: unknown author, shared with permission of Mountain Lake Biological Station and University of Virginia.

Figure 1.

Figure 2.

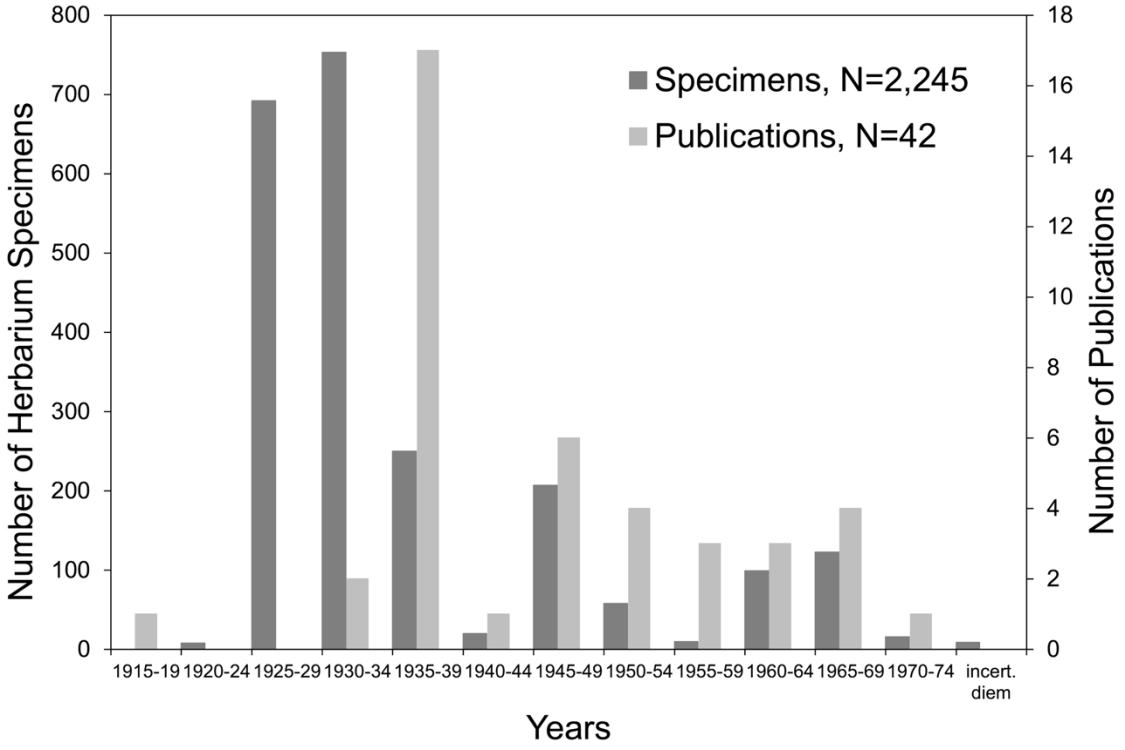
Specimens, N=2,245
Publications, N=42
Number of Herbarium Specimens
Number of Publications
Years
0
100
200
300
400
500
600
700
800
0
2
4
6
8
10
12
14
16
18
1915-19
1920-24
1925-29
1930-34
1935-39
1940-44
1945-49
1950-54
1955-59
1960-64
1965-69
1970-74
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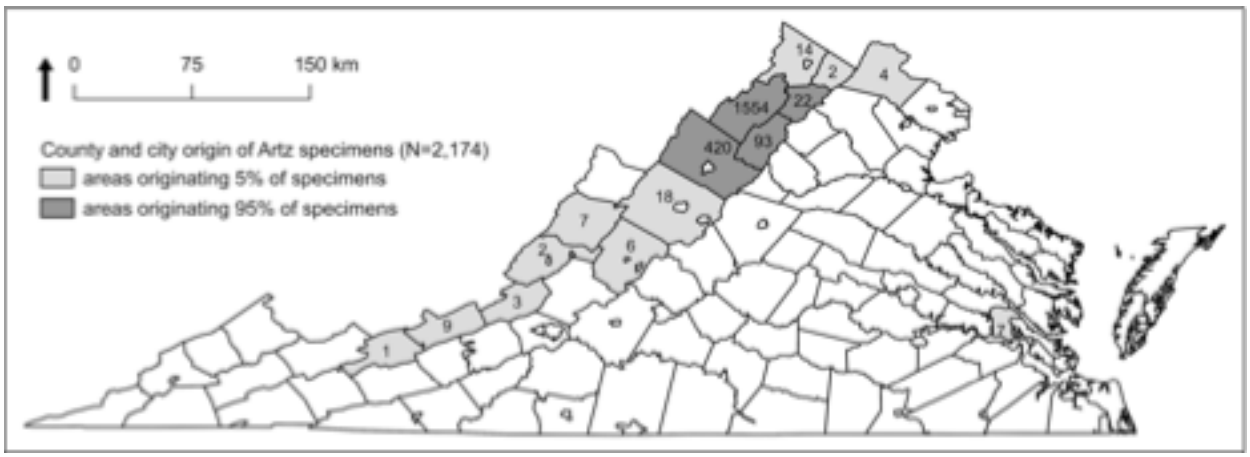
Figure 3.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County and city origin of Artz specimens (N=2,174)
areas originating 5% of specimens
areas originating 95% of specimens
14
2
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1554
22
420
93
18
7
2
6
3
9
1
4

Figure 4.


Botanical Society of America
American Fern Society
Sullivant Moss Society
Appalachian Botanical Club
June 15-18, 1937
Blomquist
Smith
Oosting
Long
Coop
Elliott
Fulford
Manley
Jones
Hoffmaster
Dodson
Freer 2
Gordon 3
Braun 4
Braun 6
Fernald
Sherrard
Wells
Totten
Gilbert
Chrysler
Ellis
Sharp
Lewis
Tollett
PMP