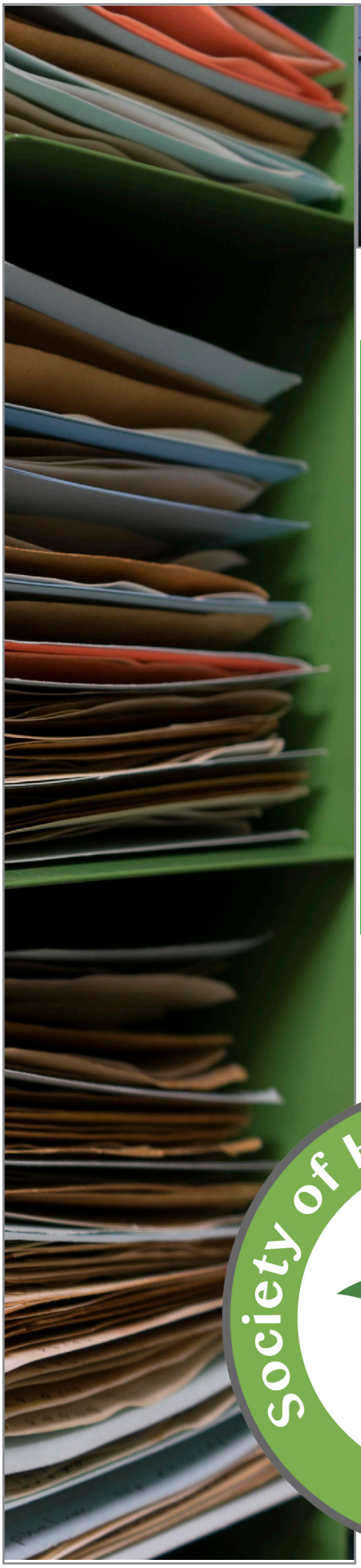

The Vasculum

The Society of Herbarium Curators Newsletter
Volume 15, Number 2: August 2020

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The Society of Herbarium Curators (SHC) unites the world's herbarium professionals in discussion, training, action, and support for the benefit of herbaria, science, and society. SHC envisions a network of innovative, well-trained herbarium professionals, empowered to recognize and address local and global stakeholder needs with organizationally sustainable strategies that advance the well-being of herbaria, science, and society. For more information, please join us online:

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Message from the President

Hello, Botanists! The initial days of my presidential term for the Society of Herbarium Curators are certainly not as I had imagined! July 2020 and the prior months have been filled with numerous unforeseen challenges (professional, personal, and social) associated with COVID-19. At the same time, we find ourselves in somewhat of an extraordinary period of opportunity and phase of creativity: a time for all of us to learn new and innovative ways to curate and manage herbaria, interact with the public, communicate with our colleagues, and teach our students. I never thought that, in my lifetime, I'd be teaching a field course entirely online. But it happened. It was early April, and COVID-19 shut down all in-person learning at the University of Colorado, leaving me with three weeks to completely renovate my 2020 "Maymester" course, entitled The Lichen Biome. The task felt impossible, but with the help of Teaching Assistants Carly Anderson Stewart and Justin Williams, we frantically traversed and camped through Colorado's wonderfully varied ecosystems, shooting 100+ educational videos and "virtual hikes" along the way. Our resulting YouTube Channel (https://www.youtube.com/watch?v=aKLtkvjVa3A) seems to have been well-received by our students—who knew! Videos are no substitute for time spent in the field or herbarium, but time will nonetheless determine how effective are the teaching tactics we scramble to invent in light of COVID-19.

So, too, is COVID-19 impacting the work we do and time we spend as curators, collections managers, data scientists, visiting researchers, and a cadre of absolutely amazing, dedicated student workers. Undergraduate herbarium technicians at COLO now georeference from home or work on other post-image processing remotely. Although gifts and loans have come to a temporary halt, our nation's collections managers—some of the most talented botanists in the world—now find themselves with expanded field time, exploring new ranges, botanizing new grasslands, documenting new arrivals into urban ecosystems, in ways that prior summertime office responsibilities may have in part stymied. The numerous data scientists who spearhead digitization efforts around the globe deserve enormous credit for helping us completely renovate our workflows and rewire our sometimes overly traditional museum brains. These individuals breathe new life daily into our now-online (hopefully soon-to-be back in-person) herbarium routines, constantly challenging the status quo. All of these actions serve to foster a new generation of herbarium junkies—botanists and students with a default passion for plants, but with new perspectives on the utility and role of herbaria in the 21st Century. These are the individuals who will introduce groundbreaking advances that we can't fully wrap our heads around yet, much in the way collectors in the 1860s never knew their specimens might get used to reconstruct the industrial revolution.

COVID-19 has yielded a number of unexpected opportunities to the botanical community at large. I write during the *Botany 2020 — Virtual!* conference, where meeting attendance is up in general, but one of the hallmarks is much broader international par-

ticipation made possible by our virtual presence. How cool is that!? This alone promotes new interactions among participants from all over the world. Moving into 2020–2021, diversity initiatives will be a major priority for SHC. The world has spoken, from the #MeToo movement to #BlackLivesMatter: will we not tolerate marginalization of any of our Society members. As a Society, we pledge long-term action toward combating discrimination, maltreatment, oppression, and violence against the many groups worldwide who have been targeted by repugnant acts of injustice and inequality. I welcome ideas and feedback from all SHC members—past, present, or future, student to retiree—regarding ways in which we can use these strange times to our advantage, in particular, to diversify and to include. I especially welcome ideas regarding how we can effectively create and disseminate a culture and an environment at SHC that promotes social justice for all, through the lens of what we do as a Society. Email me with your thoughts! 2020–2021 must be THE year of change!

The 2020–2021 year will be busy on other fronts. Some of our major activities in the SHC will include acquiring an insurance policy for the Society, developing a multi-societal and potentially international task force aimed at establishing procedures for how to handle derogatory language on herbarium labels, beginning the process of constructing a guide to best practices in herbarium curation and management, and finally, continuing to build a nascent endowment. My sincere gratitude goes to SHC Past Presidents Patrick Sweeney and Austin Mast for initiating the establishment of SHC's first endowment, in particular! It remains diminutive compared to long-established complements of other societies, but check back regularly, consider a donation, and watch it grow! The Society of Herbarium Curators welcomes donations to our new endowment of any sort, small or large. Thank you for your generosity! Huge credit also goes to former SHC Program Director Austin Mast for agreeing to continue to develop and run the *Strategic Planning for Herbaria* course for 2021. In the coming weeks, I will be soliciting member participation on several vacant committees. If you are interested in one of these (specifically: Membership, Grants, and Herbarium Assistance Committees) or know of a colleague who might be particularly fitting, please send an email.

I would like to close by acknowledging the incredible efforts of the prior years' Executive Board, Committee Members, and Members-at-Large. What has surprised me most about stepping into this position (other than learning the importance of keeping a timeline!) is just how much has been accomplished by these previous volunteer efforts. In particular, I'd like to thank Patrick Sweeney for his tireless efforts and leadership. During the prior two years, Patrick led advocacy efforts for imperiled herbaria such as that of the University of Alaska Museum of the North (ALA). He initiated an ad hoc committee and helped finalize SHC's first Investment Policy. Patrick additionally organized and co-hosted the *Botany 2020 — Virtual!* symposium entitled Biodiversity Research Collecting is More Important Than Ever. In addition to extensive work soliciting donations for our Society, he worked to draft a solidarity statement in support of the Black Lives Matter movement and the Black community. Last but not least, Patrick was instrumental in the establishment of the Society of Herbarium Curator's first endowment.

I have very much enjoyed meeting so many new faces at *Botany 2020 — Virtual!*, even if virtually, and many others through email exchanges and virtual mixers. Thanks to the entire SHC community for welcoming me to your botanical family! I hope to work hard and advocate for all—this and next year—and welcome your thoughts, opinions, criticisms, and feedback along the way!

Erin A. Tripp
Museum of Natural History, Curator of Botany
University of Colorado—Boulder

From the Editor

We find ourselves in a very different world than the one that we experienced last year when the summer edition of The Vasculum arrived in our inboxes. Although the challenges have been many, humanity collectively has been finding innovative ways to foster connection and community even during these times of social distancing. For example, SHC held a truly dynamic webinar last month at *Botany 2020 — Virtual!* Be sure to check out some photos from that webinar/workshop in this issue, along with photos from our annual members meeting during which the traditional passing of the presidential vasculum marked the end of Patrick Sweeney's term as SHC President and the beginning of Erin Tripp's.

In this issue are articles that speak to resilience and renewal. Andrea Weeks writes about the transfer of the Lord Fairfax Community College Herbarium (LFCC) to the Ted R. Bradley Herbarium (GMUF) at George Mason University, where efforts are underway to give new life to the previously imperiled collection. Weeks offers the story of LFCC as a case-example of how collaborations great and small can be crucial for sustaining regional herbaria. Our featured Herbarium is the University of Tennessee, Knoxville Herbarium (TENN), which has grown to become the third largest herbarium in the southeastern United States despite a history that includes loss of the entire herbarium to fire in 1934. Margaret Oliver and Jessica Budke share the story of how TENN continues to thrive, and all of us can take inspiration from the creative ways the herbarium is securing its future by leveraging social media and broadening community engagement. In another article, we learn about a bequest to the University of California, Riverside Herbarium (UCR)—a gift that will help preserve the future of that collection.

Also in this issue, we begin our second year of Early Career Advice, a series of interviews with experienced curators that seeks to provide insight and advice to early career members. Our interview this time is with Richard Olmstead, Herbarium Curator of the Burke Museum (WTU) at University of Washington (Seattle, Washington, USA). We also get a look inside the Leo A. Galloway Herbarium (MWSJ) at Missouri Western State University in Saint Joseph, Missouri, USA. Our third installment of SHC Worldwide gives us the opportunity to talk with Radnaakhand Tungalag, Curator of the Herbarium of the National University of Mongolia (UBU), Ulaanbaatar, Mongolia. Finally, we hear from Maribeth Latvis and Mark Freeland about an initiative to organize a data sovereignty workshop with Indigenous communities in South Dakota, USA.

With this issue, Abigail Moore and I welcome Harlan Svoboda to the Editorial Committee as an Associate Editor. We have an excellent team! As always, we invite your article ideas and contributions. Now, get comfortable and enjoy this issue of The Vasculum. This is your newsletter. We look forward to your submissions.

Melanie A. Link-Perez
Ronald L. Jones Herbarium, Curator
Eastern Kentucky University

Letter from the Past President

I would like to begin my message by welcoming our new President, Erin Tripp. Erin is an Associate Professor at the University of Colorado and Curator of the University of Colorado Museum Herbarium (COLO). I am confident that Erin will do a great job in her new role as the tenth (!) President of SHC. In this column, I will report on the last half of my final term as President, reporting on Society activities over the past six months.

The Society has been busy over the past six months. During April we held our annual election, electing three new officers to our Executive Board. I would like to welcome our new Treasurer, Maribeth Latvis (South Dakota State University, SDC), and two new Members-at-Large, Alina Freire-Fierro (Universidad Técnica de Cotopaxi, UTCEC) and George Yatskievych (University of Texas at Austin, TEX). Congratulations to the new members of the Executive Board! Thanks to the thirty percent of eligible voters who participated in this year's election and to the Nominating Committee for their work developing a slate of candidates. The new Board members began their terms at the end of the SHC Member Meeting at the *Botany 2020 - Virtual!* conference. The Society also voted on amendments to the Bylaws that were related to establishing a new Investment Committee. The proposed amendments passed (112 Approve, 0 Reject, 9 Abstain). Finally, a huge thanks to Secretary Diana Jolles for running the election.

During April and May of 2020 the popular *Strategic Planning for Herbaria* course was offered for the fourth year in a row. There were 34 applicants from 15 countries for 15 slots. I thank Austin Mast and David Jennings (iDigBio and GBIF) for co-teaching this course. We again organized and ran a symposium associated with the Botany annual meeting, which due to COVID-19 pandemic was held virtually. This year's symposium was organized by Austin and me and was entitled *Biodiversity Research Collecting Is More Important Than Ever — Ushering in a Collecting Renaissance*. We had a line-up of eight speakers representing a diversity of organizational settings and career stages. The talks addressed four themes: smart collecting, new goals for collecting, new collecting tools, and new species discovery. At times, over 150 individuals were tuning into the symposium. Many thanks to iDigBio for co-sponsoring this event by covering the registration costs of the invited speakers.

Our student award competition was very popular again this year. Thirty-three proposals were received, including 28 from Ph.D. or M.S. students and five from undergraduates. The three award winners were Nick Koenig (undergraduate, Eastern Kentucky University), Breann Whitley (M.S. student, Southern Illinois University), and Michelle Gaynor (Ph.D. student, University of Florida). I thank the Student Award Committee for running this year's competition and the 32 SHC members who took the time to provide reviews on the submissions.

Two issues of the Vasculum were published this year. Beginning with the January 2020 issue, we have a new Editor, Melanie Link-Perez, who has smoothly transitioned into her new role. I thank Melanie and the rest of the Editorial Board for all the work they have done.

I am happy to report that the Society membership numbers are holding steady. As of June 29, 2020 there were 427 members; we had 433 members at this time last year. I thank Erica Krimmel and the rest of the Membership Committee for their efforts in keeping our membership numbers up.

There are a few other initiatives and activities that warrant a brief mention. Members of the Early Career Section (Katelin Pearson, Christopher Tyrrell, Abigail Moore, Charles Zimmerman) continued their work on providing enhancements to the website by curating a jobs page and by aggregating resources for early career professionals.

An ad-hoc Investment Committee completed their work on establishing an endowment, and the stage is now set to launch the Society's endowment. And, the Executive Board approved the 2021 fiscal year's budget in advance. Thank you to Treasurer Mare Nazaire for preparing the budget.

I would like to conclude by expressing what a pleasure it has been to serve as President of the Society. It has been great to work with the Executive Board, committees, and members of standing and to be a part of the organization during a time of growth and energy.

Thanks for your support.

Patrick Sweeney
Yale University Herbarium, Senior Curator
Peabody Museum of Natural History

News from the Society

New Officers – Early Career Section

The SHC Early Career Section has completed its 2020 election. The polls were open from July 7 through July 19, 2020, and voter turnout was 25%. Thanks to all who voted! The new officers for the Early Career Section are:

Professional Development Officer—Nikisha Patel
Secretary—Tilottama Roy
Member at Large—Christina Varnava

A Brief Report on the SHC Endowment

Over the last two years The Society has been laying a foundation for establishing an endowment. With the recent approval by The Society of amendments to the Bylaws that established an Investment Committee, the last enabling piece was put into place. An endowment will provide SHC with a financial bedrock and will provide an opportunity to expand our activities in support of student awards, education, outreach, herbarium assistance, diversity and inclusivity initiatives, and other mission-related activities. Building the endowment will take time, and our efforts are now transitioning into a fundraising phase. If you are interested in making a contribution to The Society of Herbarium Curators in support of the future of herbaria, please contact the Treasurer (Maribeth Latvis, maribeth.latvis@sdstate.edu).

Fig. 1. Andy Sanders, Curator of the University of California, Riverside Herbarium (UCR). Photo: Amy Litt.

UCR Herbarium receives donation from founder

The University of California, Riverside Herbarium (UCR; Fig. 1) has received a $900,000 donation from its founder, Frank Vasek, and his wife, Maxine. The bequest will provide UCR with the funds for needed repairs, updates, and a greater impact on the campus and throughout California.

Upon coming to the newly-established U.C., Riverside in 1954, Vasek immediately set out to create from scratch a herbarium to use for research and teaching purposes. From a modest beginning relying mostly on donations of field collections from his students' coursework, UCR now boasts more than 273,000 specimens mostly from the state and throughout the Western Hemisphere. That number continues to grow thanks to the dedication of the current herbarium staff and, now, through the Vaseks' donation and legacy, the preservation and expansion of this priceless resource has a brighter future for many generations to come.

Harlan T. Svoboda
U.S. National Arboretum, Curator

A New Life for Lord Fairfax Community College Herbarium (LFCC)

In 2019, George Mason University acquired the herbarium of Lord Fairfax Community College (LFCC), which comprises approximately 20,000 specimens of mostly vascular plants from the Blue Ridge physiographic province of northwest Virginia, U.S.A. Since its transfer, undergraduate student research assistants, visiting scientists, and I have been restoring LFCC in preparation for filing its specimens alongside those of our university's herbarium that I direct, GMUF (Fig. 1). The objectives of this article are to share the history of the collection, the planning that led to its transfer, the efforts now giving new life to its specimens, and what we have learned about the scientific significance of LFCC thus far. A common thread in these recent endeavors is the participation of curators who were first linked by SERNEC, the SouthEast [US] Regional Network of Expertise and Collections, a research coordination network that was established in 2005. In retrospect, salvaging the entirety of LFCC may not have come to pass, or at least not as smoothly, without this previous community-building. Consequently, another goal for this article is to demonstrate, using LFCC as a case-example, the importance of professional networks and diverse stakeholders in sustaining regional herbaria.

History of LFCC

In 2018, Professor Robert Simpson, the founding curator of LFCC and professor of botany at Lord Fairfax Community College in Middletown, Virginia, U.S.A. retired after more than 40 years as a faculty member. Professor Simpson studied under Dr. W. Herb Wagner at the University of Michigan and worked for several years in Canada as a field botanist developing his expertise in fern systematics. When hired by Lord Fairfax Community College in 1974, he founded LFCC with several hundred herbarium specimens from his prior fieldwork and established an accessioning protocol that would eventually yield approximately 20,000 specimens and 18 hand-written volumes of metadata about the collection.

Over the course of his career, Professor Simpson expanded LFCC through personal collection in the United States and abroad, student projects he directed, and collaborations with other regional botanists. LFCC accessioned the vast majority of its specimens during years that coincided with the Atlas of the Virginia Flora (AVF) project. The AVF was a collaborative effort among state botanists to collect and document county-level occurrences of all vascular plants in Virginia (Harvill et al. 1977, 1981, 1986, 1992). As a consequence of the AVF, tens of thousands of herbarium specimens were collected state-wide during this period of time. The publications of the AVF spawned the ongoing *Digital Atlas of the Virginia Flora* (Virginia Botanical Associates 2020) and ultimately created the foundation of knowledge that made the *Flora of Virginia* (Weakley et al. 2012) possible. As a participant of the AVF, Professor Simpson focused his collection activities on the vascular plant flora of the seven-county region of northwest Virginia in the Northern Blue Ridge physiographic province, including Clarke, Fauquier, Frederick, Page, Rappahannock, Shenandoah, and Warren counties (R. Simpson, pers. comm.). Consequently, LFCC deeply documents this region, which has undergone extensive land-use change in the last five decades.

Transfer to George Mason University

In the year prior to his retirement, Professor Simpson inquired about possible destinations for LFCC and approached GMUF. Lord Fairfax Community College did not intend to hire a replacement curator and expressed its intent to use the room occupied by the specimen cabinets for other purposes. My first interaction with Professor Simpson was during the planning stages of SERNEC's proposal to the U.S. National Science Foundation's Advancing Digitization of Biological Collections program in 2012. I had contacted curators of multiple Virginian herbaria to adopt a collective digitization protocol as part of the grant proposal, and LFCC readily enlisted as a participating herbarium. Once the proposal was funded (NSF 1400186), grant-related tasks kept lines of communication open

among curators as our shared imaging equipment moved among institutions. GMUF was a logical destination for LFCC given its similar focus on the flora of northern Virginia and its active program of accessioning.

After assessing the extent of the collection and its condition, I agreed that GMUF could accept the transfer of LFCC. By Spring 2019, Lord Fairfax Community College provided written documentation of its gift. Shortly thereafter, my graduate students, Elizabeth McMurchie and Betsy Collins, and I packed the collection in 62 cardboard boxes, lined with plastic bags and sealed tightly, and moved them to tables and shelving within GMUF at George Mason University. Several hundred teaching specimens were retained by the college in support of future courses.

Curatorial Care

A grant from Virginia Native Plant Society was instrumental to our ability to quickly develop the salvage and curation workflow for LFCC and move its herbarium cabinets to GMUF. During Summer 2019, Elizabeth McMurchie was hired on the grant to cycle the specimen boxes through the -80° C freezer for decontamination and to modify our digitization protocol to process the specimens efficiently given their varied condition. In its original state, the LFCC collection did not have consistent taxonomic organization and its nomenclature, for the most part, had not been updated. About 60% of the specimens require minor or major repair. Consequently, specimens are now triaged during unpacking to accommodate needed repairs and the digitization protocol is divided into sequential steps that physically separate specimens for skeletal databasing and barcoding, taxonomic evaluation and nomenclatural annotation, imaging, taxonomic organization, and filing into the research cabinets (Fig. 2). Given its historical significance, the LFCC collection retains its identity as a separate collection at George Mason University, although its specimens are filed in cabinets with those of GMUF. Its digital data are managed in a Symbiota database separate from that of GMUF on the SERNEC portal (www.sernecportal.org).

Analysis and Discovery

To date, approximately 25% of LFCC has been processed, which has yielded preliminary data about the collection. As expected, the majority of specimens derive from Virginia (76%) but there is surprising geographic breadth, including collections from four other countries and 19 other U.S. states. Specimens from the Bruce Peninsula of

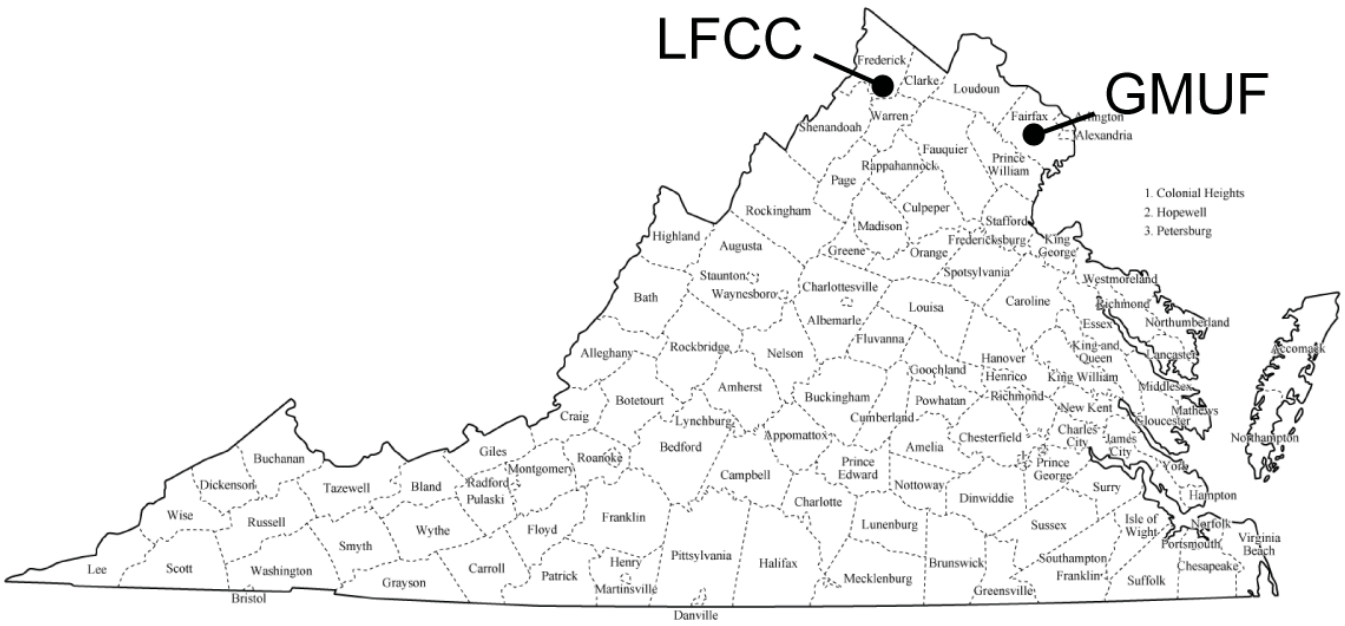

Fig 1. Original location of LFCC and its new location at GMUF in Virginia, U.S.A.

Fig. 2. Undergraduate student Rahima Adnan processing LFCC specimens at George Mason University; note boxed specimens and accession notebooks in the background. Photo credit: Andrea Weeks.

Ontario, Canada are particularly common among the international collections. Also as expected, the majority of the Virginian specimens derive from northwestern counties (Clarke, 10%; Fauquier, 4%; Frederick, 25%; Page, 8%; Rappahannock, 3%; Shenandoah, 24%; Warren 10%) but 40 of the other 133 Virginian counties and independent cities are sampled as well. Based on the diversity of the initial ca. 5000 specimens processed (1,073 spp., 122 families), we expect that LFCC will encompass ca. 3000–4000 species once all specimens are unpacked from their storage boxes and assessed.

We have discovered important additions to our knowledge of the Virginia flora in LFCC. Ten new county records have been determined to date and have been added to the *Digital Atlas of the Virginia Flora* (Virginia Botanical Associates 2020). Specimens for 32 other suspected state and county records are currently on loan for verification. Two visiting scientists, Dr. W. Carl Taylor and Dr. Judith Skog, contributed many hours processing and verifying the extensive fern collection of LFCC, which we have learned is rich in hybrids of *Dryopteris* Adans. The most surprising confirmed discovery is a new state record for Narrow-leaved Gentian, *Gentiana linearis* Froel. (Fig. 3). The specimen documents a long-distance disjunction for this predominately northeastern North American species on White Top Mountain in Smyth County, southern Virginia. The accession notebooks indicate that two populations were vouchered, although only one specimen has been found in the collection. This information will be used to relocate the species later this summer.

Future Plans for LFCC

Our experience over the last year has refined our understanding of the opportunities and challenges that adopt-

Fig. 3. A new state record for *Gentiana linearis* Froel. was uncovered in LFCC.

ing LFCC has brought to our institution. We will continue to process the remaining LFCC specimens and make them available to researchers for analysis and discovery, as planned. Depending on sources of support, we will likely be able to finish integrating specimens within two to three years.

We have also found new dimensions to the project in the course of curating this collection. The now well-established workflow for processing LFCC specimens has proven to be an excellent project for engaging undergraduate researchers in the herbarium. We previously offered these learning opportunities through Mason's Office of Student Scholarship, Creative Activities and Research Federal Work-Study Research Assistantship Program, and we will continue to offer a greater number of these positions in the future. Analysis of this university program has demonstrated that it supports proportionately more students who are from groups underrepresented in science than those present in the general student body (Nazaire and Usher 2015). The experience uncovering the *Gentiana linearis* state record highlighted the importance of preserving and sharing LFCC's accession notebooks as a tool for research. The ca. 5000 single-sided, handwritten pages contain information on how specimens were collected and identified and, in some cases, exceed the herbarium labels in their level of detail. Consequently, we will be collaborating with our University Libraries Digital Scholarship Center to create a digital resource of the notebooks that will be cross-linked to the Symbiota database of the LFCC herbarium specimens, following the best practices of the Smithsonian's Field Book Project (Smithsonian Institution Archives 2020). The collaboration is inspired by the emerging concept of the Extended Specimen (Webster 2017), which describes the power of specimen-linked datasets for driving discovery. Lastly, and not surprisingly, the integration of LFCC with GMUF has reduced the capacity of our herbarium to accession new specimens given the constraints of the existing cabinetry. The herbarium has grown from approximately 60,000 to ca. 80,000 sheets with the addition of LFCC and is now the third-largest in the state. In the coming years, we will improve the infrastructure of the herbarium to maintain its active accessioning program.

Acknowledgements
I want to thank the Virginia Native Plant Society for recognizing the value of the collection and their financial support of its transfer and initial restoration. Many individuals have contributed to preserving LFCC, notably Professor Robert Simpson, for clearing the administrative hurdles leading up to its transfer, and Dr. W. Carl Taylor and Dr. Judy Skog, whose taxonomic expertise accelerated its restoration. Undergraduate research assistants Rahima Adnan, Crystal Chaung, and Sheila Gonzalez collected much of the raw digital data and gamely adjusted to online database work in Spring 2020 to continue the project despite the COVID-19 pandemic.

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Andrea Weeks
Ted R. Bradley Herbarium, Director
George Mason University

Sarcoscypha sp. (Sarcoscyphaceae), Marie J. Desonier State Nature Preserve, Ohio (U.S.A.), 2018.
Photo credit: Harlan T. Svoboda.

A closer look at the Leo A. Galloway Herbarium at Missouri Western State University

The Leo A. Galloway Herbarium (MWSJ) is housed in the Department of Biological Sciences at Missouri Western State University in Saint Joseph, Missouri, United States. The herbarium serves as an archive for studying plant biodiversity within northwestern Missouri. It has over 3000 plant specimens and forms an integral part of teaching and research, providing vital teaching resources, as well as housing research-quality specimens for use at Missouri Western and in the broader scientific community. The plant collection is maintained in herbarium cabinets located in Agenstein Hall in the Department of Biological Sciences. This herbarium was established in 1972 by Dr. Leo A. Galloway, who was a faculty member in the biology department from 1971-1979. Former biology faculty member Dr. John Rushin was also a major contributor towards the herbarium. Dr. Galloway was a plant taxonomist and mainly worked on the genus *Abronia* Juss., belonging to the family Nyctaginaceae, and the majority of the specimens in the herbarium were collected by him. Plants in the collection are primarily from the midwestern United States, particularly from northwestern Missouri. Among the plants are an important collection of holotype specimens of the genus *Abronia*, collected by Dr. Galloway himself. This herbarium has additional plant specimens contributed by students through the variety of courses that are taught as a part of the biology curriculum. In addition to plant specimens, the herbarium has a collection of Steyermark's *Flora of Missouri*, as well as Dr. Galloway's original field collection journals, to assist in plant identification and research. Dissecting scopes are accessible to students and researchers to study specimens.

Current work is being carried on by biology faculty Dr. Tilottama Roy and her undergraduate research student Esther Par (Figs. 1-3) on cataloging, databasing, and updating the taxonomy of the specimens. Future plans include collaborative initiatives towards digitization of the specimens, as well as

Fig. 1. Missouri Western State University biology major and undergraduate researcher Esther Par, working on cataloging herbarium specimens at the Leo A. Galloway Herbarium.
Photo credit: Tilottama Roy.

Fig. 2. Entrance to the Leo A. Galloway Herbarium, housed within the Department of Biological Sciences, located in Agenstein building at Missouri Western State University. Photo credit: Tilottama Roy.

creating a link on Missouri Western's website, through which the entire collection will be virtually accessible to students, researchers, and the broader community.

Acknowledgements
The author would like to thank everyone in the Department of Biological Sciences at Missouri Western, particularly Dr. Mark Mills, Dr. Todd Eckdahl, Dr. Csengele Barta and Dr. John Rushin for their helpful comments.

Tilottama Roy
Leo A. Galloway Herbarium, Curator
Missouri Western State University

Fig. 3. Cabinets inside the Leo A. Galloway Herbarium at Missouri Western State University. Photo credit: Tilottama Roy.

Early Career Advice

Richard G. Olmstead (Fig. 1) is the Herbarium Curator of the Burke Museum (WTU) and a Professor of Biology at University of Washington (Seattle, Washington, U.S.A.).

The Vasculum: What challenges do you see early career curators and collections managers facing today or in the near future that were uncommon in your own early career, and how do you think these challenges can be met successfully?

Dick: I think one of the biggest challenges to curating or managing an herbarium today that did not exist 25-30 years ago is the emphasis on digitization of collections and providing digital access to those collections. When I began working in, and later directing, an herbarium, the work was all about direct access to specimens, either through visiting the herbarium or requesting loans. Of course, this is still a central role for an herbarium, but digital access is now the majority of specimen access in most active herbaria. And by this, I don't simply mean providing the same professional botanists remote access to collections through digital databases, but it also includes finding creative ways to provide meaningful access to a much broader array of end-users including, but not limited to, professional botanists. So, adding informatics expertise to traditional taxonomic and specimen curation and management expertise makes the job so much more challenging today.

The Vasculum: What made you first interested in herbaria?

Dick: Oh, my goodness! I had to make a plant collection for my plant systematics class in spring, 1971. We were encouraged to use both the regional flora (*Gray's Manual of Botany*) and the College's herbarium to determine and confirm specimen identifications. If our specimens were deemed good enough, they were integrated into the herbarium. My mother was a librarian, so I had always been enchanted by narrow corridors and ceiling-high shelves of books; the herbarium seemed like a budding botanist's library! I spent my last undergraduate year at U.C. Berkeley, where Lincoln Constance hired me to work in UC pulling loans and filing specimens. I also did an independent study project with him on a group of plants in which a disjunct distribution had been interpreted as one or two species. I was fascinated to see subtle differences emerge from measurements on lots of specimens. It was a number of years before I returned to grad school, where combining fieldwork with study of herbarium specimens gave herbaria yet more significance. When I eventually had the opportunity to direct a herbarium as a faculty curator, I had lots of ideas about how I could bring this experience to a broader community.

The Vasculum: What are the important ways herbarium staff can promote and advocate for their collections?

Dick: Let me say at the outset, I believe that every university herbarium needs a tenure-track faculty director. Advocating for an herbarium within a university can be done much more effectively when it is led by someone who has the level of commitment from the institution that a tenured professorial-rank director has. I worry for the future of any herbarium in which a retiring faculty director is replaced by professional staff; visibility within the institution inevitably will decline. That being said, a professor has lots of pulls on one's time and developing and nurturing all of the connections that a modern herbarium needs today cannot be done by a single person. A herbarium needs someone who can devote time to developing the community outreach that is so important to herbaria today.

Fig. 1. Richard Olmstead in the field in Argentina. Photo credit: Iris Peralta.

When I arrived on the faculty at the University of Washington in 1995, the previous herbarium director of 25 years had done very little to build collections and ran the herbarium as a closed shop. Collections growth was mostly by students collecting for their dissertation research and access was only to others who had credentials and a valid need to use the collections. In a small department, the herbarium occupied a lot of space and employed one full-time staff member funded by the departmental budget. Any expenses also had to be approved by the Chair. At the time the Chair was supportive of the herbarium, but I could see that wouldn't be so with a Chair who did not have the same perspective.

My initial goals as Director were to start building collections again and build a community around the herbarium that had roots in both academics, government agencies (we're a state university, after all), and the community. There are many reasons why continued growth of collections is important, but really all I had to say was "climate change" to justify continued documentation of plant diversity in our region. Initially, my interest in building community was both to have many people contributing to collections growth, but also to have a broad-based coalition of supporters who would cry 'bloody murder' if anyone tried to defund the herbarium or move it off campus (a trend that was ongoing in the 1990s). My first effort at this was to start our Herbarium Foray program, which brings amateur and professional botanists together for a 5-day collecting trip to a different place in the Pacific Northwest every year (Fig. 2). This and other spin-off activities accomplished both of those goals and one very important, unanticipated result: by becoming a part of the herbarium community, many of our volunteers give generously to our annual appeal letter, resulting in the establishment of a herbarium endowment and a Friends fund that helps support the work of the herbarium.

During my tenure as Curator of WTU, I have been fortunate to have an outstanding Collections Manager, David Giblin, who is a master at building the public connections that I wouldn't possibly have time to do. As a result, we have strong connections with the Washington Native Plant Society, with whom we have joint programs, state and federal land management agencies, and a large and growing support community.

The Vasculum: What is the best thing about working in a herbarium?

Dick: I love working with plants and plant specimens. I simply don't have the time to do as much of this as I would

like in my academic life, but having a herbarium to direct requires that I take time to be involved with the specimens. Also, supporting the development of outreach activities, programs, and digital applications has broadened the network of people with whom I come in contact around plants. I enjoy all of these things.

The Vasculum: What types of outreach activities do you do for the general public or students?

Dick: I mentioned the Foray program, now in its 25th year. This has been our centerpiece outreach activity, but there are many more.

- WTU maintains a Plants of Washington image gallery (Fig. 3) to which the public can submit photos that are vetted by herbarium staff before posting. This now has over 70,000 images and is a community effort in every sense of the term.
- We conduct a series of programs for professional and amateur botanists, including a one-day Washington Botany Symposium, our annual Botany Washington weekend with lectures, workshops, and fieldtrips, and a series of classes and workshops on subjects such as grasses, lichens, etc.
- We have developed the smart phone app "Washington Wildflowers" (Fig. 4) with more than 1000 species covered and a similar one for "Idaho Wildflowers," and have produced alpine wildflower guides for Mt. Rainier, North Cascades, and Olympic National Parks (available in visitor centers and regional bookstores).

Fig. 2. The first WTU Herbarium Foray in 1996 to Hart Mountain in southern Oregon. David Giblin (Herbarium Collections Manager at the Burke Museum, WTU) is second from the left in the back row. He was a masters student at the time and along as a participant. Sarah Gage, standing next to David, was Collection Manager at the time. Says Dick, "I like this photo, because it is a scan of a 35 mm slide, which makes it look old!" Photo credit: Richard Olmstead.

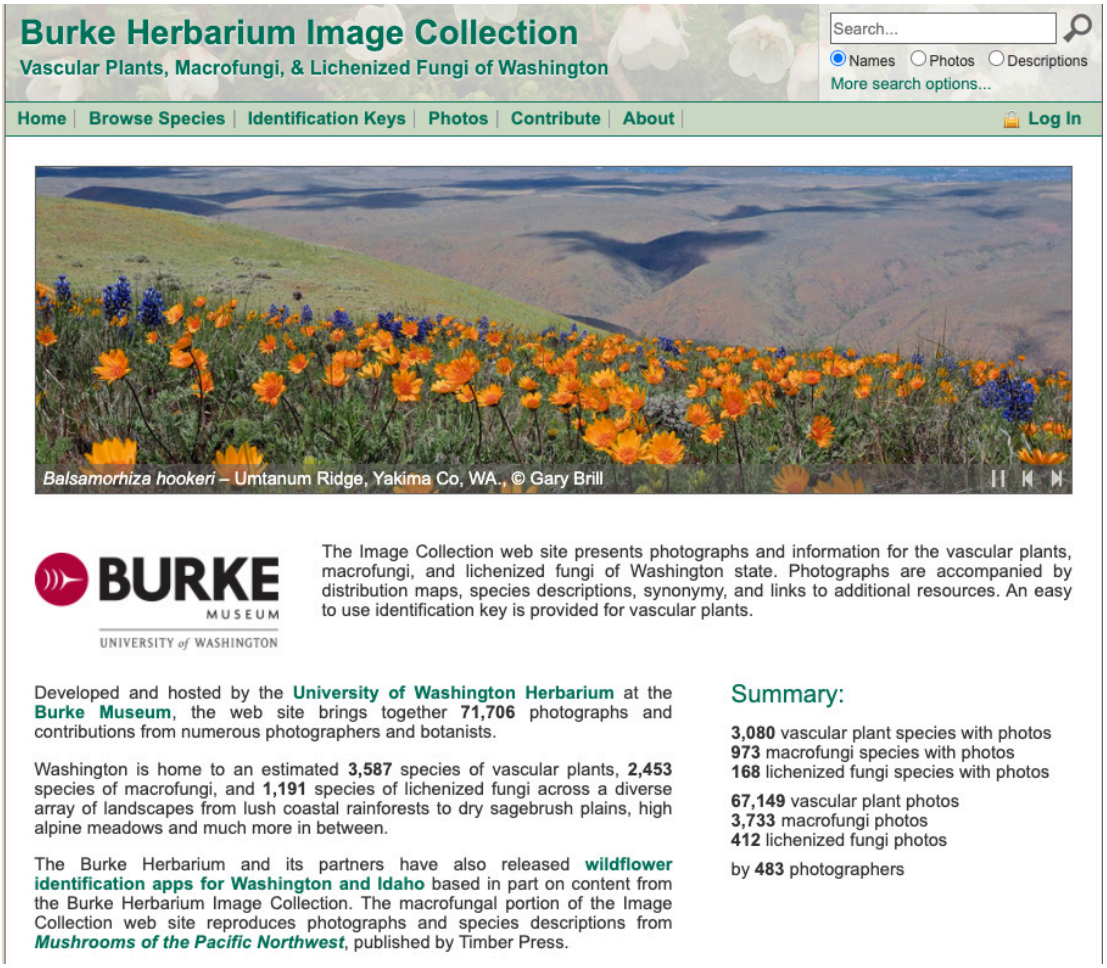

Fig. 3. Screenshot of the WTU image gallery front page. This is one of the most visited pages in the Burke Museum's web presence.

The Vasculum: What was your first herbarium-related job?

Dick: Pulling and filing specimens at UC as an undergraduate. I also worked there for a visiting researcher who needed to have a lot of bibliographic information pulled from *Index Kewensis* and the *Gray Card Index*—two data sources most younger botanists will never have heard of!

The Vasculum: What was the species of your first herbarium collection and where did you collect it?

Dick: I have no recollection of what species it was, but it must have been from the spring flora of upstate New York, where I was a student at the time. I made a set of specimens for a plant systematics class that were deposited in the college's herbarium. They probably have collection numbers under my name, but I didn't keep any records!

The Vasculum: What was the best herbarium/career advice that you received?

Dick: KEEP GOOD RECORDS! Herbaria, like libraries, are all about record-keeping. Whether it is individual plant collection records, or loan records, or visitation records, or etc. Justifying a herbarium's existence in academia is all about documenting its value through use and activity and value to the broader community.

The Vasculum: What is the one most important thing that an herbarium does?

Dick: I'm going to have to give two answers here, because the first is absolutely essential and everything else flows

from it, but, by itself, is insufficient to justify an herbarium's existence:

1. Provide the highest standard of stewardship of the collections consistent with community best practices. Without this, nothing else matters.
2. Provide access to information resident in the collections to as wide a user community as possible through direct and digital access. The specimens are the foundation of any herbarium, but the data they contain are ultimately what make them useful.

The Vasculum: What is the future of herbarium science?

Dick: I think that increasingly the value of herbaria will become tied to the historical record of human impact on the environment, directly through destruction of native flora and introduction of alien flora, and indirectly through the impact of climate change. It is difficult to imagine today the changes that will have occurred by the turn of the next century. Herbaria will be the tangible record of those changes.

The Vasculum: How have herbaria enriched your research?

Dick: As a molecular systematist interested in broad phylogenetic patterns, herbaria have made possible understanding of phylogeny that could not have been accomplished based on personal collecting alone. Herbaria represent the collective effort of an army of collectors!

The Vasculum: Do you have any closing advice for early career members?

Dick: Herbarium curation can be tremendously rewarding on one's career, whether as a faculty member directing one or as a staff member working in one. For someone in a faculty track, make the herbarium be the centerpiece for your "broader impacts" on proposals and for public outreach activities that connect your department/institution with a society that is increasingly divorced from academia. As a collections staff member, always be looking for ways to build partnerships in the broader community, whether through local native plant societies, "Friends-of" organizations, garden clubs, hiking clubs, etc. For anyone with primarily a botanical background working in, and responsible for, an herbarium, learn as much as you can about digital informatics, from databasing to Web access, but don't necessarily feel like you have to do it all yourself. It is often easier to devote your expertise to raising the funds needed to hire an expert to do the computer work! On that last point, the public is hungry for knowledge and often willing to pay for your expertise. Use workshops and other activities that take advantage of that expertise to raise revenue for your herbarium.

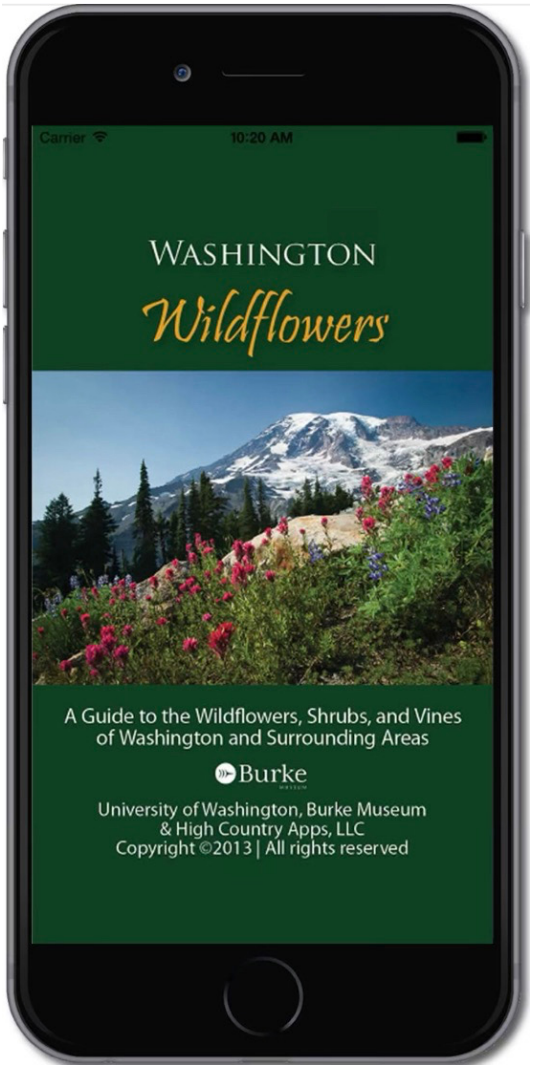

Fig. 4. Opening page of the Washington Wildflowers app.

Early Career Advice is now a regular feature of *The Vasculum*. If you have questions you would like to ask or if there is someone you would like to see interviewed, please contact us (email: melanie.link-perez@eku.edu).

Featured Herbarium

University of Tennessee, Knoxville Herbarium – TENN (U.S.A.)

History

The The University of Tennessee, Knoxville Herbarium (TENN) was established in 1888 when the University hired Frank Lamson-Scribner to lead its new Division of Botany and Horticulture and the Agricultural Experiment Station (Tennessee Flora Committee 2015). He had the foresight and vision to convince German-born medical doctor-turned botanist Augustin Gattinger (Fig. 1) to sell his personal collection of over 4,000 specimens to the University of Tennessee, Knoxville (UTK) for $600 in 1889, which is close to $17,000 today. Gattinger's collections are particularly important since he wrote the first formal flora of Tennessee using these specimens, *The Tennessee Flora with Special Reference to the Flora of Nashville* (Gattinger 1887).

Fig. 1. "It has been my misfortune to spend thirty years of my life with these half-civilized Tennesseans, and up to now I have not seen a single living Tennessee botanist." Augustin Gattinger, photo taken in 1901. Courtesy of the Tennessee Historical Society.

A major tragedy befell the University when the entire herbarium, including Gattinger's specimens and years' worth of research, was lost in January 1934 after a fire broke out in Morrill Hall, the campus building that housed both the TENN Herbarium and Botany Department (Fig. 2). In the following years, the collection was systematically rebuilt by teams of botanists led by A.J. Sharp (Fig. 3), who traversed the state collecting specimens in a repurposed World War II truck, as well as by the generosity of other herbaria that donated their duplicate Tennessee specimens to rebuild the collection (Tennessee Flora Committee 2015).

The TENN Herbarium has had several different physical locations on campus over the years. Immediately after the fire in Morrill Hall, the herbarium was moved to the Hesler Biology Building, named for the mycologist and Dean of UTK's College of Liberal Arts from 1934 to 1958, L.R. Hesler (Petersen 1978). It was then housed in UTK's Hoskins Library from 1997 until 2013 when it was moved to its current home on the main floor of Temple Hall (Fig. 4). Although this is a ten minute walk from the rest of the biology departments, TENN is now located in the heart of campus and has over 6,000 ft² of research space composed of ca. 4,000 ft² of climate controlled collection space and ca. 2,000 ft² of office and workspace for staff, students, and visiting researchers. The herbarium and other members of UTK's Botany Department joined the Department of Ecology and Evolutionary Biology (EEB) in 2005.

Fig. 2. Morrill Hall after the fire, January 1934. Courtesy of the TENN herbarium.

Fig. 3. Botany field crew at 'sunset rocks' on (according to the back inscription) Mount LeConte in the Appalachian Mountains, taken in the 1930's. From left to right -- front row: L.R. Hesler, Mary B. Wilson, Stanley A. Cain (holding dog, Teddy); middle row: Alice Caton, T. Just; back row: unnamed crew member, Mildred Cain, A.J. Sharp. Photo of botany crew from the Aaron J. Sharp Collection MS.3780. University of Tennessee, Knoxville – Special Collections.

Fig. 4. (A) Present location of the TENN Herbarium in Temple Hall. (B) Fire resistant herbarium cabinets in the (C) climate controlled collection space. Photo of Temple Hall courtesy of the University of Tennessee, Knoxville.

Digitization, collections, and curation

We are a member of several online Symbiota portals (Gries et al. 2014), enabling us to share our data with a wide audience online: SouthEast Regional Network of Expertise and Collections for vascular plants (SERNEC; https://sernecportal.org), Consortium of North American Bryophyte Herbaria (https://bryophyteportal.org), Mycology Collections Portal (https://mycoportal.org), Consortium of North American Lichen Herbaria (https://lichenportal.org), and the Macroalgal Herbarium Portal (https://macroalgae.org). A National Science Foundation grant (NSF DBI-0748955) awarded in 2008 helped fully digitize our fungal and lichen collections, which includes images of the specimen labels, georeferenced localities, and transcribed collection data. The University of Tennessee, Chattanooga Herbarium (UCHT) led a large, collaborative digitization project (NSF DBI-1410087) from 2014 to 2019 that included digitizing TENN's North American vascular specimens. Images of these show the whole specimen and label and the records were deposited with skeletal data, which includes the identification and broad locality (country, state/region, county). TENN students and staff are in the process of georeferencing and transcribing the label data for these specimens using the specimen images deposited in SERNEC. These digitization grants, which are supported by government and thus taxpayer funds, have enabled the data from our collections to reach more researchers and further contribute to studies examining taxonomy, biodiversity, conservation, climate changes, and many others. Our bryophyte collection has had all of the North American specimens digitized with images of the specimen packets and skeletal data and is in the process of being fully transcribed.

Through the efforts of numerous botanists, the TENN Herbarium has grown to be the largest herbarium in Tennessee and the third largest in the southeastern United States with approximately 649,000 specimens (Fig. 4). The

majority of our collections have been collected in eastern Tennessee and the southern Appalachian Mountains with additional specimens from other parts of the world, depending on the excursions and interests of various researchers who have worked at UTK over the years. Our vascular collection holds ca. 381,000 specimens and is the largest collection of specimens from Tennessee in the world. It also contains a large number of historical collections from the Great Smoky Mountains National Park, the most biodiverse park in the United States (U.S. National Park Service 2020), and we are working with the National Park Service to designate TENN as an official repository for plant and fungal specimens collected from the park.

Our bryophyte collection houses ca. 183,000 specimens from across the world with particular emphasis on the Pacific Northwest and Alaska in the United States, Mexico, and parts of Asia. In 2017, the TENN Herbarium Director and Bryophyte Curator Jessica Budke worked alongside students to update and reorganize the moss collection from an alphabetical by genus system to alphabetical by family (Goffinet et al. 2009) and created useful reference guides, making it easier for researchers to navigate the collection and use it to learn to identify mosses.

Our fungal collection, primarily composed of Basidiomycotina, contains ca. 74,000 specimens and includes a large collection of clavaroid fungi from China, New Zealand fungi, and numerous type specimens collected during the studies of L.R. Hesler and R.H. Petersen. The lichen collection (ca. 8,000 specimens) includes large collections of specimens from Alaska and Michigan in the United States and parts of Canada.

Fig. 5. The J.K. Underwood Seed Collection. A) Old map cabinet used for storage and B) the original glass vials containing the seeds with cork stoppers and non-archival labels. C) Updated storage in a sealed herbarium cabinet using archival containers and labels. Photos A and B were modified from Miller et al. (2019).

We offer a spring Graduate Research Assistantship (GRA) every year funded by the L.R. Hesler Fund which allows EEB graduate students to gain skills working in the herbarium. Our two most recently curated collections, the J.K. Underwood Seed Collection and a macroalgae teaching collection, were both projects undertaken by GRAs working with undergraduate students and volunteers. These collections had moved around with the herbarium, but had gone uncatalogued—the seed collection was rolling around in glass vials with cork stoppers and non-archival labels in an old map cabinet until 2017 (Fig. 5) and the macroalgae collection had been stored in a cabinet that needed to be taped shut after the handle broke during the move from Hoskins Library to Temple Hall. GRAs worked with undergraduates and volunteers to modernize the curation of these collections—the J.K. Underwood Seed Collection was updated taxonomically, rehoused, and relabeled using archival materials, and the specimens were imaged, which are now available on the TENN Herbarium website (Fig. 5; Miller et al. 2019). After fixing the herbarium cabinet, the macroalgae collection was also reorganized, updated taxonomically, and deposited in the Macroalgal Herbarium Portal. During the curation we discovered specimens from a survey conducted in 1874 by the U.S. Fish Commission in the northeastern United States and a specimen collected by Sylvia Earle in 1964, who, in 1990, became the first woman appointed Chief Scientist of the National Oceanic and Atmospheric Administration (NOAA; Holloway 1992).

Outreach and opportunities

Our herbarium team has grown over the past several years as we emphasize and advertise opportunities for students and volunteers working in our collection. We have four paid undergraduate curatorial technician positions supported by the L.R. Hesler Fund, and because we always have more interested students than we are able to hire, in 2019 we also began to offer semester-long herbarium internships to students for credit. As undergraduates in the paid positions graduate and openings become available we are able to recruit directly from interns who have found a calling working in the herbarium. We've also been lucky enough to have several engaged and enthusiastic volunteers consisting of amateur botanists and emeritus UTK staff and faculty. Two of our volunteers who have been donating their time for over three years have together barcoded and imaged over 18,000 liverwort specimens and transcribed thousands of additional bryophyte specimens.

We take advantage of social media as an additional way to connect with our wider campus community and members of the public online. We have social media accounts on Twitter, Instagram, and Facebook—and as a shameless plug, you can follow us @utkherbarium. The herbarium students rock at Internet memes, and by sharing the load among the staff and students at the herbarium we are able to post content most work days during the fall and spring semesters. We encourage the students to develop their own weekly botanical/fungal series or theme that interests them to post about. Over the past couple of years students have developed #MushroomsAndArtHistory, #HerbalMedicineWednesday, and the botany found in the Nintendo game series *Animal Crossing*. The TENN Collections Manager, Margaret Oliver, also posts #FamilyoftheWeek threads highlighting different plant families in Tennessee, the species in each family you can find in the state, and key characteristics to help everyone learn to identify them.

Our most popular outreach campaign using social media is #HerbMadness, which we put on in the spring to coincide with the National Collegiate Athletic Association Division I college basketball tournaments. Prior to the start of our botanical tournament we take nominations for plant, fungi, and algae genera that people want to see compete and create fact sheets for each of them. The public then gets to vote for their favorites as they go head-to-head in a weekly bracket/competition that starts with 32 genera and ends with a single champion. The first ever champion in 2018 was *Quercus* L., and the fern genus *Azolla* Lam. was 2019's champion, nominated by the Massey Herbarium (VPI). The 2020 competition saw the beautiful flowering genus *Rhododendron* L. come out on top, though *Sphagnum* L. gave it a run for its money.

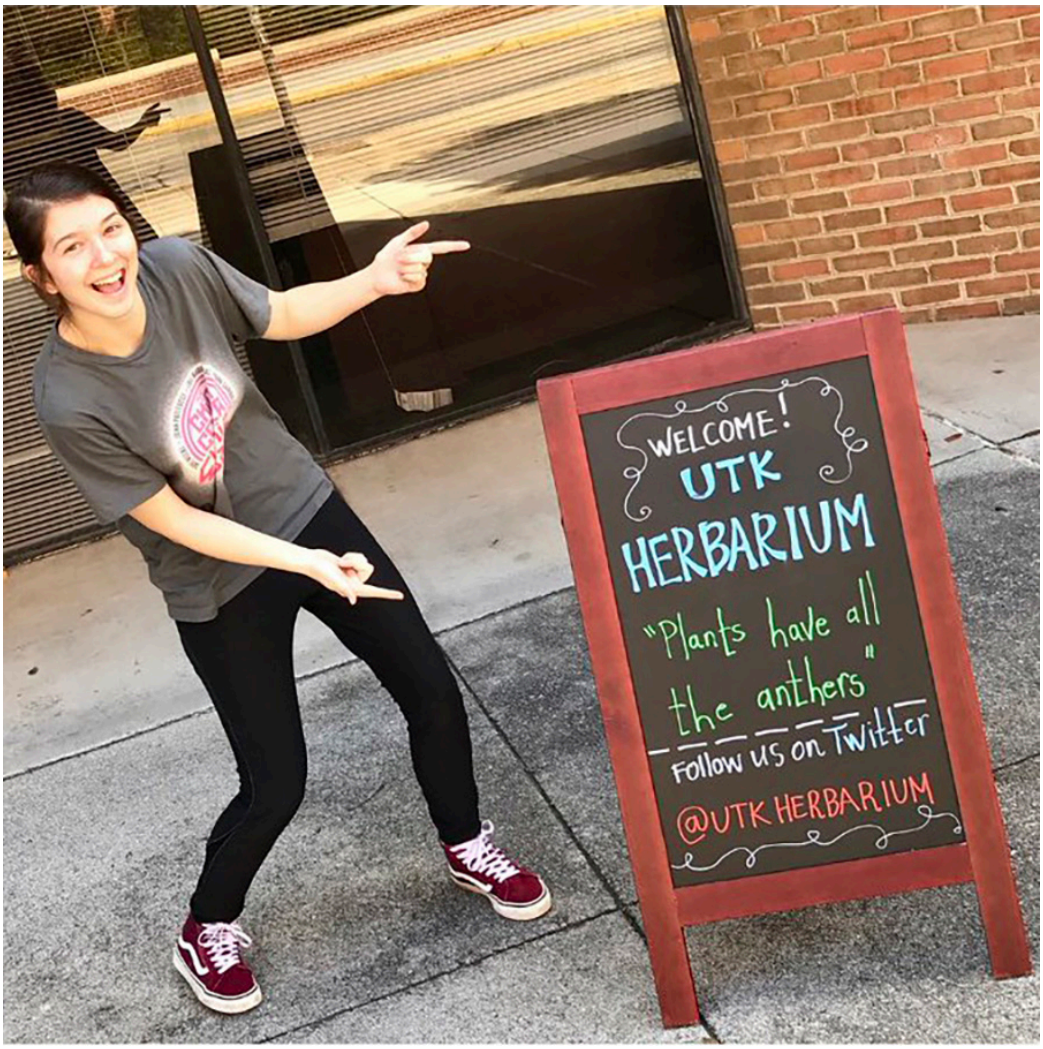

Fig. 6. Undergraduate herbarium curatorial technician Becca Atkins (class of 2019) showing enthusiasm for plant puns on the chalkboard sandwich sign outside of the herbarium in March 2018.

Not only are we interested in engaging with people online, but we think it is critical for members of our campus community to visit the herbarium in person. Temple Hall is about a ten-minute walk from the rest of the EEB Department on campus so many colleagues had not visited since our 2013 move. Thus, in 2018 we began an open house event, *Specimens and Scones*, that we host twice a semester. These events are an opportunity for students, faculty, and anyone from the broader campus community to visit the herbarium for a behind-the-scenes tour of our collections and learn about the research we facilitate while also enjoying a tasty, locally baked treat and a hot beverage in hand-thrown mugs made by our herbarium Director. Fortunately, we are located on the ground floor of the building and our main lobby faces the street that will soon be an extended pedestrian walkway. We use a colorful and ever-changing chalkboard sandwich sign (Fig.6) in front of the entrance to the herbarium to encourage people to walk in off the street and visit the herbarium. Last year we recorded 85 student visitors who had never seen an herbarium before and were drawn in by the sign! Although the pandemic has put a temporary hold on these gatherings and walk-in visitors we look forward to hosting them again when it's safe for in-person gatherings.

The TENN Herbarium is grateful to have a strong history of financial support, enabling us to offer multiple funding opportunities to visiting researchers, students, and faculty. The Breedlove, Dennis Fund Awards for Student Botanical Field Experiences was generously started by Breedlove, Dennis & Associates, Inc. (www.bda-inc.com) and Mike Dennis, an alumnus of the UTK Botany Department. It offers financial support for undergraduate and graduate students to pursue botanically-based fieldwork and accepts applications on a rolling basis (Fig.7). You

Fig. 7. Field work supported by the Breedlove, Dennis Fund. **(A)** Undergraduates Jackson Turner (left) and Rosy Harpe (right, class of 2019) in the Great Smoky Mountains National Park; **(B)** graduate student Alex Aromin collecting moss specimens in New York, United States; **(C)** graduate student Jacob Moutouama (far right) with his EEB faculty advisor Arou Gaoue (center) and a field assistant in Benin; and **(D)** an herbarium excursion to the Hiwassee River, Tennessee, United States with undergraduate students Joanna Huntoon (far right) and Helen Law (the photographer, class of 2019) with volunteer Lynne Davis (center right), Herbarium Director Jessica Budke (center left), and Collections Manager Margaret Oliver (far left).

can learn about previous student projects which have been supported by the Breedlove, Dennis Fund on our website (https://herbarium.utk.edu/Previous%20Breedlove%20Dennis%20Awards.pdf). The L.R. Hesler Fund supports awards to undergraduate and graduate students, EEB faculty, and visiting researchers for herbarium-based research. The Hesler Fund visiting researchers awards are open to graduate students, postdocs, faculty, and independent researchers from anywhere in the world who want to collaborate with an EEB faculty or staff member on a research project using specimens from the TENN Herbarium. Application details are available online (https://herbarium.utk.edu/HeslerVisitingResearcherAward.pdf) and we typically accept applications from the end of November to January.

We will also begin offering a new funding opportunity for students in fall 2020—the Lynne and Bob Davis Herbarium Award was generously started by our two longest herbarium volunteers and will help fund undergraduate research projects focusing on plant taxonomy, natural history, and floristics. We are very excited to be offering this new award in addition to the Breedlove, Dennis and Hesler awards. Anyone who is interested in learning more about these funding opportunities can access all of the requirements and applications through the TENN Herbarium website (https://herbarium.utk.edu/) or by contacting our Collections Manager (molive18@utk.edu).

The expansion of TENN's outreach, student opportunities, and engagement with the community has made us more visible on campus. We regularly interact with students and administrators who have never heard of a herbarium, have no idea what we do (or think we're a botanic garden), or don't know that we exist on the UTK campus. In a world where defunding natural history collections or eliminating them completely has been viewed as a viable solution during financial crises of the past (Dalton 2003, Gropp 2003), it's more important than ever for us to continue advocating for the value of collections as a record of the past and a resource for the future.

Acknowledgements

Thank you to the National Science Foundation for its continued support of natural history collections. Thank you to Alex Aromin, Bob and Lynne Davis, Rosy Harpe, Jacob Moutouama, and Jackson Turner as well as the Tennessee Historical Society and the University of Tennessee, Knoxville–Special Collections for granting us permission to use photos.

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Margaret G. Oliver, Collections Manager
Jessica M. Budke, Herbarium Director
University of Tennessee, Knoxville Herbarium
Email for correspondence: jbudke@utk.edu

Society of Herbarium Curators Worldwide

Welcome to the column where we highlight individual members from across the globe! For this edition, we interviewed **Radnaakhand Tungalag**, Curator of the UBU Herbarium in the Department of Biology at the National University of Mongolia, located in Ulaanbaatar, Mongolia.

SHC Worldwide: How large is your herbarium?

Tungalag: The UBU Herbarium was established at the National University of Mongolia in 1963 for educational and research purposes. It is one of the two officially recognized herbaria in Mongolia and houses more than 14,000 plant specimens.

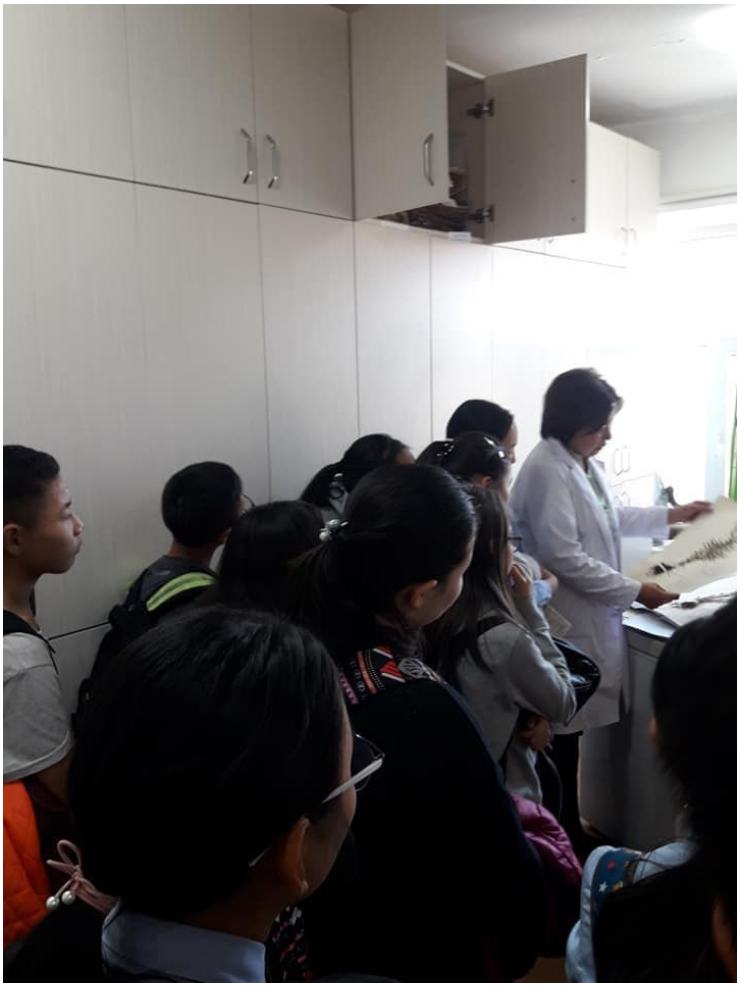
SHC Worldwide: What is your favorite part about working with your herbarium?

Radnaakhand Tungalag, Curator of UBU herbarium

Tungalag: I like to exhibit our collections and explain the importance of herbaria to students and visitors. The most delightful moments for me are showing guests our rare and endemic plants collection.

SHC Worldwide: What are some botanical highlights of your region?

Tungalag: The flora and vegetation of Mongolia are as unique as the country is vast and has a continental climate. There are several high mountain systems—namely Khentii, Khangai, Mongol-Altai and Gobi-Altai—which play important roles in differentiation of vegetation zones, such as mountain taiga, forest,



Above: Radnaakhand Tungalag introducing the UBU Herbarium to visitors from a secondary school in Ulaanbaatar.

steppe, and desert.

SHC Worldwide: What types of research does your herbarium facilitate? What projects, organizations, or individuals are the major sources of specimens in your collection?

Tungalag: Students and teachers of our department are major sources of specimens in our herbarium. They collect plant specimens while doing fieldwork in different areas of the country.

SHC Worldwide: What are the biggest challenges you face in managing your herbarium?

Tungalag: Proper storage rooms with enough space, and equipment required for e-herbaria.

SHC Worldwide: What is your greatest aspiration in your botanical life? What is your dream for your herbarium?

Tungalag: My dream is to obtain all plant species, especially endemics of Mongolia, and to digitize our herbarium. Doing so would give anyone the chance to be acquainted with plant diversity of our country.

Right: *Aquilegia daingolica* Erst & Shaulo, a new species from Mongolia.

If you would like to be interviewed for a future column, please get in touch with us via membership@herbariumcurators.org.

Consultation and Consent: Incorporating Indigenous Methodologies into Best Practices for Natural History Collections

Wokini Challenge Grant FY21, South Dakota State University

Indigenous peoples are stewards of ~4% of the land in the United States, and these land holdings contain more wildlands than national parks or nature conservancy areas (Kimmerer 2002). Within South Dakota, the percentage is much higher, with reservation or trust lands occupying over 12% of land within the boundaries of the state. Tribal communities possess detailed knowledge of the biota of their homelands, and this Traditional Ecological Knowledge (TEK) has been recognized as having equal status with more "standard" scientific knowledge (UNEP 1998) but historically has been marginalized by the scientific community (Salmon 1996). Land management, restoration, and conservation issues will require input from these communities, and federal agencies are required to consult with tribal governments on policies. Thus, there is an important need for guidelines on how to integrate TEK, or natural history information coming from tribal lands, into "best practices" in the scientific community.

The C.A. Taylor Herbarium (SDC, https://www.sdstate.edu/herbarium) at South Dakota State University (SDState) is partnering with the Wokini Initiative (https://www.sdstate.edu/wokini) to organize a data sovereignty workshop with Indigenous communities in South Dakota. There is limited information on culturally sensitive best practices on how TEK is obtained and recorded from Indigenous communities. This project will address this problem by working with Indigenous communities to develop a dialog with natural history collections. To accomplish this, we will assemble members of the Oceti Sakowin who can help to identify best practices for collection, storage, and dissemination for TEK, medicinal plants, and other culturally sensitive material at the Spring 2021 Indigenizing Spaces Research Summit at SDState. We aim to address the following questions:

- Should such cultural information be made publicly available, or should it be restricted to particular stakeholders?
- How often are tribal stakeholders consulted regarding how this information should be handled?
- What pieces of information would be most useful to tribal stakeholders and how should we integrate this into existing digitization platforms?
- Do any formal permitting procedures exist for obtaining biological collections from tribal lands?

We will also provide training opportunities through the C.A. Taylor Herbarium for Indigenous students on herbarium digitization and curation. This research will provide the basis for the dissemination of these best practices and a case study for how other Indigenous and non-Indigenous researchers can go about negotiating similar relationships in other areas of the world. These long-term efforts will fill important biodiversity and cultural gaps in our natural history collections, especially in significantly under-collected wildlands, and make natural history collections more relevant to stakeholders that have been historically left out of the conversation (in terms of data organization, collection practices, etc.). Moving forward, we also hope to establish infrastructure at tribal colleges and

"There is an important need for guidelines on how to integrate Traditional Ecological Knowledge, or natural history information coming from tribal lands, into 'best practices' in the scientific community."

universities in South Dakota for the establishment of their own herbarium collections, further extending the impact of this Wokini Challenge project.

Literature Cited

Kimmerer, R.W. 2002. Weaving Traditional Ecological Knowledge into biological education: A call to action. *Bio Science* 52: 432–438.

Salmon, E. 1996. Decolonizing our voices. *Winds of Change* 11: 70–72.

UNEP (United Nations Environment Programme). 1998. Report of the fourth meeting of the parties to the convention on biodiversity. Nairobi: United Nations Environment Programme UNEP/CBD/COP/4/27.

Maribeth Latvis (Natural Resource Management, SDState)
Mark Freeland (American Indian Studies, SDState)

Cover Image & Credits

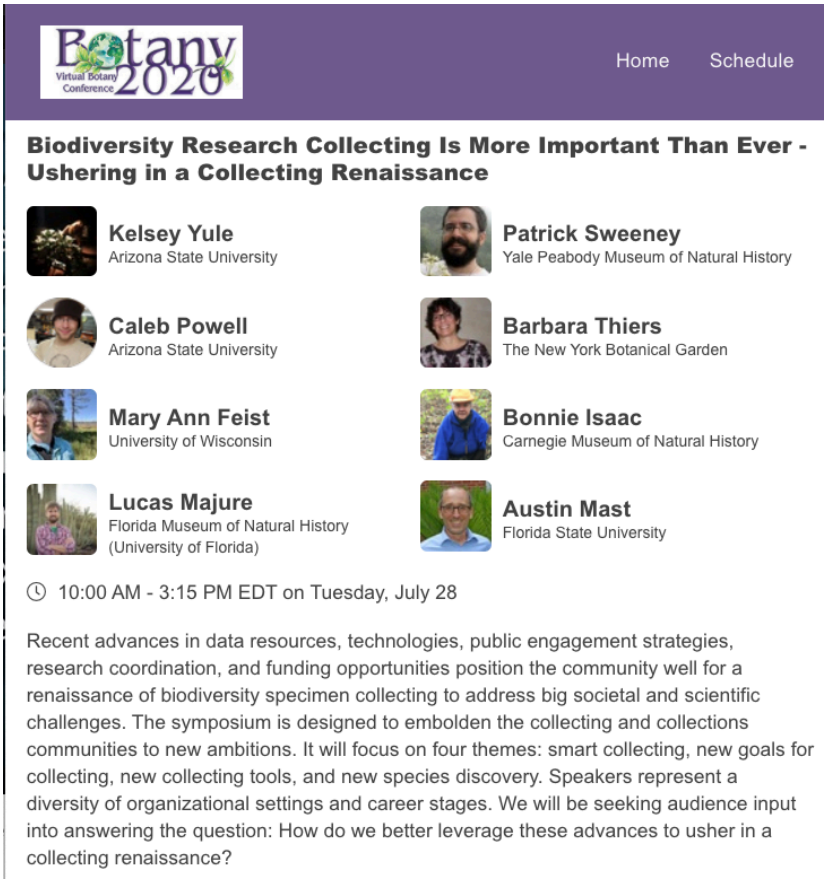
Glimpse inside the Morton Peck (WILLU) collection at the Oregon State University Herbarium (OSC). The building that houses OSC (which includes ORE and WILLU) is undergoing renovations, so the herbarium has been temporarily relocated but expects to return to Cordley Hall on the main campus in two years. Read more here: https://bpp.oregonstate.edu/herbarium. Photo by Sara Sargent, 2018.

The Society of Herbarium Curators at *Botany 2020 — Virtual!*

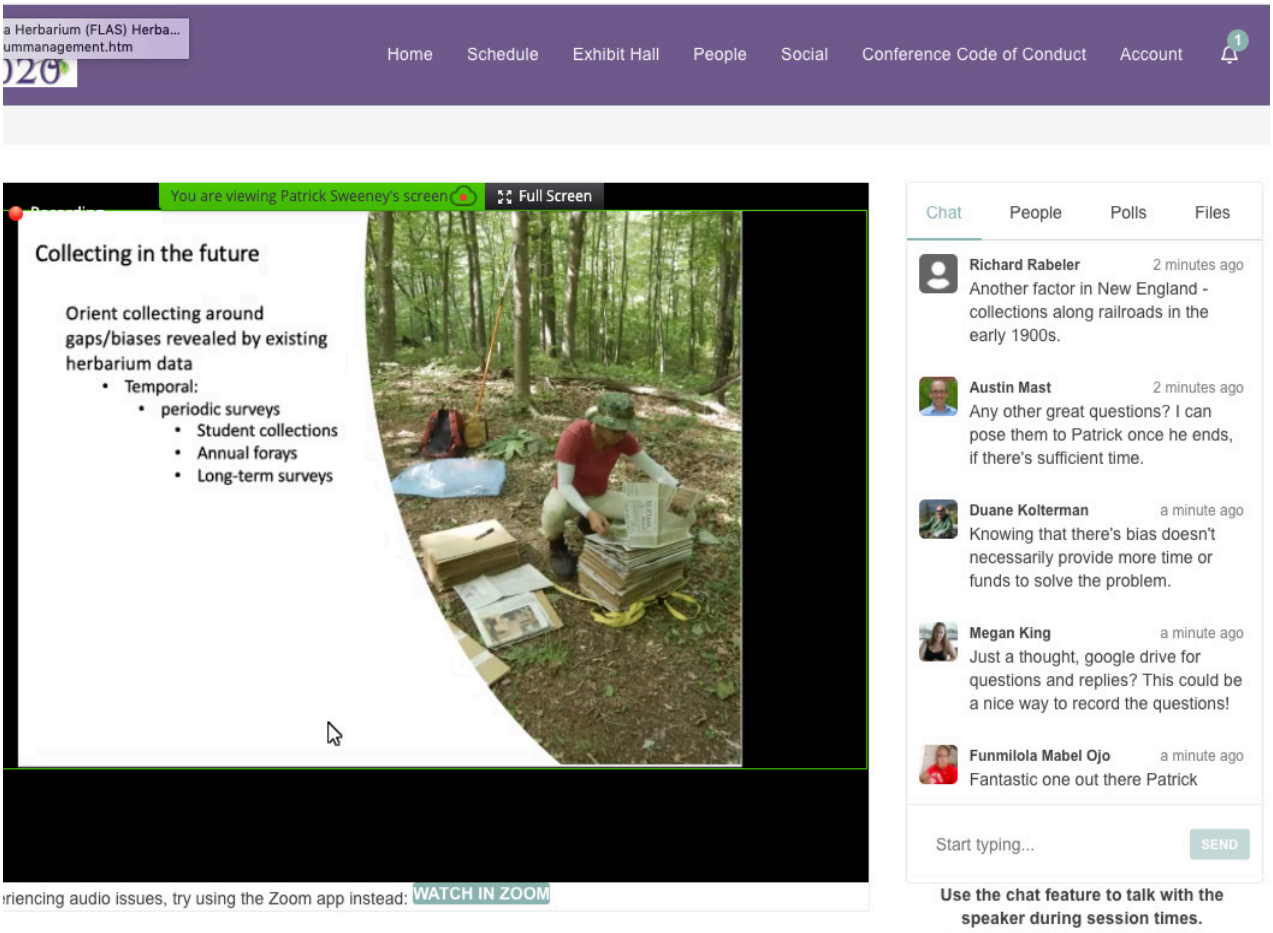
The Society of Herbarium Curators was well-represented and active at *Botany 2020 — Virtual!* in late July. Below, enjoy a few screenshots (in lieu of photographs) to get a sampling of SHC events at the virtual conference.

Above: Members of the SHC Executive Board met on July 27, 2020, using the Zoom platform. Here is our best impression of *The Brady Bunch* or *Hollywood Squares* (old television reference...).

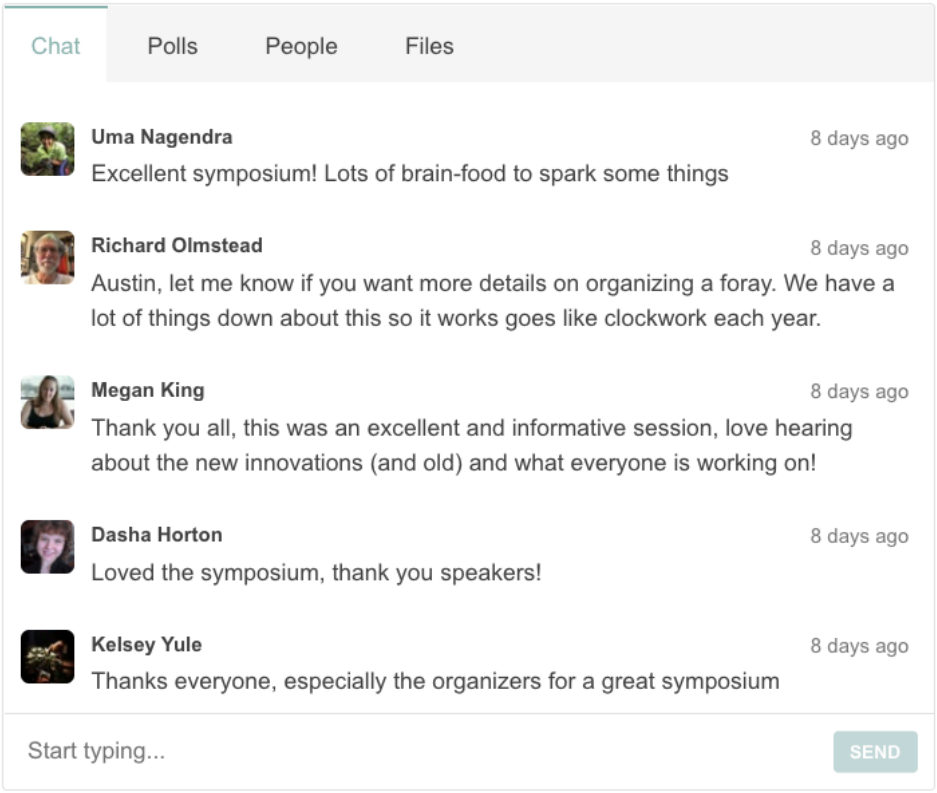
Right: The SHC Symposium *Biodiversity Research Collecting is More Important Than Ever–Ushering in a Collecting Renaissance* offered up a steller line-up of speakers, with presentations happening live (in real time) at the scheduled times on July 28, 2020.



Below: The SHC Symposium followed a webinar format, with attendees able to interact with each other and post questions or comments for the presenter using the live chat window (see right-side panel). Presenters shared their presentation in the panel shown on the left, often with the presenter appearing in a small Zoom window in the upper right of their shared screen.



Use the chat feature to talk with the speaker during session times.



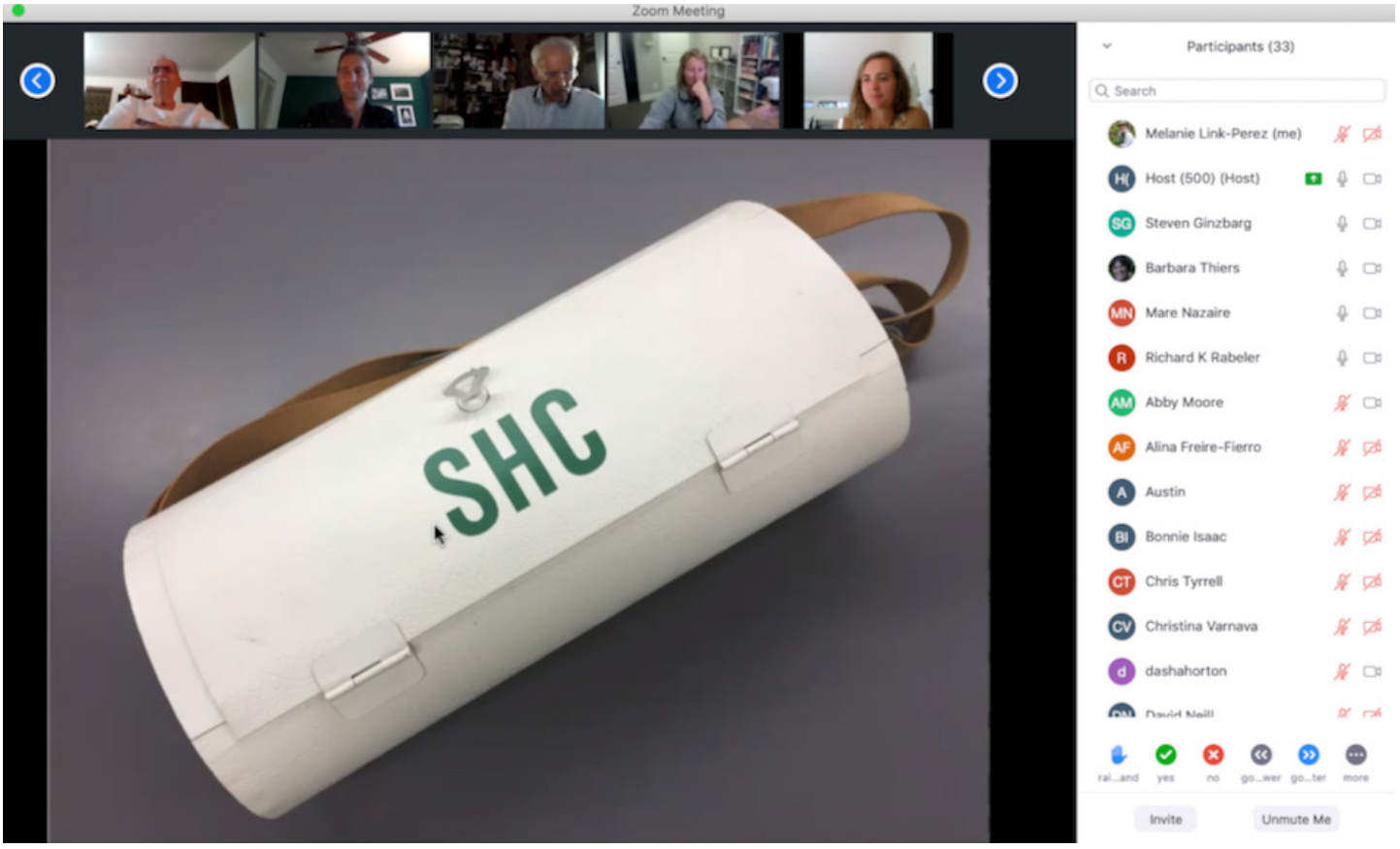
Left: The SHC Symposium was well-received and inspired a flood of positive feedback, like these comments made in the chat window at the conclusion of the session.

Above: As many as 34 people at any given time were participating in the annual SHC members meeting on July 30, 2020.

At the conclusion of the annual SHC members meeting, it was time for the traditional passing of the ceremonial vasculum, to mark the end of one president's term and the beginning of another's.

Pictured to the right, the vasculum passes from Patrick Sweeney (second person from the left at the top of the image)...

...to Erin Tripp (fourth person from left at the top of the image below).



SOCIETY OFFICERS AND EDITORIAL COMMITTEE