

The Vasculum

The Society of Herbarium Curators Newsletter
Volume 17, Number 1: January 2022

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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



COVID-19 ... a global phenomenon in more ways than one?

It has been a relatively quiet fall at SHC, with many among us focusing on office tasks and seeing full-time back-to-school or back-to-work activities in-person again, since the start of the COVID pandemic. Stepping back into the classroom, at least for me, felt strangely triumphant, and I had forgotten the simple satisfaction of a face-to-face meeting! Two years later, we have both mastered online platforms for gathering and learned simultaneously to loathe them. But the fact remains: this virtual existence has yielded a connectedness never-before seen, among friends, colleagues, students, teachers, and botanists all over the world. This will never change.

My long-standing vision for SHC is that of a truly global membership and global engagement, and towards this, Zoom, Teams, etc. have become treasured friends. Already, SHC consists of hundreds of members from 37 different countries. But as a society, we are still in the early phase. We need to continue to work hard, month after month, year after year, to grow and diversify... not only our membership but also our activities, and thereby our reach. We are a member-led organization that, unlike others, depends on, and indeed thrives on, international involvement to fulfill our goals and objectives. What if we were instead 137 countries strong? Over the coming year, I want to make a simple challenge to each of us: do one thing, just one thing, to tell somebody new about the Society of Herbarium Curators. It might be merely a brief mention of SHC, or information about our annual symposium (traditionally held as part of the Botany Conference, although not always), an invite to one of our social events or annual meetings, or perhaps even a gift membership. Perhaps you are well versed with social media, and could meet this simple challenge by contributing some new, relevant information with our ad hoc Social Media Committee (if so, send a message to Jessica Budke, the Chair: jbudke@utk.edu)? In 2022, I ask all of us to think about ways we can expand our reach, and our positive impact.

Recent news! We have a new, incoming Editor for SHC's *The Vasculum* newsletter... Tilottama Roy! Tilo is an Assistant Professor in the Biology Department of Missouri Western State University, and formerly contributed to our society as Secretary of the Early Career Section. This is a huge undertaking, and nobody knows that better than Melanie Link-Perez, who has served in this capacity (Newsletter Editor) since 2019. Melanie has so graciously offered to stay on as an Associate Editor for the time being, until the transition has fully been made. Endless thanks to Tilo and Melanie for their tremendous service!

Other happenings: we will soon have a new "donate" button on our SHC website, thanks to long-serving webmaster Michael Thomas. Looking for other ways to give, financially? Don't forget about our still nascent SHC Endowment. The Executive Board is currently

contemplating potential topics for the 2022 SHC Symposium, so if you have any creative ideas, please do pass those along to me!

Please do not hesitate to write with your suggestions on how we can continue to grow as a society, or things we can do to improve current operations. Sending everyone my best wishes for the 2022 new year. Stay healthy!



Erin A. Tripp
President, Society of Herbarium Curators (2020-2022)

Curator of Botany (COLO Herbarium), Museum of Natural History
Associate Professor, Department of Ecology and Evolutionary Biology
University of Colorado—Boulder



Cover Image & Credits

Bruce G. Baldwin of Jepson Herbarium and the University of California, Berkeley is featured in Early Career Advice for January 2022. In this photo, Bruce is keying plants on the Modoc Plateau, a volcanic table land lying in the northeast corner of California, along with parts of Oregon and Nevada. Read the article in this issue of *The Vasculum*. Photo credit: Susan Fawcett.



The digitization of collections has extended the reach of the world's herbaria, providing increased access to specimen data and images. Similarly, over the past two years in response to the pandemic, we have seen virtual meetings extend our personal and professional networks, allowing us to collaborate and connect with each other in ways previously under-explored. This issue of *The Vasculum* contains plenty of examples of the expanding reach of collections and the networks of the people who care for them.

In News from The Society, you will learn about a new support hub for users of Symbiota-based data portals; the team offers help and tutorials for the broader collections community, too, with resources aimed at a wide range of digitization issues. Seven curators from the state of West Virginia (U.S.A.) recently met virtually to discuss their collections; their article provides a glimpse into herbaria across their state and hints at the powerful collaborations that can develop between curators within a region when they come together—virtually.

Bruce G. Baldwin of University of California, Berkeley (U.S.A.) and the Curator of the Jepson Herbarium (JEPS) provides our Early Career Advice and talks about the value of outreach and being motivated by a love of the plants. Our featured herbarium is the Herbarium (ALA) at the University of Alaska Museum in Fairbanks, Alaska (U.S.A.). Current curator Stefanie Ickert-Bond provides an overview of the collection—the largest collection of Alaskan plants anywhere—and shares information about infrastructure improvements, taxon concepts, specimen-based education (including teaching with collections for online learning), and some fascinating history of notable collectors and curators. In SHC Worldwide, we meet Maura Quezada and learn about the Herbarium (USCG) she curates at University de San Carlos de Guatemala.

This is my last issue of *The Vasculum* as Editor. I have enjoyed nearly five years as part of the Editorial Team, first as Associate Editor and for the past two and a half years as Editor. I'm happy to welcome Tilottama Roy to the team and to pass the reins to her capable and enthusiastic hands while I pursue new opportunities. I'll remain involved in the newsletter through the next issue.

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 future submissions.

Melanie A. Link-Perez
Editor, *The Vasculum*
The University of Tampa

News from The Society

New Symbiota Support Hub formed to support users of Symbiota-based data portals

Over the last decade, the content management software Symbiota has enabled the discovery of over 70 million digital specimen records and 9 million images, and it is used by over 700 natural history collections as their primary specimen database. There are nearly 50 portals that serve data from more than 1,500 collections: [SEINet](#), [SERNEC](#), [CCH2](#), the [Consortium of Midwest Herbaria](#), the [Consortium of North American Bryophytes](#), and the [Consortium of Northeastern Herbaria](#) are only a few examples of such portals that host herbarium specimen data.

In recent years, many portals have been migrated to Arizona State University (ASU) as the server host, and much of the portal management and backend help has come from the pre-existing ASU team. This role is now better supported through the creation of the **Symbiota Support Hub (SSH)**. The Hub is funded as part of [iDigBio's phase 3](#), allowing us to maintain a dedicated team of people to engage and empower the Symbiota user community. The Hub (Fig. 1) is led by Nico Franz (ASU), Ed Gilbert (ASU), and Jenn Yost (California Polytechnic State University, San Luis Obispo), with development and informatics from Dr. Laura Prado (ASU). Katie Pearson (ASU) is serving



Fig. 1. Symbiota Support Hub personnel.

as the All-Portals Data Manager, and Samanta Orellana (ASU) is the International Community Coordinator. More team members will be added in the coming months.

The SSH can be a huge resource to the herbarium community. Anyone who interacts with herbarium specimen data can take advantage of the SSH's HelpDesk support through the new [Discussions board](#) and email address (symbiota@asu.edu). New Symbiota help and tutorials are now available through the new Symbiota Docs site (<https://symbiota.org/docs>), and the Symbiota website (<https://symbiota.org/>). The SSH leads a monthly "Symbiota Support Group" webinar to demo Symbiota tools and answer questions that the community may have (more info here: <https://www.idigbio.org/content/symbiota-support-group>). The SSH team is also available to help with establishing digitization workflows, publishing data to GBIF and iDigBio, and troubleshooting data quality or accessibility issues. The team is dedicated to empowering herbaria and other natural history collections to efficiently manage and mobilize their digital specimen data.

The logo for Symbiota, featuring the word "Symbiota" in a sans-serif font. The "Sym" is in black, and "biota" is in white, set against a green circular background that is partially obscured by the text.

The Society of Herbarium Curators will participate in Botany 2022 in Anchorage, Alaska. See you there!

West Virginia Herbaria: Status, Updates, and Plans

The West Virginia (U.S.A.) Herbarium Curators met on December 1st, 2021 (Fig. 1), with the intent of sharing updates on the collections, fostering collaboration, learning from each other's experiences, and identifying priorities for the collections towards the future. This article presents a summary of the herbaria that were represented in this meeting.

West Virginia University Herbarium (WVA)

The WVA Herbarium is located in the basement of the Life Sciences Building in the main campus of West Virginia University in Morgantown, West Virginia. It is the largest herbarium in the state with approximately 190,000 specimens of vascular plants. Founded around 1889, the WVA Herbarium is a National Resource Collection and the best collection of plants for the state of West Virginia and the Central Appalachia region.

In addition to vascular plants, the Herbarium also houses the Earl L. Core Botanical Slide Collection (over 25,000 color photographic slides), the Elizabeth A. Bartholomew Seed Collection (over 2,000 seed collections), and ca. 30,000 specimens of non-vascular plants (mosses, liverworts, and lichens). The latter are located in a room on the top floor level of the same building at WVU.

The West Virginia University Herbarium was involved in the NSF grant that funded the digitization efforts of Southeastern Herbaria in the United States that resulted in the creation of the Southeast Regional Network of Expertise and Collections (SERNEC) portal, <https://sernecportal.org>. About 95,000 specimens from WVA were digitized as part of this grant and are available in the portal.

All West Virginia label information from the WVA vascular plant collection has been transcribed to an in-situ database and is available upon request, by emailing the curator (dford2@wvu.edu). This dataset served as the



Fig. 1. Meeting of West Virginia Herbarium Curators, online due to COVID-19.



Fig. 2. (A) Marshall University Herbarium, detail of one of the cabinets. (B) Graduate student working at the digitization station. (C) Ongoing organization of the Herbarium library. Photos: Pamela Puppo.

foundation for the Checklist and Atlas of the Vascular Flora of West Virginia published by Harmon et al. in 2006. WVA is a fast-growing herbarium mainly due to collections by the West Virginia Division of Natural Resources (WV DNR), and the West Virginia Native Plant Society.

Marshall University Herbarium (MUHW)

The Marshall Herbarium (MUHW) is located on the third floor of the Science Building in the main campus of the University in Huntington, West Virginia. Founded in 1930 by Frank A. Gilbert, it is the second largest collection in the state of West Virginia with about 42,000 vascular plants (Fig. 2). MUHW also has small collections of mosses, lichens, algae, fungi, fossils, and some ethnobotanical artifacts brought from Ecuador by one of the former curators, Dan Evans (1974–2012).

Almost the entire vascular plant collection was digitized as part of the SERNEC project referenced above and is available at the SERNEC portal (<https://sernecportal.org>). This digitization was conducted by former curator Emily Gillespie (2012–2018), who was one of the Principal Investigators of that grant.

Current efforts in the Herbarium include processing its manuscript collection (see Puppo and Thompson 2021) and organizing the Herbarium library with the help of a student worker, so that it can be a space used by students.

George B. Rossbach Herbarium (WVW)

WVW is located in the Department of Biology, Christopher Hall of Science at West Virginia Wesleyan College in Buckhannon, West Virginia. The Herbarium was founded in 1949 by George Rossbach and is the third largest herbarium in the state, with 25,557 specimens databased, imaged, and online (Fig. 3). From these, ca. 90% are collections from the USA; 36% of the total are from West Virginia. Nearly 65% of all specimens were collected by Rossbach. Other important collectors include M.L. Fernald, Ruth M. Peabody, and W.L. Jepson. The Herbarium also houses Rossbach's childhood herbarium books comprised of about 1,500 specimens.

Almost the entire collection of the George B. Rossbach Herbarium is available online at Wesleyan's Pages in Time (<https://cdm16111.contentdm.oclc.org/digital/collection/p15135coll5>). This digitization effort was funded by a grant awarded by the West Virginia Division of Science in 2011 (see Gregg 2011). The expectation is that the remaining collections will be online in 2022. A floristics study of a site in SE Upshur County is currently underway, and collections will be digitized and uploaded as they are made.

Fairmont State University Herbarium (FWVA)

The Herbarium at Fairmont State University (FWVA) is composed of ca. 5,000 specimens, of which 3,500 are vascular plants and most of the rest are slime molds collected by mycologist and former curator Steve Stephenson (1973–2003). Most of the vascular plant collection is comprised of West Virginia native plants, and since Fairmont is a primarily undergraduate institution, the majority of the new collections come from what students collect as part of their botany classes.

Most of the vascular plants have been digitized and labels have been transcribed. This information is housed in an in-situ database that is available upon request by emailing the curator (Rcook11@fairmontstate.edu). This effort was made possible with the help of student workers.



Fig. 3. (A) Dr. Katharine Gregg at the George B. Rossbach Herbarium. (B) Student worker and Dr. Gregg working at the digitization station. (C) Student worker processing specimens in the work room. Photos: Katharine Gregg.

Davis and Elkins College Herbarium (DEWV)

The DEWV Herbarium is located in the Biology Department of the Davis and Elkins College in Elkins, West Virginia. It houses the West Virginia State collection of Macrofungi which comprises over 10,800 specimens, almost all from West Virginia. The vascular plant collection is composed of 2,000–3,000 specimens and is mostly used for teaching purposes.

The Macrofungi collection is fully digitized and available at the Mycology Collections data Portal (MyCoPortal), <https://mycoportal.org/>.

West Virginia Natural Heritage Program Herbarium (WVHP)

The WVHP Herbarium is located at the West Virginia Division of Natural Resources office in Elkins and is comprised of ca. 3,500 accessioned specimens (Fig. 4). It is a small herbarium with a focus on rare plants and taxonomically challenging groups. Most of these collections come from Natural Heritage Program botanists and ecologists who maintain databases on locations of rare species and habitats in the state. The Herbarium also houses many specimens collected across West Virginia by the late Dr. Eugene Hutton, a local physician and amateur botanist. In addition to accessioned collections, the Herbarium has a large backlog of vascular and non-vascular collections in need of identification or curation.

Information on accessioned plant collections is housed in an in-situ database which is available upon request by emailing the curator (james.p.vanderhorst@wv.gov).

Recent projects in the Herbarium include reporting new plant species for the state (Vanderhorst et al. 2013, 2019), and into the future, updating the Checklist and Atlas of the Vascular Flora of West Virginia (Harmon et al. 2006).



Fig. 4. Staff working at the West Virginia Natural Heritage Program Herbarium. Photo: James Vanderhorst.

Glenville State College Herbarium (GSC)

The Glenville State Herbarium (GSC) is located on the first floor of Science Hall at Glenville State College. The Herbarium was established in 2016 to bring together specimens collected by previous faculty and students. GSC collections are primarily from Gilmer County and surrounding areas in West Virginia and southern Ohio. The total collection is around 1,000 mounted specimens and over 2,000 unmounted specimens from around the state (Fig. 5).

The staff continues to work toward mounting, databasing, and digitizing the entire collection. The collection contains type and voucher material from species described by the current curator, Dr. Keene. In addition, the Herbarium maintains an active relationship with South American and Asian researchers and holds an extensive collection of Gesneriaceae seeds.

Current challenges and plans

Perhaps the main challenge to our collections is that most herbaria in our state do not have dedicated staff, only a curator who often has teaching and/or research responsibilities as well. This means that the time we can dedicate to curation activities is often limited. A second challenge that stems from this lack of time is the amount of backlog specimens in the collections that needs to be processed. This is an issue that has worsened since last year due to the COVID-19 pandemic because most of our institutions have been closed to the public, including to volunteers or students that helped with specimen mounting and processing.

Two main conclusions were drawn from this meeting. First, we need to get accurate estimates of the numbers of specimens in our collections, especially those of non-vascular plants, which in many cases is unknown. Second, we discussed the need to continue with digitization efforts so that we can make our collections accessible to a broader set of users. Some of our institutions already have a digitization station funded by a former grant that we can lend to a smaller herbarium, or smaller herbaria can have such specimens sent to a larger herbarium to be digitized.

Large databases such as SERNEC or MyCoPortal are extremely important to increase the visibility and availability of herbaria collections, but meetings at state-level are also very relevant to identify common problems and to work together on finding solutions. We are planning an in-person meeting for 2022.

Other Herbaria listed for West Virginia

There are five other herbaria listed in Index Herbariorum (Thiers, 2021) for the state of West Virginia, but we do not know the status of these collections. These are:

- Parasitic Seed Plants Herbarium (PSP), Burlington. No contact information is available for the curator of this collection, if it still exists.
- Institute of Technology Herbarium (WVIT), West Virginia University, Beckley. Former curator Lisa Ferrara retired in May 2021, and we have not been able to get in contact with the new curator.
- University of Charleston Herbarium (MVC), Charleston. Former curator, Merewyn Meadors, passed away in 2019 and we have not been able to locate the new curator.
- Salem International University Herbarium (SAWV), Salem. Former curator, Suzanne Rogers, passed away in 2018 and we have not been able to locate the new curator.



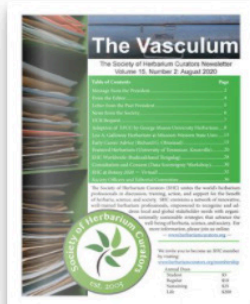
Fig. 5. Glenville State Herbarium. Photo: Jeremy Keene.

- Coopers Cove Herbarium (BCWS), Burgundy Center for Wildlife Studies, Capon Bridge. Two curators are listed for this Herbarium, Lavinia Schoene and Susan Hepler. We have not been able to contact them.

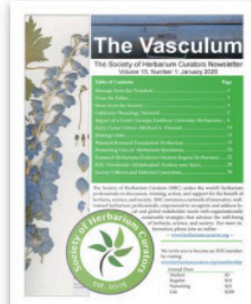
References

- Gregg, K. 2011. A virtual herbarium to enhance learning in botany, ecology, and environmental science. *The Vasculum* 6 (2): 7.
- Harmon, P.J., D. Ford-Werntz, and W. Grafton. 2006. *Checklist and Atlas of the Vascular Flora of West Virginia*. West Virginia Division of Natural Resources, Wildlife Resources Section, Elkins, WV. 381 p.
- Puppo, P. and L. Thompson. 2021. Partnering with archivists to process the manuscript collection present at the Marshall University Herbarium. *The Vasculum* 16 (2): 8–11.
- Thiers, B. 2021. Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff. New York Botanical Garden's Virtual Herbarium. Available from <http://sweetgum.nybg.org/science/ih/> (Accessed December 2021).
- Vanderhorst, J.P., B.P. Streets, E.A. Byers, G. Short, P.L. Faulkner, and R.L. Bartgis. 2019. Noteworthy collections: West Virginia. *Castanea* 84: 13–23.
- Vanderhorst, J.P., B.P. Streets, P.L. Faulkner, S.P. Grund, and J.R. Kunsman. 2013. Noteworthy collections: West Virginia. *Castanea* 78:134–136.

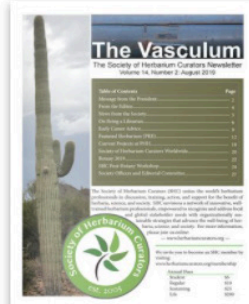
Pamela Puppo, Curator, Marshall University Herbarium, puppo@marshall.edu
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 Michelle Mabry, Curator, Davis and Elkins College Herbarium, mabrym@dewv.edu
 Jeremy Keene, Curator, Glenville State College Herbarium, jeremy.keene@glenville.edu



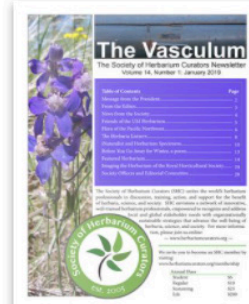
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(August 2020)



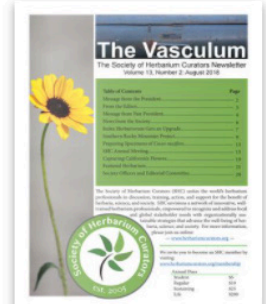
The Vasculum 15.1
(January 2020)



The Vasculum 14.2
(August 2019)



The Vasculum 14.1
(January 2019)



The Vasculum 13.2
(August 2018)

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Early Career Advice

Bruce G. Baldwin (Fig. 1) is a professor in the Department of Integrative Biology at University of California, Berkeley. His research program encompasses vascular-plant systematics, floristics, and conservation biology. Bruce is Curator of the Jepson Herbarium (JEPS) and the Convening Editor for the Jepson Flora Project.

The Vasculum: How is being an early career curator/collections manager nowadays different than when you began your career? What has become more challenging and what has become easier?

Bruce: When I was getting started as a curator there were some early efforts underway with digitizing herbarium collections, such as the SMASCH (Specimen Management System for California Herbaria) project at Berkeley, but the web and bioinformatics were in their infancy and there were serious computational limitations to the progress that could be made in making collection data and images accessible electronically, not to mention analyzing such information. That situation in turn meant that collection-based research was slower and more laborious than it is today. Now, with much greater electronic accessibility of specimen information, the value of herbaria for a broad range of research purposes is becoming more widely appreciated, and what it means to be a curator is changing accordingly. Meeting those demands requires effort that was not part of being a curator in the early 1990s, and those responsibilities have been added to all of the other demands of running an herbarium, with fundraising being especially significant in the face of fiscal austerity imposed by institutional budget cuts in recent years. It is easier now to realize and argue for the potential of collections to meet major goals of research, education, and conservation – and the biodiversity and climate crises are more apparent than ever – but that value has proven to be exceedingly difficult to instill in those who make decisions about budget cuts to and within institutions.

The Vasculum: What made you first interested in herbaria?

Bruce: My first love was floristics and it is still is one of my main interests. I did not know that herbaria existed until I was undergraduate starting my upper-division coursework in botany. I was introduced to the UC Santa Barbara Herbarium by curator Wayne Ferren, who was very welcoming and expressed contagious enthusiasm for collections. I was excited to discover that so much was already known about the diversity of plants and that herbaria made that information accessible to anyone who had a serious interest in pursuing it. I fell in love with the California flora then (Fig. 2, and cover image shown on page 3) and came to increasingly value herbaria for what they allowed me to pursue.

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

Bruce: There is no substitute for outreach focused on education and involvement of the public in ways that creates a community of supporters who grow to love an herbarium and care about its future. Demonstrating to upper-level administrators that an herbarium is a vital contributor to the institution's mission, through successful fundraising and research and educational initiatives, is also critical, although sadly is no longer sufficient to safeguard herbaria from major budget cuts. Cultivation of potential donors who may be in a position to make substantial gifts is an important long-term strategy to try to replace institutional resources with endowment funding that is not subject to budget cuts.

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

Bruce: I most value the physical collections and all of the resources surrounding them, including the people, who are some of my closest colleagues and friends. Being able to readily access and examine actual specimens is invaluable to pursuing my research and interests, and having knowledgeable colleagues nearby – including students and postdocs – is a real privilege. I also enjoy the close connection that the physical specimens provide with botanists of the past, especially when their insights are accessible through their determinations and annotations.

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

Bruce: I had the pleasure of being a paid assistant to Billie June McCaskill at the UC Davis Herbarium shortly after completing my Ph.D. at Davis. She gave me the enjoyable task of identifying unknown plants that came in from the weed scientists and others within and outside the university. Working for June was special – she had an almost magical personality and always made life more fun for everyone around her while being an exemplary curator.

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

Bruce: Outreach is a big part of the Jepson Herbarium's mission, primarily through the Jepson Flora Project (including the Jepson Videos) and the workshop program. My main outreach is as convening editor for the flora project, which is tasked with keeping up-to-date information accessible on the diversity and identification of Californian vascular plants, in large part through the Jepson eFlora and, earlier, the Jepson Manual. I also participate in educational workshops, field trips, and other events, mainly for the Friends of the Jepson Herbarium. More broadly speaking, I also very much value the Jepson Herbarium's collaborations with the California Native Plant Society and other California herbaria in ways that expand on our ability to contribute to understanding of California plant diversity and conservation to the benefit of society.



Fig. 1. Bruce Baldwin with large flowered phacelia (*Phacelia grandiflora* (Benth.) A.Gray, Boraginaceae), an annual herb found in coastal sage scrub and chaparral communities of southern California and Baja California. Photo credit: Susan Fawcett.

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

Bruce: The best career advice I have received – which is the same advice I give to aspiring or early-career botanists – came from my major professor, Don Kyhos, who implored me to follow my passion in botany and to be motivated by love of the plants rather than by love of career. My colleague John L. Strother (University Herbarium) also has given me countless valuable bits of advice over the years but one that stands out pertains to editing of floristic treatments: key the descriptions; that is, run taxon descriptions through the provided key and see if they key out to the appropriate taxon. That advice may seem esoteric – and the method definitely is laborious – but it has helped to ferret out more significant problems with floristic treatments than any other. And I spend a lot of time editing floristic treatments for the Jepson Flora Project.

The Vasculum: Do you have a personal favorite collection? Where did you collect it and why is it your favorite?

Bruce: In 1986 I collected *Carlquistia muirii* (A.Gray) B.G.Baldwin (Compositae) on Ventana Double Cone, in the Santa Lucia Range of central western California. The trail to that wilderness peak was completely grown over with dense chaparral for miles and it was by far the most difficult collection I ever made, but it clinched the relationship between California tarweeds and Hawaiian silverswords, both through molecular and experimental data. I was able to grow it from seed and it served as the pollen parent in a successful cross that I made to *Dubautia laevigata* A. Gray, a large shrubby member of the Hawaiian silversword alliance. That was the first successful cross between members of the Californian and Hawaiian Madiinae. I have continued to study that population as part of a range-wide systematic and biogeographic analysis of *Carlquistia muirii*, which has given me a lot of pleasure, as has the association of this species with two of my botanical heroes – Sherwin Carlquist, who has only recently left us and whose friendship I valued very much, and John Muir, who was a close personal friend of Willis Linn Jepson.



Fig. 2. Bruce Baldwin with *Hulsea algida* A.Gray (Asteraceae), a perennial herb native to California. Photo credit: Susan Fawcett.

Early Career Advice is 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: winitkys@gmail.com).

Featured Herbarium

North to the Future - The Herbarium (ALA) at the University of Alaska Museum

Overview

Alaska (U.S.A.) comprises approximately 1,723,344 square km and is by far the largest state in the Union at about one-fifth the size of the entire Lower 48 states (Fig. 1). If you combined the area of the states of Texas, California, and Montana, it would still be less than the size of Alaska. The state is vast, sparsely populated, and still so under-explored botanically that new species and new records are frequently found (Fig. 2, Andrus and Janssens 2003; Al-Shehbaz et al. 2009; Murray 2015; Fryday, 2017; Lewis et al. 2017, Kyrkjeeide et al. 2018). The Herbarium (ALA) at the University of Alaska Museum of the North is the major regional collection and part of a network of collections with similar interests in the origin and evolution of the circumpolar flora. We are now the largest collection of Alaskan plants anywhere. Whereas there are significant holdings at some of the large North American herbaria, we are the only one mandated by virtue of our geography to study in the far north. This, of course, is true for the other collections at the UA Museum and indeed for much of the University of Alaska Fairbanks (UAF) campus, where the Institute of Arctic Biology, the Institute of Marine Sciences, the Geophysical Institute, and the International Arctic Research Center are located (Fig. 1).



Fig. 1. Map of the state of Alaska, emphasizing its size relative to the lower 48 states and showing the location of the Herbarium (ALA) at the University of Alaska Museum of the North in Fairbanks as well as placement of rural communities, roads, and regional centers.

Legend

of Sampling Locations

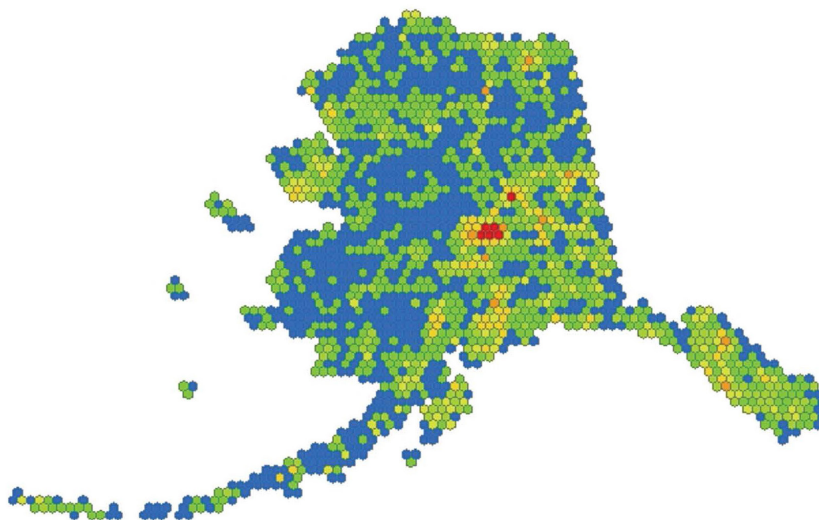
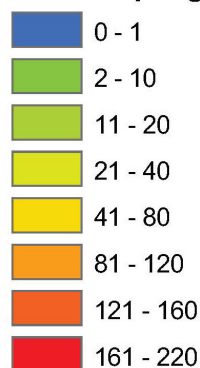


Fig. 2. Map showing sampling effort in Alaska by 30 km hexagon for collections at ALA. Note in blue sampling gaps throughout the state. Modified from Huettman & Ickert-Bond (2018).

Hired in 2006 following an international search and a move to Alaska, my arctic adventure began (Fig. 3). During my tenure, my team and I have brought important infrastructure developments to ALA through funding mainly from the National Science Foundation (Fig. 4), the National Park Services Shared Beringia Program, the Institute of Museum and Library Studies (IMLS), and the Council on Library and Information Resources' Hidden Collections Program.



Fig. 3. One of the author's first collecting trips in Alaska in 2006 on the Denali Highway (Photo: Richard Bond).



Herbarium (ALA) UA Museum

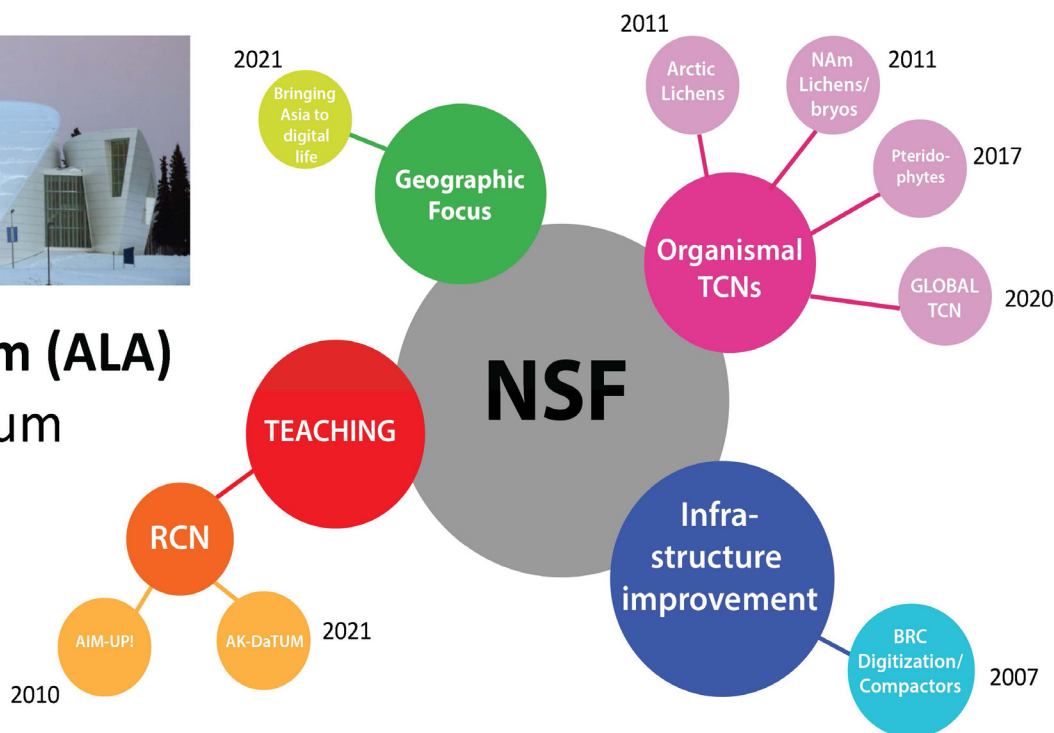


Fig. 4. Funding stream from the National Science Foundation for infrastructure improvements to ALA, digitization, and using collections in teaching since 2007. Many of these were collaborative awards.

ALA is fully online with metadata and nearly 280,000 vascular and non-vascular specimens representing the largest collection of Alaskan plants anywhere. We installed high density storage and new cabinetry in 2009 and the collections are searchable with accompanied high resolution images of the specimens in the ARCTOS community database (<https://arctos.database.museum/SpecimenSearch.cfm>), as well as through the Global Biodiversity Information Facility (GBIF), the Consortium of Pacific Northwest Herbaria (<https://www.pnwherbaria.org/>), the Consortium of North American Lichen Herbaria (<https://lichenportal.org/cnalh/>), and the Consortium of North American Bryophyte Herbaria (<https://bryophyteportal.org/portal/>). Completion of biogeoreferencing and Russian language label transcription is currently underway. The ALA collections are a leading example of online data access and delivery which helps to promote the inherent value of the Arctic flora and landscapes (Pellisier et al. 2016; Stewart et al. 2016).

The prominence and utility of the ALA Herbarium is further demonstrated by an *h*-index of 59 on our Google Scholar profile (<https://scholar.google.com/citations?user=8UKsh1UAAAAJ&hl=en>). The *h*-index (Hirsch 2005) for small collections was pioneered by Winker and Withrow (2013) and is widely seen as an effective means of measuring the impact of collections. An *h*-index of 59 (comparable with that of a Nobel laureate in Physics) emphasizes how much research infrastructure the ALA collections provide to researchers within Alaska and abroad. This use of the ALA collections will increase as new lines of investigation are developed.

Taxon Concepts and the New Flora of Alaska

In 2018, ALA was funded by the National Science Foundation for the project: Taxonomically intelligent data integration for a new Flora of Alaska. This project is innovative in using “taxon concepts” to weave together the data resources. Although the taxon concepts offer a level of information precision beyond that of scientific plant names alone, they have yet to be used in a multi-resource database such as ARCTOS. Data about the organisms

that make up a biological taxon (e.g., a species) are linked in most databases by the taxon's scientific name and its synonyms. Given the ever-increasing amount of biological information in digital form, names have been called “the key to the big new biology” (Patterson et al. 2010). Using a single name to aggregate specimens when that name has differing circumscriptions will draw together a set of collections that do not represent a single coherent hypothesis of a taxon's boundaries. This is a major problem when mapping taxon distributions, especially when searching for range shifts over time (Franklin et al. 2017). This problem also results in decreased community trust in aggregated datasets (Hortal et al. 2015; Wiser 2016; Franz & Sterner 2018).

A solution to the problem of ambiguity caused by names' shifting circumscriptions has long been recognized: to use instead the **taxon concept**, by explicitly stating the circumstances of every name's usage (Berendsohn 1995), citing the publication of a particular circumscription (e.g., “*Claytonia arctica* Adams *sensu* (or *sec.*) Porsild (1974)”). Different usages can then be compared, or “aligned” (Franz et al. 2008), and explicitly presented by data aggregators to inform users and guide them when compiling records for downstream analysis (spatial distribution, etc.). Quoting the taxon concept rather than just the name in policy documents can also avoid some of the furor arising in user communities when the taxonomy of an endangered species changes (e.g., Garnett & Christidis 2017).

Some large taxon concept datasets do exist (e.g., Alan Weakley's comprehensive taxon concept records for the flora of the Southeast USA (Weakley 2015), Avibase (Lepage et al. 2014), VegBank (Peet et al. 2012) and the OIPI checklist (OIPI)), but there is no example of a comprehensive, online flora or fauna platform based on taxon concepts. The added sophistication of using taxon concept is vital for integrating data collected over long periods of time, during which the circumscription of some names has changed, yet few biodiversity databases include this added “taxonomic intelligence.” As part of our ongoing project to create a new Flora of Alaska, we have developed such a taxonomic informatics infrastructure based on taxon concepts. Taxon concepts are now fully implemented in ARCTOS and names can be explored under the “concept” tab within the taxonomy search (Fig. 5).




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[Media Details](#)
ALA V154332: Claytonia ar...




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Concepts for *Claytonia arctica*

Claytonia arctica Adams *sensu* Yurtsev 1981 [link](#) [Open Publication](#)

Claytonia arctica Adams *sensu* Porsild 1974 [link](#) [Open Publication](#)

- includes --> *Claytonia porsildii* Jurtz. *sensu* Yurtsev 1981 (*Claytonia porsildii* - Yurtsev 1981) according to Yurtsev 1981

Common Names Associated with *Claytonia arctica*

- arctic springbeauty

Fig. 5. Taxon concept view for *Claytonia arctica* Adams in ARCTOS. https://arctos.database.museum/name/Claytonia%20arctica#concept_104

Teaching with collections

ALA and the University of Alaska Museum of the North (UAM) are part of the University of Alaska system and located on the University of Alaska Fairbanks (UAF) campus. It was founded to aid teaching and research within UAF and has major representative natural history and cultural collections from all corners of Alaska, the Circumpolar North, and beyond. In 2015 UAM was designated the official state repository of natural and cultural collections by the State of Alaska in 2015. The museum's collections include more than 1.5 million specimens and artifacts representing millions of years of biological diversity and thousands of years of cultural traditions in the North (<http://www.uaf.edu/museum/collections/>). The curators are faculty members with a dual appointment in the Museum and in their respective discipline of expertise at UAF, allowing them to access educational funding via the National Science Foundation (NSF) and integrate specimen-based science into their curriculum. UAM provides content for public exhibits and programs, and it is also deeply involved in training tomorrow's professional scientists at all levels of education.

While natural history collections represent primary sources and are used in high-impact science research (Cook et al. 2014, 2016; Wen et al. 2015), they can also be used in object-based learning (Chatterjee 2010; Chatterjee and Duhs 2010) outside of a docent-guided museum tour. Bringing collections and associated research into the classroom provides the opportunity to engage students in real-world science investigations. Science-literate students become citizens with the ability to make informed decisions based on their understanding of STEM fields.

ALA has been involved in several activities centered on emerging opportunities in specimen-based education through the AIM-UP! RCN (Cook et al. 2014, 2016; Lacey et al. 2017, Anderson et al. 2017) and most recently through the AKDatUM RCN (<https://akdatum.community.uaf.edu/>). As a Professor of Botany in the Department of Biology and Wildlife at UAF, I also use specimen images extensively in my asynchronous delivery of BIOL331 (Systematic Botany). For the lab section of the course I have developed a virtual herbarium tour in ThingLink (<https://www.thinglink.com/scene/1406090479749038081>), where students can explore annotated specimen images highlighting particular characters of interest with microphotography (Fig. 6).

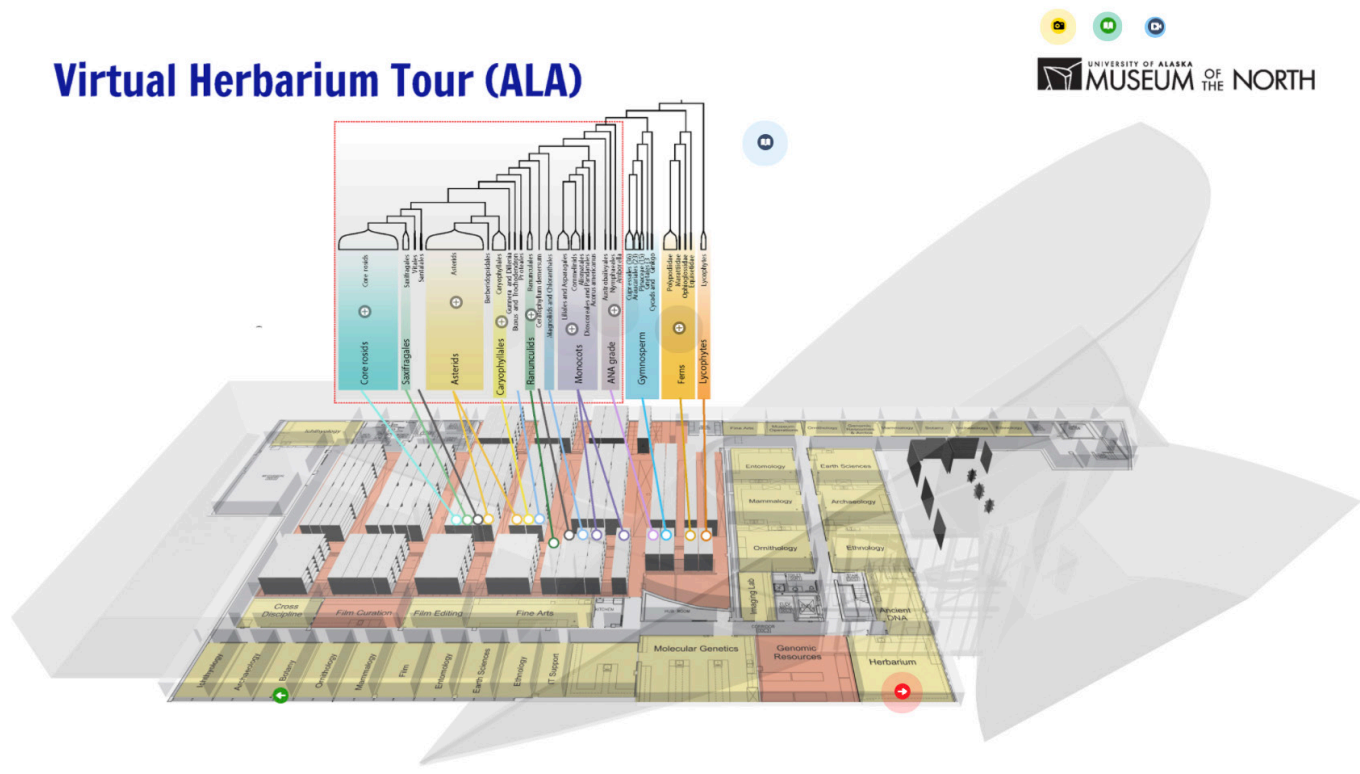
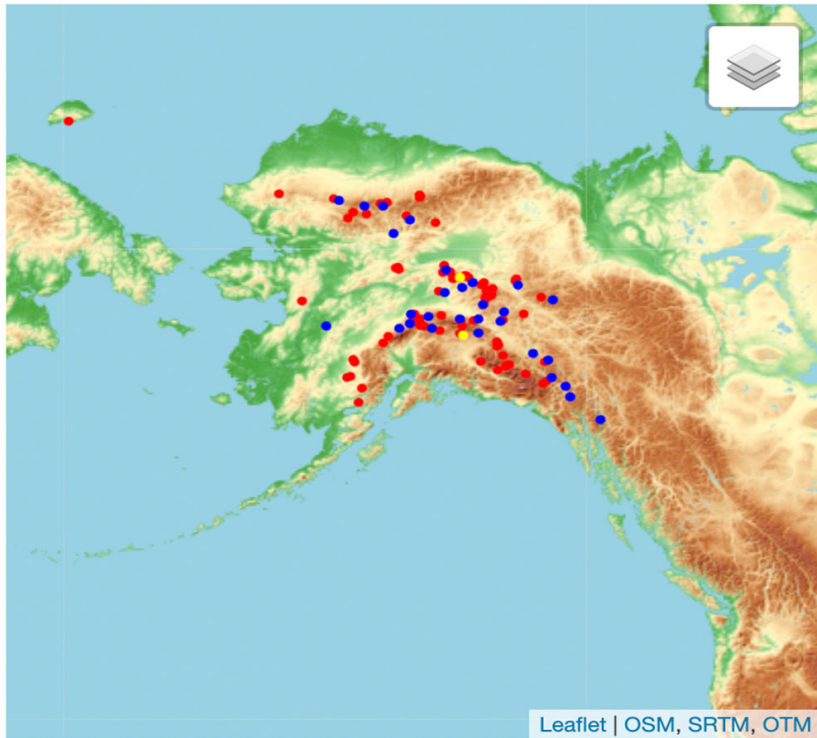


Fig. 6. Landing page of the ALA virtual herbarium tour in ThingLink.

Oxytropis scammaniana



Data usage licenses: Arctos ALA collections, Hultén's Flora, iNat



Fig. 7. Distribution map for *Oxytropis scammaniana* Hultén using the mapping tool for the flora of Alaska, showing Arctos ALA collections (in red), occurrence records from distribution maps shown in Hultén's 1968 *Flora of Alaska* (in blue), and observations in iNaturalist (in yellow). *Oxytropis scammaniana* on Eagle Summit (Photo: Steffi Ickert-Bond) at right.

Beringia

Alaska and the adjacent regions of Canada and northeastern Russia are a distinct biotic province, often referred to as Beringia. The Beringia region as we know it today extends from the McKenzie River in western Canada to the east as far as the Lena River in Siberia. One of the most important contributions to our understanding of Beringia came from Swedish botanist Eric Hultén's doctoral dissertation in 1937 at Stockholm University entitled: *Outline of the history of the Arctic and Boreal biota during the Quaternary period*. Hultén's theories, which are widely accepted today, certainly are a body of work important to the story of the assembly of the flora of Alaska. His 1968 *Flora of Alaska and its Neighboring Territories* is a fabulous textbook containing an unrivaled synthesis of his work and serves as the best manual for the flora of Alaska today. His studies were based on herbarium specimens, and the occurrence dots on his distribution maps in this work are now included in a small mapping tool we created based on herbarium specimens in ARCTOS, and iNaturalist observations for Alaska. The mapping tool is searchable by taxon. For example, see *Oxytropis scammaniana* Hultén (<https://alaskaflora.org/qm/do?method=detail&taxon=Oxytropis%20scammaniana>; Fig. 7).

First botanical explorers

Most of the exploration of Alaska's flora was through **marine botanizing**, an interesting phenomenon of relatively safe travel on spacious ships exploring the continents. These included explorations by James Cook (Fig. 8),



Fig. 8. James Cook visited Southcentral Alaska in 1778 as he sought the Northwest Passage. Cook's vessel, the HMS Resolution beating through the ice. Etching by John Webber/ British Library. Maps 7.TAB.74 <https://www.bl.uk/collection-items/the-resolution-beating-through-the-ice>

Thaddaeus Haenke of the Malaspina expedition, Georg Heinrich von Langsdorff and Wilhelm Tilesius on the Krusenstern circumnavigation, and Archibald Menzies on Vancouver's voyage.

The earliest known western botanist who collected plants in Alaska (on the western shore of Kayak Island and Nagai Island) was the German naturalist George Steller who joined Vitus Bering on the second Kamchatka Expedition and early explorations of the Bering Strait in 1741. Interestingly, Linnaeus obtained some of the plants collected by Steller on Kayak Island "under somewhat dubious (unethical, if not illegal) circumstances" (Savage, 1945), and described *Tiarella trifoliata* L. and *Claytonia sibirica* L. from Siberia, despite their absence from these areas. The type locality of these plants is probably Kayak Island (Jäger 2008).

Next to collect in Alaska was naturalist and surgeon William Anderson on Captain Cook's third voyage in 1778. The most important historical collections of Alaska plants were made by physician and naturalist Ludolf Karl Adelbert von Chamisso and the entomologist Johann Friedrich von Eschscholtz during the Otto von Kotzebue circumnavigation between 1815–1818. The expedition was commissioned by Count Nikolai Romanzoff, Chancellor

of the Russian Empire and a patron of science, in search for a northern passage between the Pacific and Atlantic, and to explore the coast of North America and the Pacific Ocean. In his first report to Romanzoff, Chamisso (1818) estimated that they had collected around 2,500 species of plants with a third of them being undescribed. After returning to Europe, Chamisso was allowed to take his botanical collections to Berlin for study and publication and the bulk of them remained there until his death (Hiepkko 2004; Maaß 2016; Chamisso 1818). A few of the collections described as new to science for Alaska include *Habenaria schischmareffiana* Cham., *Romanzoffia unalaschcensis* Cham., *Pedicularis purpurascens* Cham., *Arenaria elegans* Cham. & Schldtl., *Gentiana aleutica* Cham. & Schldtl. and others. Up until Alaska was purchased by the U.S. from Russia in 1867 the Interior remained mostly uncollected, with its exploration becoming more common at the turn of the 20th century.

ALA had its origins in the 1920s as one by one, small, personal herbaria found their way to Fairbanks and were entrusted to the care of the University of Alaska's Department of Biology. These collections came from pioneer scientists in agronomy (George Gasser Collection), range management (L.J. Palmer Collection) and from such eclectic contributions as those of Mardy and Olaus Murie and Otto Geist. During the 1950s a graduate program in wildlife management was established and plant collecting became routine at the University of Alaska Fairbanks. Additional specimens were acquired in the late 1950s and early 1960s during the Atomic Energy Commission's Project Chariot, a multi-disciplinary environmental study at Ogotoruk Creek in extreme northwestern Alaska, which include several hundred specimens made by Albert W. Johnson, Leslie Viereck, and Herbert Melchior (Fig. 9).

Jacob Peter Anderson

One notable collector was Jacob Peter Anderson, a native of Iowa who lived in Juneau and travelled extensively throughout Alaska from 1914 to 1953 (Fig. 10). He founded the Juneau Botanical Club and continued to collect and organize his collections throughout his life. He returned to Iowa in 1941 with the largest collection of Alaskan plants, which he expanded through exchange with other botanists. Anderson prepared a flora of Alaska which he published in nine parts in the *Iowa State Journal of Science* with some 30,000 plant specimens at hand.

The J.P. Anderson Herbarium of Arctic and Boreal Plants was transferred from Iowa State University in Ames on permanent loan to the UA Museum of the North in 2010. This collection consists of about 32,000 specimens mostly of flowering plants (Fig. 11). Anderson arrived in 1914 from Iowa to take up the position of horticulturist at the agricultural experiment station in Sitka, but after three years there moved to Juneau where he became the first commercial florist in the state. He was the driving force for the Juneau Botanical Club whose plant collection is at the Alaska State Museum of Juneau. For many years in the 1920s and 1930s Anderson travelled through the state of Alaska, to some far flung places when getting there and back was an adventure. Anderson's first herbarium was lost to fire in 1924, but the very next year he began again, and eventually, by 1941, amassed another 24,000 specimens.



Fig. 9. Isotype of *Smelowskia johnstonii* G.A. Mulligan at ALA (A.W. Johnson, L. Viereck and H. Melchior 688).

Anderson was well aware that Eric Hultén of Stockholm had already published a *Flora of the Aleutian Islands* and was working on a *Flora of Alaska*. Inasmuch as Hultén did not provide identification keys in his work that would allow an amateur botanist to get full value from his work, Anderson wanted to write a flora that was more accessible. After 20 years in Juneau, Anderson sold his business and accepted an invitation from what was then the Iowa State College of Agriculture and Mechanical Arts to bring his collection and enjoy all the benefits of faculty but without the usual teaching responsibilities. He was, in effect, undertaking a large research project leading to his manual of the plants of Alaska.

Thus, the J.P. Anderson collection is the basis for his *Flora of Alaska and Adjacent Parts of Canada*, which appeared in separate fascicles between 1943 and 1952 and after his death in 1953 was republished as a single book in 1959. It did, indeed, fill the niche Anderson sought, for with the various keys and a knowledge of botanical terms, one could find out the names of the plants of Alaska. The manual was soon sold out and in the late 1960s Stanley Welsh of Brigham Young University and an Iowa State University graduate, began work to produce a revised *Anderson's Flora*, which appeared in 1974 (Fig. 12). With financial assistance from a bequest that Anderson had established,

Welsh was able to make several trips to the state to collect plants (Fig. 10). Additionally, he received collections from others, several thousand sheets, all of which are also part of the J.P. Anderson herbarium, now at ALA.

Our recent acquisition from Iowa State University of the J.P. Anderson Collection (32,000 specimens in 2003) gives us the opportunity to substantially increase the intellectual and outreach value of ALA's holdings. This collection of arctic and boreal plants, which contains 67 nomenclatural type specimens (Fig. 11), formed the basis for much of Anderson's seminal work, *The Flora of Alaska*. This early Alaska collection is not only important for

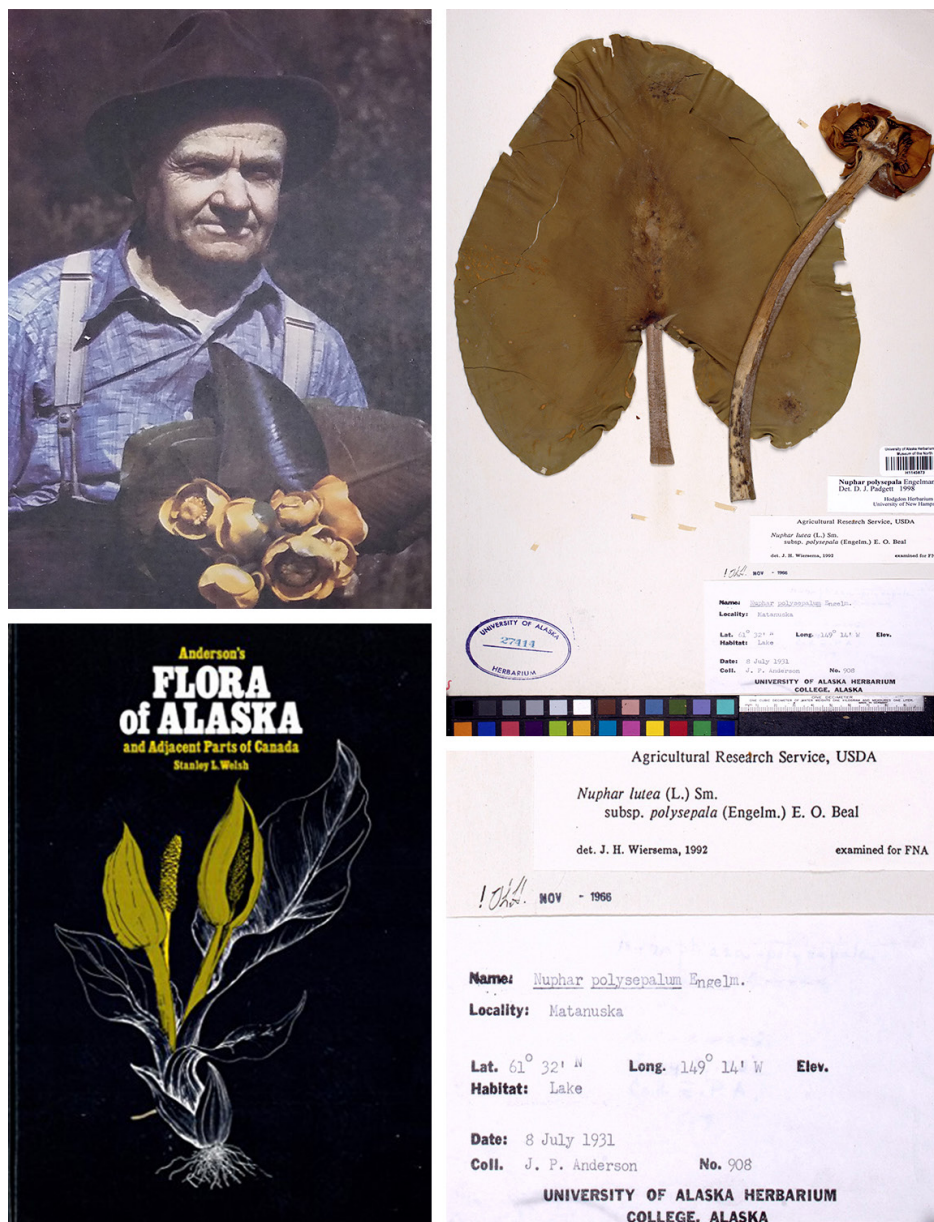


Fig. 10. Jacob Peter Anderson with yellow pond lily (*Nuphar polysepala* Engelm.) from frontispiece of Anderson's *Flora of Alaska and Adjacent Canada* by Stanley Welsh (1974). Photo: Maxime M. Williams, Alaska State Archives (PCA 01-406). Front cover of Anderson's *Flora of Alaska and Adjacent Canada*. Pond lily specimens at ALA (Anderson 908) with details of the label below.



Fig. 11. Photograph of the holotype specimen of *x Elyleymus hultenii* (Melderis) Barkworth (J.P. Anderson 4790) on permanent loan to ALA.

and H. Krog (lichens), further strengthened the foundation for ALA's cryptogamic collections. Barbara Murray's collecting of lichens (but mostly bryophytes) started in the 1970s just after the discovery of oil at Prudhoe Bay on the arctic coast of Alaska (Fig. 14). Use of helicopters became frequent and as a result Dr. Barbara Murray collected large numbers of specimens at over 250 Alaska localities (7,300 of these specimens are deposited at ALA).

During the 1980s, many additional specimens were collected under research mandated by the Endangered Species Act and were deposited at ALA. In the early 1990s we secured many arctic specimens through NSF International Programs, the National Park Service's Beringia Program, and from collaboration with Russian scientists. As the primary repository for these efforts, we acquired many exceptional specimens, often from previously uncollected areas.

Other growth was through exchanges, which have further broadened high-latitude representation (W. Drury, Kuskokwim River; H. M. Raup, Brintell Lake; A.E. and R.T. Porsild, Ogilvie Mountains; Fredskild et al., Greenland; as well as general collections from Finland and Sweden). Critically important to recent work on the Panarctic Flora are collections from the Russian Far East and central Siberia acquired mostly from the Komarov Botanical Institute in St. Petersburg, Russia, and the Central Siberian Botanical Garden in Novosibirsk, Russia, but also from our own collecting in the Altai and Sayan Mountains of south-central Siberia (by D. Murray) and Chukotka (by C. Parker and myself). So far, 1608 Russian-language specimen labels from Chukotkan specimens have been translated and

nomenclatural and taxonomic research, but also provides an important historical insight into the flora of the past. The presence of the J.P. Anderson Herbarium at ALA, now fully accessible, is a significant boost to our collection and our research, especially as many of these specimens are cited by other botanists in numerous early publications.

Postmodern collectors

In 1969 when David F. Murray arrived to become Curator, the Herbarium consisted of about 40,000 vascular plant specimens and several shoeboxes of various mosses and lichens. The establishment of the Arctic National Wildlife Refuge, the Trans-Alaska Pipeline and the National Environmental Policy Act (NEPA) during the 1970s provided surveys and specimens from areas that later became Noatak, Gates of the Arctic, and Yukon-Charley National Parks/Preserves. In 1974, ALA was designated a National Resource Collection in the report of the Advisory Committee for Systematic Resources in Botany (American Society of Plant Taxonomists) to NSF. The first Museum building was completed in 1979, which included the 71 cabinets that have housed the main body of the collection until it was purchased by the University of Alaska Museum (Fig. 13).

Most lichen collections in the ALA date from the early post-WWII period, after the Alcan (now Alaska Highway) was completed, including specimens from John Thomson's first of two Alaska expeditions in 1958 on the Arctic Slope as well as his 1967 expedition along the Alaska Highway. The contributions of three other people, H. Persson and W.C. Steere (bryophytes)

Fig. 12. Photograph of the isotype of *Oxytropis arctica* R.Br. var. *barnebyana* Welsh at ALA (S.L. Welsh 5729).



databased in ongoing projects supported by the National Park Service, the Council on Library and Information Resources' Hidden Collections Program, and NSF. Resulting from these efforts were numerous documented range extensions as well as information to otherwise botanically unexplored areas. During this time, Alaska has become the rich source for revisions, monographs, floristic surveys, and phylogenetic studies of its plants that it remains today, and ALA has served as the premier repository for Alaska and other arctic floras.

Collecting activities and interest from federal agencies has continued to be strong through the 1990s to present. The past decade has been a transitional time for the herbarium with the retirement of David Murray in 1994, who continues to remain active in arctic floristics at ALA. Elena Conti was Curator from 1997–1999, followed by Amy Denton (2001–2003). Collections Manager Alan Batten and Research Associate Carolyn Parker maintained continuity and kept ALA running during that turn-over of curators. Both Batten and Parker have formed and sustained close-knit relationships with state and federal agencies and are responsible for most recent floristic inventories at ALA. Carolyn Parker has contributed some 18,000 specimens to ALA, has annotated 10,000 specimens in ARCTOS documenting numerous range extensions, and several of her collections are the basis of new species (*Draba mulliganii* Al-Shehbaz, *Eritrichium boreale* D.F.Murray, *Eritrichium grandiflorum* D.F.Murray, *Papaver roseoalbum* Björk, *Parrya nauruaq* Al-Shehbaz, J.R.Grant, R.Lipkin, D.F.Murray & C.L.Parker). Al Batten similarly has been instrumental in organizing and expanding the collections at ALA. He has contributed nearly 10,000 specimens and has made several collections that are the basis of species new to science (*Papaver roseoalbum* Björk, *Draba murrayi* G.A.Mulligan, and *Potentilla psychrophila* Soják).

Fig. 13. University of Alaska Museum entrance in 1991. Historic American Buildings Survey photos, Library of Congress, HABS AK,6-FAIBA,3--5 (Photo: Jet Lowe).



Fig. 14. A very influential couple in the development of the collections at ALA: Drs. Barbara and David Murray, Curator Emeritus at ALA in 1972 (Photo: unknown).



Fig. 15. Drs. David Murray and Reidar Elven examining specimens at ALA in 2006 (Photo: Steffi Ickert-Bond).

At present, Curator Emeritus, Dr. David Murray, and Dr. Reidar Elven, Professor at the Natural History Museum of Oslo, Norway, are continuing their work on the Panarctic Flora with particularly vexing taxonomic puzzles in the flora of Alaska and Beringia (Fig. 15). Murray and Elven have reviewed many problematic genera for the flora of Alaska and have a combined total of nine taxonomic and phylogenetic papers on the flora of Alaska and Beringia (Elven et al., 1999, 2010, 2011; Murray & Elven, 2007, 2011; Elven & Murray, 2008; Ertter et al., 2008; Murray et al., 2009, 2010). Their combined knowledge is invaluable to providing insight into the many taxonomic puzzles that have plagued botanists in Beringia for many years. Elven will travel to Alaska in 2022 and together with Murray they will review the literature since their last collaborative work on the PAF list in 2010, and make entries and comments to both ALA holdings as well as the Panarctic flora. The most important aspect of the visit will be examining together the specimens at ALA and making judgments and writing comments, since the greatest value of PAF lies in the annotations.

Currently ALA includes Curator Steffi Ickert-Bond, two graduate students (one Ph.D. student and one M.S. student), two undergraduate curatorial assistants, Curator Emeritus David Murray, active Research Associates Carolyn Parker and Campbell Webb, and a few volunteers. Because of Alaska's northern latitude, the plants of Alaska are being affected by climate change more than those of any other US state. Species ranges are shifting, and

whole vegetation types are changing. Monitoring and understanding these changes is vital for managing Alaska's fragile biological resources. An estimated 50 million pounds of wild foods are harvested annually by subsistence users in Alaska, including fish, game, many berries, and other flora (State of Alaska 2021). With the many gaps in our understanding of the flora of Alaska, ALA is always looking to take on motivated students eager to explore the flora of the last frontier.

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Literature Cited

- Al-Shehbaz, I., Grant, J., Lipkin, R., Murray, D.F., and C.L. Parker. 2009. *Parrya nauruaq* (Brassicaceae), a new species from Alaska. *Novon* 17: 275–278. 10.3417/1055-3177
- Anderson, K.L., Kaden, U., Druckenmiller, P.S., Fowell, S., Spangler, M.A., Huettmann, F., and S.M. Ickert-Bond. 2017. Arctic science education using public museum collections from the University of Alaska Museum: an evolving and expanding landscape. *Arctic Science* 3: 635–653.
- Andrus, R.E. and J.A. Janssens. 2003. *Sphagnum alaskense* - A new species from Western North America. *The Bryologist* 106: 435–438. <https://doi.org/10.1639/08>
- Berendsohn, W.G. 1995. The concept of “potential taxa” in databases. *Taxon* 44: 207–212. <http://archive.bgbm.org/BioDivInf/Docs/PotentialTaxa/PotentialTaxa.pdf>
- Chamisso, L.K.A. von. 1818. Voyage de Kotzebue. Lettre écrite à M. le comte de Romanzoff, par M. de Chamisso, naturaliste français, qui a fait le voyage autour du monde, avec M. de Kotzebue, sur le bric le Rurick. *Journal des Voyages, Decouvertes et Navigations Modernes* 1818: 201–208. <http://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb10465475-7>
- Chatterjee, H.J. 2010. Object-based learning in higher education: the pedagogical power of museums. *UMAC Journal* 3: 179–181.
- Chatterjee, H.J., and R. Duhs. 2010. Object-based learning in higher education: pedagogical perspectives on enhancing student learning through collections. Centre for Excellence in Teaching and Learning through Design, University of Brighton. http://arts.brighton.ac.uk/data/assets/pdf_file/0010/18649/01-Object-based-learning-in-higher-education.pdf
- Cook, J.A., Edwards, S.V., Lacey, E., Guralnick, R.P., Soltis, P.S., Soltis, D.E., Welch, C., Bell, K.C., Galbreath, K.E. et al. 2014. Natural history collections as emerging resources for innovative education. *BioScience* 64: 725–734. doi:10.1093/biosci/biu096.
- Cook, J.A., Lacey E.A., Ickert-Bond, S.M., Hoberg, E.P., Galbreath, K.E., Bell, K.C., Greiman, S.E., McLean, B.S., and S. Edwards. 2016. From museum cases to the classroom: emerging opportunities for specimen-based education. Pp. 787–799 in I. Pavlinov (Ed.), *Aspects of biodiversity archives of the zoological museum of Lomonosov Moscow State University*. Moscow: KMK Scientific Press Ltd..
- Elven, R. and D.F. Murray. 2008. New combinations in the Panarctic vascular plant flora. *Journal Botanical Research Institute of Texas* 2: 433–446.
- Elven, R., Jonsell, B., Murray, D.F., and B.A. Yurtsev. 1999. An operational species concept for the Panarctic Flora. Pp. 23–32 in Nordal, I. and V. Yu. Razzhivin (Eds.), *The species concept in the High North-A Panarctic Flora initiative*. Oslo: Det Norske Videnskaps-Akademi. 1. Matematisk-naturvidenskapelig Klasse Skrifter Ny Series No. 38.

- Elven, R., Murray, D.F., and H. Solstad. 2010. To arter av kastanjesiv (*Juncus castaneus* og *Juncus leucochlamys*), begge i Europa. *Blyttia* 68:128–131.
- Elven, R., Murray, D.F., Razzhivin, V. Yu., and B.A. Yurtsev. 2011. Checklist of the Panarctic Flora (PAF). Oslo: Natural History Museum, University of Oslo. <http://panarcticflora.org/>.
- Ertter, B., Elven, R., Murray, D., and J. Reveal. 2008. Proposal to reject the name *Potentilla dissecta* (Rosaceae). *Taxon* 57: 1010–1011.
- Franklin, J., Serra-Diaz, J. M., Syphard, A. D., and H.M. Regan. 2016. Big data for forecasting the impacts of global change on plant communities. *Global Ecology and Biogeography* 26: 6–17. doi:10.1111/geb.12501.
- Franz, N., and B. Sterner. 2018. To increase trust, change the social design behind aggregated biodiversity data. Database 2018, bax100, <https://doi.org/10.1093/database/bax100>
- Franz, N., Peet, R. K., and A. Weakley. 2008. On the use of taxonomic concepts in support of biodiversity research and taxonomy. Pp. 61–84 in Q.D. Wheeler (Ed.), *The New Taxonomy* (Vol. 76). London: Chapman and Hall.
- Fryday, A. 2017. Additions to the lichenized fungi biota of Alaska from collections held in the Museum of the North herbarium (ALA). *Arctic Science* 3: 577–584. doi: 10.1139/as-2016-0040.
- Garnett, S. T., and L. Christidis. 2017. Taxonomy anarchy hampers conservation. *Nature* 546: 25–27. doi:10.1038/546025a.
- Hirsch, J.E. 2005. An index to quantify an individual's scientific research output. *Proc. Natl. Acad. Sci. USA*. 102: 16569–16572. doi: 10.1073/pnas.0507655102. PMID: 16275915.
- Hortal, J., Bello, F. de, Diniz-Filho, J. A. F., Lewinsohn, T. M., Lobo, J. M., and Ladle, and R. J. 2015. Seven shortfalls that beset large-scale knowledge of biodiversity. *Annual Review of Ecology, Evolution, and Systematics* 46: 523–549. doi:10.1146/annurev-ecolsys-112414-054400
- Huettmann, F., and S.M. Ickert-Bond. 2018. On open access, data mining and plant conservation in the Circumpolar North with an online data example of the Herbarium, University of Alaska Museum of the North. *Arctic Science* 4: 433–470. [dx.doi.org/10.1139/as-2016-0046](https://doi.org/10.1139/as-2016-0046)
- Hultén, E. 1937. *Outline of the history of the Arctic and Boreal biota during the Quaternary period*. Ph.D. Dissertation. Stockholm: Stockholm University.
- Hultén, E. 1968. *Flora of Alaska and its Neighboring Territories*. Palo Alto: Stanford University Press.
- Jäger, E. J. 2008. Die ersten Listen und Aufsammlungen von Pflanzen aus Alaska - Georg Wilhelm Stellers botanische Arbeiten in Amerika. *Feddes Repertorium* 111: 321–368. doi:10.1002/fedr.20001110507.
- Kyrhjeeide, M.O., Hassel, K., Shaw, B., Shaw, J., Temsch, E.M., and K.I Flatbed. 2018. *Sphagnum incundum* a new species in *Sphagnum* subg. *Acutifolia* (Sphagnaceae) from boreal and arctic regions of North America. *Phytotaxa* 333: 1–21. doi.org/10.11646/phytotaxa.333.1.1
- Lacey, E.A., Hammond, T.T., Walsh, R.E., Bell, K.C., Edwards, S.V., Ellwood, E.R., Guralnick, R., Ickert-Bond, S.M., Mast, A.R., et al. 2017. Climate change, collections and the classroom: using big data to tackle big problems. *Evolution: Education and Outreach* 10:2. doi: 10.1186/s12052-017-0065-3.
- Lepage, D., Vaidya, G., and R. Guralnick. 2014. Avibase—a database system for managing and organizing taxonomic concepts. *ZooKeys*, 420:117. doi:10.3897/zookeys.420.7089
- Lewis, L.R., Ickert-Bond, S.M., Biersma, E.M., Convey, P., Goffinet, B., Hassel, K., La Farge, C., Metzgar, J.S., Stech, M., Villarreal, J.C., and S.F. McDaniel. 2017. Future directions and priorities for Arctic bryophyte research. *Arctic Science* 3: 475–497. doi: 10.1139/as-2016-0043.
- Murray, D.F. 2017. Notes on *Eritrichium* (Boraginaceae) in North America III. Three new species of *Eritrichium*. *Journal of the Botanical Research Institute of Texas* 11: 19–23. <https://doi.org/10.17348/jbrit.v11.i1.1133>
- Murray, D.F., R. Elven, and K.N. Gandhi. 2010. A new combination in *Lagotis* (Plantaginaceae). *Journal of the Botanical Research Institute of Texas* 4: 219–220.
- Murray, D.F., and R. Elven. 2011. *Polemonium villosissimum* (Polemoniaceae), an overlooked species in Alaska and Yukon Territory. *Journal of the Botanical Research Institute of Texas* 5: 19–24.
- Murray, D.F., Mirré, V., and R. Elven. 2009. *Empetrum*. Pp. 486–489 in North America Editorial Committee

- (eds.), *Flora of North America North of Mexico*. Vol. 8. New York: Oxford Univ. Press.
- OIPI. International Organization for Plant Information: Provisional Global Plant Checklist. <http://ww2.bgbm.org/OIPI/gpc/default.asp> (accessed 28 Dec. 2021).
- Patterson, D., Cooper, J., Kirk, P., Pyle, R., and D. Remsen. 2010. Names are key to the big new biology. *Trends in Ecology and Evolution* 25: 686–91. doi:10.1016/j.tree.2010.09.004
- Peet, R., Lee, M., Boyle, F., Wentworth, T., Schafale, M., and A. Weakley. 2012. Vegetation-plot database of the Carolina Vegetation Survey. *Biodiversity & Ecology* 4: 243–253. doi:10.7809/b-e.00081.
- Pellissier, L., Eidesen, P.B., Ehrich, D., Descombes, P., Schönswetter, P., Tribisch, A., Westergaard, K.B., Alvarez, N., Guisan, A., Zimmermann, N., Normand, S., Vittoz, P., Luoto, M., Damgaard, C., Brochmann, C., Wisz, M.S., and I.G. Alsos. 2016. Past climate-driven range shifts and population genetic diversity in Arctic plants. *Journal of Biogeography* 43: 461–470. doi: 10.1111/jbi.12657.
- Porsild, A.E. 1974. *Materials for a Flora of Central Yukon Territory*. Publications in Botany 4. Ottawa: National Museums of Canada.
- Savage, S. 1945. A catalogue of the Linnean Herbarium, London, England - Linnean Soc. of London.
- State of Alaska 2021. Subsistence in Alaska. Alaska Department of Fish and Game. <https://www.adfg.alaska.gov/index.cfm?adfg=subsistence.main> (accessed 28 Dec. 2021).
- Stewart, L., Alsos, I.G., Bay, C., Breen, A.L., Brochmann, C., Boulanger-Lapointe, N., Broennimann, O., Bültmann, H., Bøcher, P.K., Damgaard, C., Daniëls, F.J.A., Ehrich, D., Eidesen, P.B., Guisan, A., Jonsdottir, I., Lenoir, J., le Roux, P.C., Lévesque, E., Luoto, M., Nabe-Nielsen, J., Schönswetter, P., Tribisch, A., Tveerabak, L.U., Virtanen, R., Walker, D.A., Westergaard, K.B., Yoccoz, N.G., Svenning, J.-C., Wisz, M.S., Schmidt, N.M., and L. Pellissier. 2016. The regional species richness and genetic diversity of Arctic vegetation reflect both past glaciations and current climate. *Global Ecology and Biogeography* 25: 430–442. doi: 10.1111/geb.12424.
- Weakley A. S. 2015. *Flora of the Southern and Mid-Atlantic States*. Chapel Hill: University of North Carolina Herbarium. <http://www.herbarium.unc.edu/flora.htm> (accessed 28 Dec. 2021).
- Wen, J., Ickert-Bond, S.M., Appelhans, M., Dorr, L., Funk, V. 2015. Collections-based systematics: Challenges, opportunities and outlook. *Journal of Systematics and Evolution* 53: 477–488.
- Welsh, S.L. 1974. *Anderson's Flora of Alaska and Adjacent Canada*. Provo: Brigham Young University Press.
- Winker, K.H., and Withrow, J.J. 2013. Natural history: small collections make a big impact. *Nature* 493: 480–480. doi: 10.1038/493480b.
- Wiser, S. K. 2016. Achievements and challenges in the integration, reuse and synthesis of vegetation plot data. *Journal of Vegetation Science* 27: 868–879. doi:10.1111/jvs.12419.



Artomyces pyxidatus (Pers.) Jülich
(Auriscalpiaceae), Wayne National Forest,
Ohio (U.S.A.), 2018 - Photo credit: Harlan T.
Svoboda.



Society of Herbarium Curators Worldwide

Welcome to the column where we highlight individual members from across the globe! For this edition, we interviewed **Dr. Maura Quezada**, Curator of Herbario USCG at Universidad de San Carlos de Guatemala, located in Guatemala City, Guatemala.

SHC Worldwide: What is the size of your Herbarium?

Maura Quezada: The USCG Herbarium currently consists of more than 47,000 accessioned specimens that represents 273 families, 1,959 genera and 6,905 species, including lichens, fungi, liverworts, mosses, ferns, and seed plants. Most notably, we house historical collections from Ulises Rojas and Rafael Tejada, some of whose collections date back to 1910. Additionally, we house duplicates of the specimens used by Paul C. Standley and Julian A. Steyermark to write the *Flora of Guatemala* (1946–1977) and duplicates of fern specimens used by Robert G. Stolze to write *Ferns and Fern Allies of Guatemala* (1979–1983). The USCG Herbarium holds important collections made by Elfriede de Pöhl between 1978 and 1980, and duplicates of material collected during the expeditions of Mexican botanists Esteban Martínez and Mario Souza during 1980. Recently, we accessioned duplicates of specimens used to publish *Flora Mesoamericana* (Davidse et al., 1995) and a number of studies on *Quercus* carried out by a research team from the Universidad de San Carlos de Guatemala.

SHC Worldwide: What is your favorite part about working at the Herbarium?

Maura: My favorite part is looking at specimens and finding the characters to identify species, being able to see the diversity of morphological changes in response to different habitat conditions. I particularly enjoy teaching and supporting students, as well as helping educate the general public using the herbarium collections.

SHC Worldwide: What kind of training do you have and how did you end up working where you do?

Maura: I started working as a volunteer at the herbarium when I was an undergraduate student. I learned about handling herbarium material by looking at curators and participating in workshops and meetings. Later on, I happily accepted a permanent position to work at the herbarium.

SHC Worldwide: What type of support staff does your Herbarium have?



Above. Maura Quezada (USCG) and Andrés Torres (UNAM) studying *Quercus* collections housed at USCG.

Maura: We are a small team, only having two part-time positions, a curator, and one assistant curator (currently Lourdes Rodas).

SHC Worldwide: What type of research does your Herbarium facilitate? Are there any specific projects that you are particularly excited about?

Maura: We support several taxonomic revisionary studies on specific groups carried on by colleagues from the Universidad de San Carlos de Guatemala, short research projects completed by undergraduate students as honors theses, and other research and conservation projects supported by the government and the university. Currently we are enthusiastically participating in a study of the distribution of oak species in Guatemala. We are planning to evaluate their population genetic structure and look at potential adaptations.

SHC Worldwide: What are some of the biggest challenges that you face when managing your Herbarium?

Maura: One of the biggest challenges we see is to make university administrators and government officials understand the role of natural history collections as fundamental repositories of biological and cultural knowledge, which are critical to inform conservation efforts. We would also like to improve our facilities to fit the purpose of specimen curation and support Herbarium users and visitors. Additionally, we are constantly seeking funding to maintain and increase our collections.

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

Maura: I envision the USCG Herbarium becoming a reference collection for the Mesoamerican flora, particularly for key taxa like the genus *Quercus* for which we hold important collections. I would like the USCG Herbarium to support research staff and students participating in graduate-level studies focused on botany and in the Guatemalan flora. My aim is to position the USCG Herbarium as an open and reliable resource to enhance conservation and research of the flora in the Mesoamerican region.

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

Maura: The Mesoamerican region comprises the South of México to Panama, it includes floristic elements from the Neotropics as well as from temperate regions from both the Northern and Southern Hemispheres. An estimate of 18,000 plant species occurs in this region, 10,300 of which can be found in Guatemala. Given this extraordinarily high species richness concentrated in a relatively small area, the country is considered a hotspot of plant diversity. High levels of plant diversity are related to variability in climate, topography, and soil characteristics, as well as dynamic geological history. These characteristics have also generated an extremely high level of endemism in the region which makes it particularly interesting for plant discoveries.

SHC Worldwide: Do you have a dream project for your Herbarium?



Above. Rosario Rodas (USCG), Susana Valencia (UNAM), and Maura Quezada studying *Quercus* collections housed at USCG.

Maura: Ideally, I would like the Herbarium to be in a building with appropriate space and facilities to process incoming plant materials, mount specimens, adequate compactors and cabinets, well equipped space for researchers to study specimens, and good support for staff to get training so they can grow in their positions and develop new research skills. I would love to see more people interested in working at the Herbarium and in natural history collections.

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

Herbarium at California Botanic Garden (RSA)



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