



The Vasculum

The Society of Herbarium Curators Newsletter
Volume 17, Number 2: August 2022

Table of Contents	Page
Message from the Past President.....	2
Message from the President.....	3
From the Editor's Desk.....	4
News from the Society.....	5
New Herbarium Resources on the SPNHC Wiki.....	6
The Botanical Legacy of R. Dale Thomas.....	7
Diversifying Collections in Herbaria: A Pilot Project to Create a Color Pigment Library for the Genus <i>Aloe</i>	10
Reassembling an Herbarium.....	12
Early Career Advice (Andrew J. Henderson).....	15
Featured Herbarium (Kwazulu-Natal Herbarium on its 140th Anniversary).....	17
Society Officers and Editorial Committee.....	24

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 Past President

My most sincere thanks to all current (and future!) SHC members who made Anchorage a success! It's hard to believe we finally managed to meet in person again! I hope this marks the return of some sort of normalcy for our community. At the same time, the hybrid format allowed so many others to participate (remotely) in this meeting for perhaps the first time, thus a real win-win to botanists all around the world. Over the last two years, we as a society have worked very hard to extend our reach and build further community, particularly among an international audience. It has been an incredible success, with new membership initiatives, transitions in our student awards program to fund a broader set of recipients, translations in our newsletter to reach more people of different backgrounds and nationalities, and finally a membership and Executive Board that itself has become much more diversified. I see this as the crux of our future: truly growing into a global society that lives and breathes herbarium stewardship and advocacy all over the globe and at all career stages and walks of life, from general enthusiast to career academic. My term as President of SHC concluded during this meeting, and it is my pleasure to introduce Anna Monfils as incoming President of our society. I have had the pleasure of interacting with Anna on numerous occasions prior to her assuming this role, and I am truly excited and inspired by all she will bring to our society. I write to ask all readers of this newsletter to please offer feedback, become involved, and make suggestions regarding any and all ideas you may have to help us thrive as a Society and achieve our goals, be they growth, inclusivity, diversification, education, research, or stewardship. Each of us has a unique perspective to bring, and all such perspectives serves SHC for the better. Thank you for the opportunity to serve our Society these past two years. I welcome any feedback you have.

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

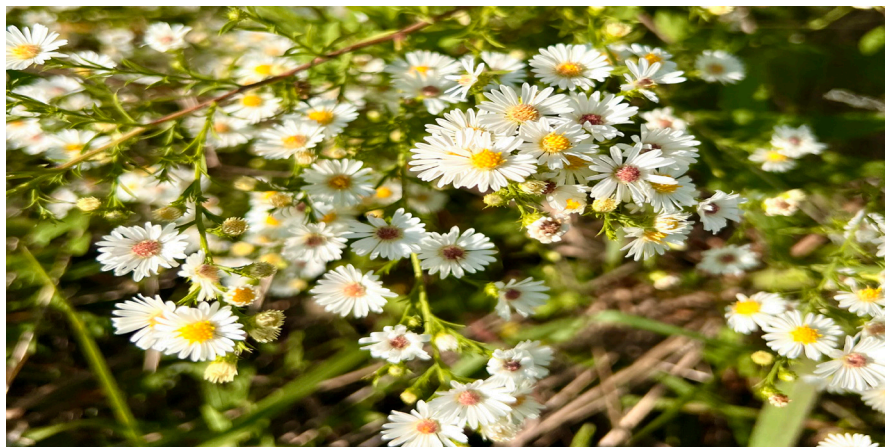
Message from the President



Thank you to Erin Manzitto-Tripp for their leadership and excellent guidance. It is exciting to see the impacts of Erin's leadership and efforts to extend the global reach of the Society of Herbarium Curators (SHC). I was sorry to miss attending the Botany 2022 meeting in Alaska and receiving the SHC vasculum. I made it as far as Washington State, but had to switch to virtual and hunker down with COVID. Thanks to Patrick Sweeney for carrying this across country, and home again. While switching to a virtual meeting was not an ideal scenario, I did get an opportunity to experience the hybrid Botany experience. There is a lot of potential in hybrid meetings to engage a larger community. I look forward to a time with safer travel, more virtual opportunities, and a wide array of accessible modalities to build the Society of Herbarium Curators community and support and engage stewards of herbaria. I second Erin's suggestion to reach out with ideas and opportunities for ways the Society can promote herbaria and support members. As I take on this new role in the Society, I am interested in hearing from members about community interests and initiatives. My first charge will be nominating and appointing members of the Executive Board. I look forward to learning this process and engaging with members. I will be reaching out to members who would like to serve the Society. So please let me know if you have an interest in an Executive Board position or service to the Society of Herbarium Curators community.

Looking forward to the coming year.

Anna K. Monfils
Professor, Biology,
Director, CMC Herbarium
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President, Society of Herbarium Curators (2022-2024)



From the Editor's Desk

Since the last two years, our lives have been radically molded by the COVID 19 pandemic. Masking, social distancing, etc., became a part of our everyday lives, and online meetings, conferences etc. became the new norm. However, vaccines have been able to soothe the situation to a great extent, and it seems like we are slowly and gradually getting back to the pre-COVID times, although it may never be the same as it used to be. Last two years have seen us meeting, interacting, and presenting our research through the virtual Botany meetings. This year, we were able to bring the best of both worlds, in-person and online, through a hybrid Botany Conference, with the in-person, face-to-face meetings happening in Anchorage, Alaska in July, that included an online component to it. The Society of Herbarium Curators was able to show a strong presence at this year's meetings including the SHC special session "Biodiversity at the brink: leveraging herbaria for conservation!"

Our current issue of *The Vasculum* doesn't have a specific theme, but instead has chosen to showcase a wide range of articles related to herbarium curators, collections, and their uses, that we hope will cater to a variety of audiences interested in engaging in a good read. This current issue marks the end of Erin Tripp's term as the SHC president, with Anna Monfils taking over as the next president. This issue of *The Vasculum* showcases the far-reaching effects of herbaria worldwide, and includes write-ups from Maura Flannery on rebuilding the Berlin Herbarium, Sean Lahmeyer on a collaborative project towards creating and documenting a color pigment library for the genus *Aloe*, Genevieve Tocci on the SPNHC symposium in Edinburgh, as well as another great article on the life of eminent botanist R. Dale Thomas by Chris Havran. Our "featured herbarium" section showcases a contribution by Yashica Singh on the celebration of the 140th anniversary of the KwaZulu-Natal Herbarium in South Africa. Andrew J. Henderson, curator emeritus of the Institute of Systematic Botany at the New York Botanical Garden, (U.S.A.) provides our Early Career Advice and talks his experiences in herbarium curation. In the "News from The Society" you will find information about some recent initiatives taken up by the Society to broaden its reach.

This is my first issue of *The Vasculum* newsletter, in the role of the Editor, and in spite of the steep learning curve, I thoroughly enjoyed the entire process from the start to the finish. I will take this opportunity to express my heartfelt thanks to Melanie Link-Perez, the former Editor, whose help and guidance was invaluable towards publication of this issue.

As always, we invite your article ideas and contributions. Now sit back, relax, and enjoy this new issue of *The Vasculum*, hot off the press! We look forward to your future submissions, as well as any feedback you may have.

Tilottama Roy
Editor, *The Vasculum*
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News from the Society

New Officers – Early Career Section

The SHC Early Career Section has new officers for the term 2022-2024. Since there was only one candidate for each position, no polling was done. The new officers for the Early Career Section are:

Anthony Baniaga - President, UCLA

Daniel Konemann - Member at Large, Howard University

Erin Berkowitz - Professional Development Officer, New Mexico University

Maryam Sedaghatpour - Secretary, UC Berkeley

Nina House- President Elect, California Botanic Garden



SHC special session “Biodiversity at the brink: leveraging herbaria for conservation!” at the Botany 2022 conference in Anchorage, AK (Photo Credit: Tilottama Roy)

Cover photo: *Nepenthes* sp. at the Alaska Botanical Garden (Photo Credit: Connor Root, undergraduate student, Missouri Western State University)

New Herbarium Resources on the SPNHC Wiki

Many talks relevant to herbarium work featured in “Back to Basics: Museum Techniques Skillshare” at the 2022 annual meeting of the Society for the Preservation of Natural History Collections (SPNHC) in Edinburgh, UK. This joint meeting with the Biodiversity Heritage Library and Natural Sciences Collections Association (NatSCA) was co-hosted by Royal Botanic Garden Edinburgh and National Museums Scotland in June. The conference had talks on herbaria and herbarium practices throughout the sessions, however the Skillshare symposium focused specifically on generating practical resources to share back with the community immediately. The slides from these talks are available on the SPNHC Wiki (https://spnhc.biowikifarm.net/wiki/Museum_Techniques_Skillshare).

The most relevant talks in the session ranged from imaging to pressing to shipping. In her talk “Press Juicy, Sticky Plants with Tissue Paper and Pillows of Silica to Prevent Mould and Retain Colour,” Nadia Cavallin detailed her process and results of preparing deliquescent plants that have softer parts. Bob Gooday presented “Smartphone microscopy – Tips for taking high-quality microscope images with a phone camera.” He gave clear and straightforward advice that will immediately improve taking photos with a smartphone through a microscope ocular. Extremely difficult to decipher specimen labels were featured in “Deciphering natural history and mapping the world through collection labels” by Krisztina Lohonya, as well as ways to deal with several problems such as the difficulties of transliteration and translation. Larissa Welton gave a stunning presentation on “Using Excel Macros for Data Quality Assurance: Lessons Learned from a Coding Beginner.” Macros have changed a lot compared to older versions of Excel and recording a macro is now much easier, making data cleanup and organization a snap. For anyone looking for tips on packing and shipping nonvascular plants, the author presented “Herbarium Life: Shipping Cryptogamic Specimens” with examples on how to pack the basic kinds of specimens in packets, boxes, bags, and even slides.

The SPNHC Best Practices Committee hope these resources are helpful to the SHC community.



Figure 1: Back to basics skill-share introductory slide (Photo credit: Genevieve Tocci)

Genevieve Tocci
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Senior Curatorial Technician, Harvard University Herbaria

The Botanical Legacy of R. Dale Thomas



Figure 1: R. Dale Thomas in his herbarium demonstrating a sheet of *Ophioglossum*

Dr. Roy Dale Thomas (R. Dale), a botanist and herbarium curator who had a transformative impact on the botanical collections of the southeastern United States, passed away in Knoxville, Tennessee on May 28, 2022.

R. Dale was born in Sevier County, Tennessee on November 12, 1936. At a young age he developed an appreciation for the natural world by working on his family's farm and exploring the foothills of the Smoky Mountains. He obtained a B.S. in Biology at Carson-Newman College before enrolling in Southeastern Seminary in Wake Forest, North Carolina. At Carson-Newman College he met his future wife, Barbara Ann Gilliam. The two would raise three children, Scott, Steven, and Suzanne. He would serve as pastor at several churches in Tennessee while he completed his dissertation work on the Ecology of Chilowhee Mountain, Tennessee through the University of Tennessee, Knoxville.

Following the completion of his dissertation in 1966, R. Dale Thomas obtained a faculty position in Monroe, Louisiana at Northeast Louisiana State College (later Northeast Louisiana State University and currently the University of Louisiana at Monroe). His tenure in Louisiana would last for 37 years. During that time, he taught numerous field-based botany and plant systematics courses. He would lead students on trips throughout Louisiana and across the United States, exposing them to the diversity of plants and ecosystems from the Atlantic Coast to the Rocky Mountains. He was also a frequent leader of hikes at the Spring Wildflower Pilgrimage in the Great Smoky Mountains National Park. At this yearly event he had the opportunity to teach

his current students and the public about the diversity of plants in the Smoky Mountains, where he first began to explore plant diversity.

In addition to his teaching, R. Dale Thomas mentored many students who conducted research projects on the southeastern flora. His students completed floras of natural areas, Louisiana Parishes, and counties of adjacent states. These studies helped to expand and define the ranges of numerous southeastern taxa. The collections of these students, in addition to R. Dale's own collections, would grow the herbarium at Northeast Louisiana University (NLU) astronomically during his tenure. When he arrived in Monroe, the herbarium contained approximately 250 specimens dispersed over three cabinets. By the end of his career, R. Dale Thomas had personally collected over 174,000 unique specimens, recognized as the highest number of plant collections by a single collector. He would often collect many duplicate specimens per collection. These duplicates would be dispersed as exchanges to over 200 global herbaria. These specimen exchanges not only allowed national and international botanists to have access to a unique record of the southeastern flora, but they provided students in northeastern Louisiana with a remarkably diverse herbarium that grew to over 470,000 specimens.

R. Dale Thomas' collections spanned the breadth of the plant Kingdom, but he is particularly well-known for his work on *Ophioglossum* L. (Adder's Tongue Ferns), and especially the diminutive species *O. crotalophoroides* Walter. He developed an expert understanding of the microhabitats associated with the species and documented the distribution of the fern, previously thought to be rare, throughout Louisiana and in numerous counties in the southeastern United States. The small fern can be found in slightly damp soil among very short vegetation. R. Dale Thomas instructed numerous students to crawl about on their hands and knees in lawns and cemeteries, searching for the species.

R. Dale Thomas could demonstrate a mischievous streak in his teaching and research. On one outing with the author of this piece, R. Dale gestured toward a pile of dead leaves and gave instructions to collect a voucher of the *Ophioglossum*. Smiling at his confused student, who could not observe anything resembling a fern, R. Dale swept away the pile of leaves with his walking stick, revealing a beautiful patch of *Ophioglossum* underneath.

R. Dale Thomas retired from The University of Louisiana at Monroe in 2003. Following a retirement party that was attended by dozens of former students, he returned to Sevier County, TN with his wife Barbara. There they helped to raise their grandchildren on one half of a mountain that they had purchased for their retirement. Following Barbara's passing in 2008, R. Dale Thomas continued to be involved in his community. He was engaged in activities at his church and sold plants at his local farmer's market. He also continued to lead hikes at the Spring Wildflower Pilgrimage in the Great Smoky Mountains National Park. He took several trips with his family to Hawaii and Costa Rica where he continued to explore global plant diversity.

The NLU herbarium was relocated from Louisiana to the Botanical Research Institute of Texas (BRIT) in 2017. At BRIT, the hundreds of thousands of specimens R. Dale Thomas amassed during his career continue to be curated and serve as an important historical record of the plants of Louisiana and beyond.

R. Dale Thomas left behind a legacy of former students who have pursued their own work in academia, field sciences, and beyond. The hundreds of thousands of plant collections that he amassed and distributed remain in herbaria around the globe. They not only serve as a historical record of the diversity of plants in the southeastern United States, but also as a reminder of one person's passion for teaching and love for the natural world, sciences, and beyond. The hundreds of thousands of plant collections that he amassed and distributed remain in herbaria around the globe. They not only serve as a historical record of the diversity of plants in the southeastern United States, but also as a reminder of one person's passion for teaching and love for the natural world.

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Figure 2: R. Dale Thomas at his retirement party surrounded by former students.

Acknowledgements:

The author expresses gratitude to Suzanne Thomas Spell and Patrica Blackwell-Cox for providing photos of R. Dale Thomas and for reviewing this piece for accuracy.

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Diversifying Collections in Herbaria: A Pilot Project to Create a Color Pigment Library for the Genus *Aloe*



Figure 1: Pigment vouchers from the first set of *Aloe* plants sampled (photo credit: S. Lahmeyer, Huntington Library, Art Museum, and Botanical Gardens).

In 2021, a collaborative project was undertaken by botanical staff from The Huntington Library, Art Museum, and Botanical Gardens and artist Enid Baxter Ryce, professor of Experimental Arts and Environmental Studies at California State University, Monterey Bay, to create and document a color pigment library for the genus *Aloe*. This unique ethnobotanical collection explores and documents the range of dried pigment colors in the genus using a reference Pantone® color scheme.

As of December 2021, a color library was developed for thirty-four species of *Aloe* as part of a pilot phase of the project. Ten of these species were artistically interpreted by students at CSU Monterey Bay as part of a Visual Design course that used traditional Medieval Herbals as inspiration.

Using the Huntington's rich collection of more than 350 species, freshly extracted leaves were hammered and pressed to remove the leaf exudate (usually yellow, but sometimes drying a different color) that is well known for the genus. The exudate was allowed to dry for one week, leaving oxidized plant pigments that were then evaluated for a color match. The dried plant pigments were stored on archival paper and archived in the Huntington Herbarium (HNT), as a pigment reference collection.

It is the hope of the authors that this niche collection highlights the diversity of collections that can be stored in

herbaria and further serve the dual purpose of complementing existing pigment libraries, as well as offering another set of traits that may be useful in the field for botanical researchers studying *Aloe*.



Figure 2.: Student drawn color chart of *Aloe petricola* Pole-Evans as part of a visual design course at CSU Monterey Bay (photo credit: Visual Design course, CSU Monterey Bay).

Acknowledgements:

The authors wish to thank Deb Stoike, John Trager, and Irene Tsatsos for their help and support with this project. This project was a creative offshoot of an ethnobotanical study From the Ground Up: Nurturing Diversity in Hostile Environments, a project of Armory Center for the Arts, which was supported by the Getty Arts Initiative Pacific Standard Time

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Enid Baxter Ryce,
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Kelly Fernandez,
Head Gardener of the Herb Garden, The Huntington Library, Art Museum, and Botanical Gardens

Reassembling an Herbarium

This is a short reflection on a large subject: rebuilding the herbarium of the Botanical Museum Berlin-Dahlem (B) after a great deal of it was destroyed by bombs in 1943. Of its approximately 5 million specimens at the time, only a half million survived (Hiepko, 1987). Some were in the west wing and basement that escaped total ruin, and the 38,000-specimen collection of Carl Willdenow, mentor of Alexander von Humboldt, was safe in storage. There were also some loans that were returned after the war. Still the loss was massive since Berlin-Dahlem was one of the largest herbaria at the time and held a large number of type specimens.

Here I would like to discuss just a few of the efforts over the years to rebuild the collection, which, according to the 2021 Index Herbariorum Annual Report, now has about 3.8 million specimens. Days after the bombing, the rector of Vienna University sent a letter to the director of the Botanic Garden and Botanical Museum Berlin-Dahlem promising support in rebuilding the collection. In 1944, fourteen boxes of specimens were sent from Vienna to a German mine being used to store botanical material evacuated from Berlin. Ten of the boxes contained 60,000 specimens amassed in the 19th century by members of the Reuss family who collected throughout Europe. Beginning in the 1950s the specimens were sorted into families, then gradually the specimens were mounted and integrated into the general collection. Lack, Rahe, and Killian reported in 2019 that this process was nearing completion. Rebuilding an herbarium is a slow process, even when the donation was given before rebuilding could begin.

The Reuss collection was created by August Emanuel Reuss (1811–1873), who was a physician in Bílina, Czech Republic north of Prague and collected many types of natural history specimens, including plants. His sons August Leopold and Wilhelm Joseph, both physicians, added to the collection, which also held many specimens from other collectors. It appears that at some point after August Leopold Reuss donated it to Vienna University in the early 20th century an unknown number of specimens were integrated into the herbarium's collection, with the rest remaining unmounted. Now that the entire collection has been processed it is clear that most of the material is from Europe, and that a significant portion is from gardens, including the botanic gardens of the universities of Prague and Vienna as well as a number of private gardens, some of which no longer exist. This makes the specimens interesting in documenting what was grown in such venues in the 19th century

Another article (Vogt & Gottschlich, 2022) deals with a relatively small cache of plants in the *Hieracium* L. (Asteraceae) genus that were collected between 1902 and 1922 by Ferdinand Tessenorff, a teacher and amateur botanist. The 565 specimens were found in the backlog at Berlin-Dahlem; most of the other specimens he collected had been processed and incorporated into the herbarium, so were lost in 1943. The *Hieracium* collection avoided destruction because it was among unprocessed material stored in the Harz Mountains during WWII. In examining the plants, the authors identified 11 type specimens of nine names that had been described by Karl Hermann Zahn, who had studied Tessenorff's collections for his treatment of *Hieracium* in Adolf Engler's *Das Pflanzenreich* (Zahn, 1921, Vol. 4). Zahn's herbarium was destroyed during the war, making these specimens particularly important. This is a small contribution to enriching the information in the Berlin-Dahlem Herbarium, and it suggests that the rebuilding will continue well into the future.

Another indication of this is an article from several years ago by the *Solanum* (Solanaceae) experts Maria Vrontsova and Sandy Knapp (2010). It reports on material they found at the Universität Göttingen Herbarium (GOET), but they begin by discussing the difficulties in their work posed by the loss of types for many *Solanum* species in the 1943 Berlin bombing. Paul Hiepko wrote a history of the herbarium in 1987 and prepared a list of the 20,000 types that survived. However, it was not just the loss of types. For some particularly rare species or those from areas not well-collected, there were no specimens available anywhere.

The project began in Britain before World War II with collaboration with German botanists to publish the Flora of East African plants was delayed for years afterward because many species had to be recollected (Polhill, 2015). And I am sure there were other such delays.

Vorontsova and Knapp's research was part of the PBI *Solanum* project to create an online flora for the genus *Solanum* and to designate lectotypes for all names in the genus. They went to GOET because Georg Bitter had been director of the Göttingen botanical institute and gardens from 1922 until his death in 1927. During his career which began in the early 1900s, he published many new taxa of African *Solanum* species often with Carl Dammer who was based in Berlin, where the types were held. These were destroyed, and since then taxonomists have been searching for duplicates. Some were found in various collections, but it was time-consuming to track down every lead.

Vorontsova and Knapp went to GOET because Bitter had brought his *Solanum* material with him when he moved there, and that is where it has remained. What they found was an interesting collection that included sheets with later material, but sometimes also with envelopes of fragments he had gathered from Berlin specimens and thus they could, in some cases, be considered type materials. A number of the packets contained not only plant fragments but also tracings of the more significant ones. The tracings were done in ink and a few had more than just an outline, with details like fruits painted in with ink. There were also several rubbings of leaves done in pencil. The authors carefully describe what they found in the packets. Ultimately, they were able to use this collection and other material to typify 37 names of African *Solanum*; 27 of these had no types before this work. It was quite an achievement and shows the effort involved in compensating for lost types. It also shows the continuing usefulness of art, even in the form of tracings and rubbings, in supporting study of plant material itself.

I have described these examples because I happened to come upon them, and it seemed to me worth writing as a reminder of what can be lost in conflict, as Ukrainian herbaria are now threatened and efforts are being made to store their collections safely. In the terrible firestorm that engulfed Dresden near the end of WWII, a large part of the technical university's herbarium was destroyed, and there was a recent article on the continuing work to inventory the collection there, which is an amalgamation from several institutions. The assumption was that most of the types had been lost, but a project that began in 2017 to sort specimens and update the names as well search for type material has resulted in the discovery of more types that had been expected. A paper by Wagner and Müller (2021) describes the type material found for the Poaceae family, especially from the collection of Hanns Stiefelhagen.

And to bring up another pleasant surprise, there was a report several years ago on pre-Linnaean herbaria that were thought to have been destroyed in WWII (Spalik, 2014). They were created by Georg Helwing (1666-1748) and after the war four could not be found. Then one was discovered in the National Library of Poland and another in the herbarium at the University of Warsaw (WA). Before the war they were in the Königsberg city library. These volumes are significant because they not only document plants growing in what is now Poland, but also chronicle Helwing's experiments in acclimatizing exotic species in his garden. In addition, they give Polish and German names for many of the plants. It pleases me to end the tragic stories presented here on a positive note.

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Early Career Advice

Andrew J. Henderson (Fig. 1), is a Curator Emeritus at the Institute of Systematic Botany in the New York Botanical Garden. His research focuses on the systematics of Arecaceae, and has traveled across South Asia, Central America, Caribbean, South America for the purposes of his research,

The Vasculum: How have herbaria enriched your research?

Andrew: As a systematic botanist, or taxonomist, my whole research is based on specimens in herbaria.

The Vasculum: What made you first interested in herbaria?

Andrew: I began my career as a horticulturist at Royal Botanic Gardens, Kew in London. I remember being fascinated by the idea of botanists and the herbarium – all this esoteric knowledge.

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

Andrew: I came to the New York Botanical Garden in 1982 as a graduate student. I suppose my first herbarium-related job was filing specimens – something that all grad students had to do in those days.

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

Andrew: 20th January 1983, a palm, *Leucothrinax morrissii* (H.Wendl.) C.Lewis & Zona, in Puerto Rico.

The Vasculum: What are some herbarium-specific challenges you have faced during your career and how were you able to overcome them?

Andrew: My research concerns the palm family [Arecaceae], and palms are traditionally poorly represented in herbaria. The plants are usually big, often spiny, and generally intractable. So I spent a lot of time in the field, collecting specimens.

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

Andrew: I remember as a horticultural student at Kew, going to the herbarium and asking one of the botanists about working in the tropics. He said, “oh, you should write to the Head of Science at the New York Botanical Garden.” I did, and my career began then. Pure luck.

The Vasculum: What advice could you give for early career members to be successful?

Andrew: Work hard.

The Vasculum: How is being an early career curator/collections manager nowadays more challenging than when you began your career?

Andrew: Now I think you need much broader skills than when I began, such as familiarity with molecular methods, statistics, GIS, etc.

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

Andrew: By emphasizing the importance of collections. I think the word ‘herbarium’ is something of an impediment. No one knows what a herbarium is, but everyone knows what a library is.

The Vasculum: What are some future challenges you see early career members facing, and how can they rise to meet those challenges?

Andrew: Funding, probably.

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

Andrew: It stores and curates collections of dried plants.

The Vasculum: What is the future of herbarium science?

Andrew: I think that herbaria in the future will become increasingly important. Once collections are digitized, and once there is software that can identify specimens, then we will have a huge database of specimens that can be used to answer any number of global questions on systematics, biogeography, ecology, etc. And this database will be vastly more important once we have perfected the sequencing of DNA from herbarium specimens. Imagine the amount of data!

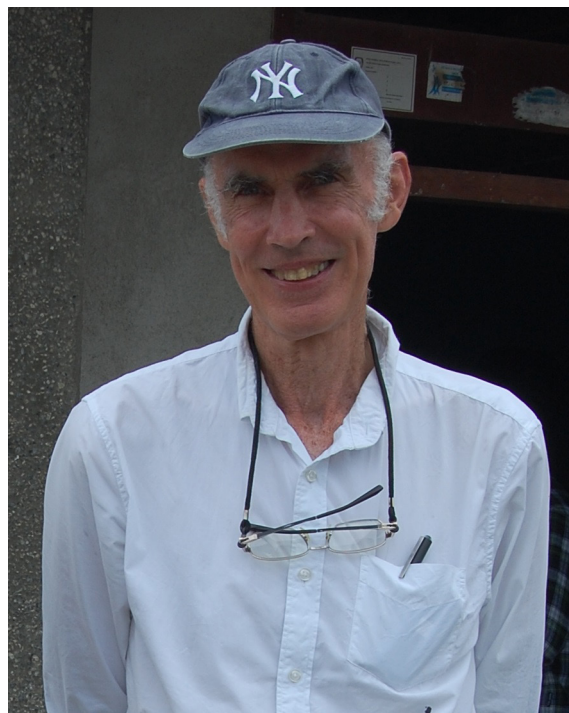


Figure 1: Andrew J. Henderson

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 (Anthony Baniaga; email: abaniaga@g.ucla.edu).

Featured Herbarium

Kwazulu-Natal Herbarium on its 140th Anniversary



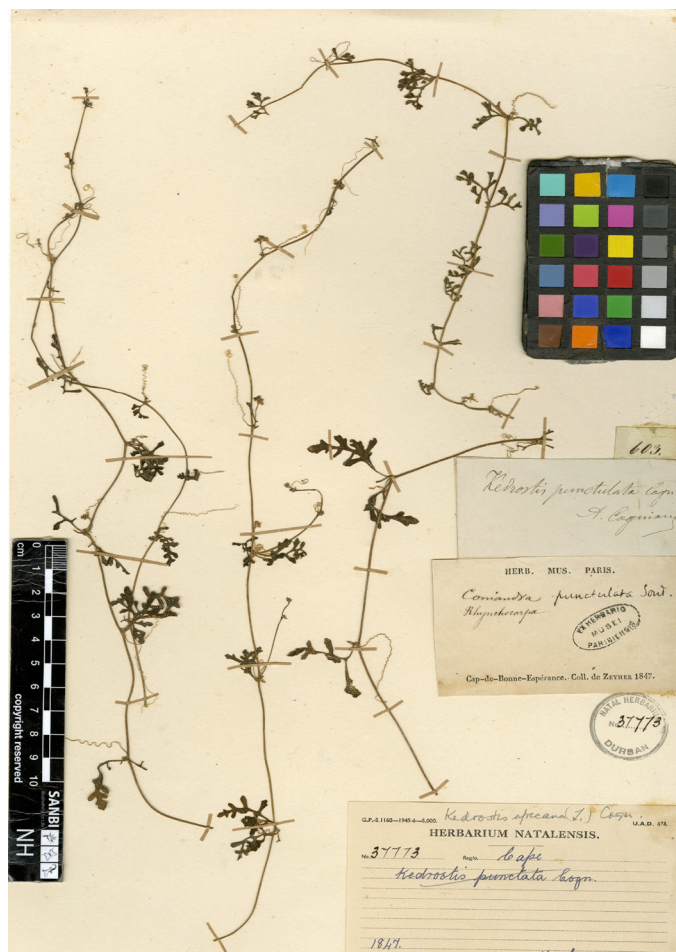
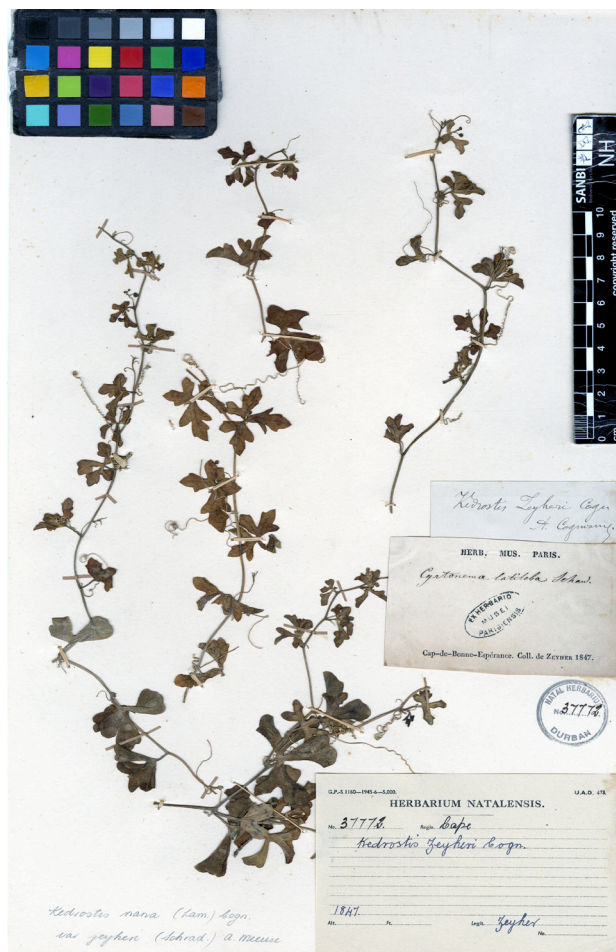
Left to right: -Figure 1a: Medley Wood House built in 1882 for the Curator of the Botanic Gardens, now serves as the administration building for the KwaZulu-Natal Herbarium; Figure 1b: The Herbarium Building built in 1902 continues to house the collection.

INTRODUCTION

The greatest achievement that dovetails with the 140th anniversary of the KwaZulu-Natal Herbarium (NH) is the completion of databasing all of its $\pm 140\,000$ specimens. Just with two full time technicians who from 2008 worked tirelessly and with courage to add specimens, train interns and adapt to changing databases, the data is now accessible. Since users of herbaria require clean data necessary for predicting biodiversity health, this article describes the KwaZulu-Natal Herbarium, a part of the South African National Biodiversity Institute (SANBI) from current to past.

DATA CURATION

As the Data Management Section developed at the SANBI National Herbarium (PRE), Pretoria, South Africa, an initiative followed South Africa, an initiative followed to database specimens in the KwaZulu-Natal Herbarium, one of the two regional SANBI herbaria. Specimens were captured in an in-house database called The National Herbarium of South Africa Computerized Information System (PRÉCIS). After a few years of deliberation, in 2014 SANBI adopted the Oxford University's Botanical Research and Herbarium Management System (BRAHMS) and migrated PRÉCIS data into BRAHMS. At this stage, $\pm 39,000$ of the specimens migrated were from the KwaZulu-Natal Herbarium collection, and this had doubled since 1999 due to the computerisation drive by the Southern African Botanical Diversity Network (SABONET) Programme. For the KwaZulu-Natal Herbarium, records include complete label information (all fields) and quality checks before being transferred to BRAHMS. As data capturing of mounted specimens in the collection is tailing off this year, data cleaning and updating are on the rise.



Left to right: Figures. 2a–b. Scanned images of Zeyher's specimens of 1847, *Kedrostis nana* (Lam.) Cogn. and *Kedrostis africana* (L.) Cogn., considered to be the oldest specimens among those with dates in the KwaZulu-Natal Herbarium.

The KwaZulu-Natal Herbarium records are accessible through the Botanical Database of Southern Africa (BODATSA) portal. BODATSA is making it possible for users to acquaint themselves with the specimen data as well as collectors, both early and modern, and their contributions over time, without having to work through the physical specimens. Querying of the dataset indicates the oldest specimens with dates in the collection are the two cucurbits (Fig. 2) collected by Carl Zeyher in 1847, when he spent time in Hamburg, Eastern Cape, South Africa before returning to the Western Cape. These specimens would have been added to the collection through exchanges by John Medley Wood, founder and first Curator of the KwaZulu-Natal Herbarium. A number of the early specimens do not have dates, like most of those collected by Gerrard and McKen between 1861 and 1872, which Wood used as a basis to start up the herbarium.

Between the period 1861, when McKen was Curator of the Botanic Gardens, and 1915 when Wood passed away as Director of the KwaZulu-Natal Herbarium, the collection had built up to ±13,500 specimens of South African plants, the remaining 32,500 were from tropical areas outside of Africa. Among these are a number of specimens of Thomas Cooper, who is regarded as an important early collector in KwaZulu-Natal, and John Sanderson, who played a prominent role in the political affairs of the Natal Colony. Both Cooper and Sanderson sent specimens to the Royal Botanic Gardens, Kew and are commemorated in the names of a number of species. Sanderson is also honoured by the genus *Sandersonia* Hook. f.

The dataset also shows collectors with the highest number of specimens in the collection (Fig. 3), and among these is a current staff member, Mkhipheni Ngwenya. It also indicates 3626 specimens of Wood's are in the collection, which is less than the 6000 reported by Schrire (1983). It is most likely the specimens counted previously with Wood as collector, had been databased with Wood's assistants as collectors and among them are John Wylie and 'Indian Collector'.

SPECIMEN DIGITISING

As a partner in the African Plants Initiative (API), the KwaZulu-Natal Herbarium managed to barcode and scan close to 1380 type specimens between 1 February 2004 and 31 December 2006. The images are now accessible through JSTOR Global Plants. The API was funded through the Andrew W. Mellon Foundation with the aim to digitise type specimens and associated information of African plants housed in northern and southern herbaria, and to make them accessible electronically (Smith 2004). The Epsom scanners that were set up for the API digitising are still in use at the KwaZulu-Natal Herbarium (Fig. 4). They are used for images requested by researchers and projects. Though the scanners produce excellent quality images, the rate of scanning is slow. Therefore, digitising the collection is likely to continue using a light box with a camera system. Discussion is also underway in SANBI on mass digitising of specimens in its three herbaria.

THE COLLECTION

About 2000 new specimens are added each year to the KwaZulu-Natal Herbarium collection, and a number of specimens from 2019 are being databased currently following interruptions by the COVID-19 pandemic lockdowns. Expansion of the collection is through field work by the herbarium staff in areas that are under-collected, these are often sites in rural KwaZulu-Natal. Staff in the SANBI's Biodiversity Research, Assessment and Monitoring (BRAM) Division also contribute specimens to the collect-

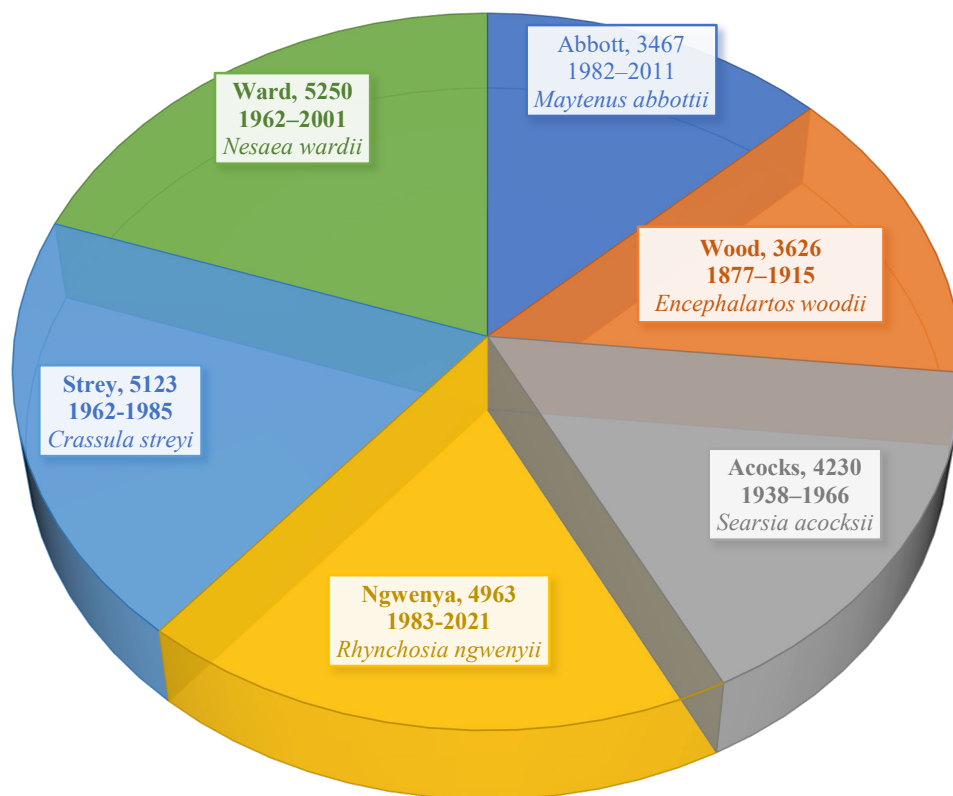


Figure 3: Collectors with the highest numbers of specimens in the KwaZulu-Natal Herbarium collection, each one commemorated in one or more plant names. The years are from records indicating collecting period (BODAT-SA 2022).



Figure 4: Two specimen digitising stations in the KwaZulu-Natal Herbarium

ion. In addition, the herbarium benefits from collections linked to research projects and Bioblitz activities at universities, as well as Environmental Impact Assessments (EIAs) by private companies. Being a regional herbarium, the KwaZulu-Natal Herbarium has specimens mostly representing the eastern region of South Africa which includes the provinces of KwaZulu-Natal, Mpumalanga, and Eastern Cape. The collection represents ± 6040 species of ferns, gymnosperms, and flowering plants in KwaZulu-Natal (Table 1).

	Families	Genera	Species
Ferns and allies	34	82	190
Gymnosperms	6	7	22
Monocotyledons	47	331	1445
Dicotyledons	150	1032	3868
TOTAL	316	1677	6040

Table 1: Estimate of families, genera and species for plant groups in KwaZulu-Natal based on specimen records in BODATSA (2018)

The collection also has a separate cultivated plant section built up from February 1979 by Mrs. B.J. Pienaar, a half-day technician in the collection. It also has a wet collection, housed in an Inflammable Store, a few metres from the Herbarium Building. The wet collection contains mainly plant parts preserved by researchers for anatomical studies, and among these are a number of samples collected by Rudolf Strey (1907–1988) who was the Officer-in-Charge from 1962.

BRIEFLY TRACING BACK TO THE 1ST STEPS

The KwaZulu-Natal Herbarium has a long proud history of achievements and success over the past 140 years. The developments towards a Botanic Gardens and herbarium, and achievements by various Natal botanists are presented in detail by Schrire (1983) and Bayer (1971) respectively.

1982–2022

Brian Schrire was Curator of the KwaZulu-Natal Herbarium from 1 August 1979. One of his milestones was setting up a Quick Guide system for plant identifications (Fig. 5). He also appointed and mentored Mkhapheni Ngwenya in using the Quick Guide and keys for identifications. By 1982, the collection had over 75,000 specimens, mostly plants from KwaZulu-Natal (Schrire 1983), and this was different to the period up to 1915 when Wood had incorporated about 75% non-South African specimens into the collection. Schrire left the herbarium in 1985 and took up a post in the Kew Herbarium (K), and Marie Jordaan who was a technician at the herbarium from June 1981 undertook the Curator duties. Jordaan then moved to the National Herbarium, Pretoria and Ashley Nicholas, a scientist at the National Herbarium was appointed as Acting Curator of the KwaZulu-Natal Herbarium.

In 1988, Rosemary Williams was the first female appointed as Curator of the herbarium. During her term, a number of citizen botanists were encouraged to photograph, collect, and submit specimens to the herbarium.



Figure 5: Inside the herbarium showing the Quick Guide cabinet (opened) with dicot specimens

This also grew from her collaborations with authors of field guides of KwaZulu-Natal and the Eastern Cape. Many new specimens were added to the herbarium and storage space presented a challenge. Therefore, the extra southern African specimens were donated to the National Herbarium, Pretoria. While Williams was the Curator, an interest in Indigenous Knowledge Research developed at the KwaZulu-Natal Herbarium. The collection supported and benefited from research on medicinal plants in the province that was being conducted at the University of Zululand. A post for an ethnobotanist was created as part of the herbarium, and subsequently the post was moved to a newly established Ethnobotany Unit. As its functions expanded over the years, the Ethnobotany Unit evolved and now represents Wildlife Economy in the SANBI BRAM Division. Later, Williams together with stakeholders established the Zulu Botanical Knowledge Project which added ±2000 specimens to the collection, and these are from rural areas in KwaZulu-Natal. The product of a trial phase of the project was a book *Ulwazi LwamaZulu ngezimila: isingeniso* (Fig. 6) which gives the meanings and the origins of the isiZulu names for 40 plant species. With the birth of her son, Williams exited the Curator post in February 2003 and moved into a half-day scientist post for the year that followed.

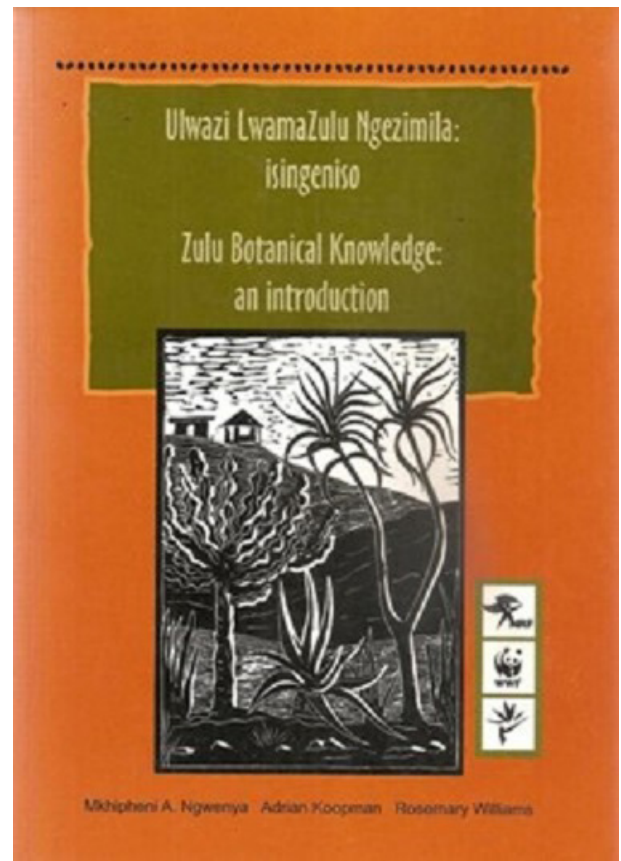


Figure 6: Product of the Zulu Botanical Knowledge Project

On 1 March 2003, Yashica Singh, a scientist at the herbarium from January 1994 was appointed Curator. At the same time, the name of the province changed to KwaZulu-Natal and the Herbarium, which did not have a specific name before, followed with an application for a change in name. In the strategic plan of the herbarium, Singh's first priority was to database all specimens in the collection. This led to her applying for the gardener post to be converted to a technician post dedicated to data capturing specimens, and garden care was outsourced. The target for the number of specimens to be databased each year was doubled and when there was opportunity, interns were appointed to help achieve the target. Current taxonomic research being done at the herbarium include the families Portulacaceae, Melianthaceae and Hypoxidaceae. The herbarium staff also engage in training and promoting botany in the community, the most popular being the One day herbarium hands on course for four universities in KwaZulu-Natal. Since 2008, the herbarium also accommodates the BRAM Division's nodes for the Directorate of Biological Invasions and Custodians of Rare and Endangered Wildlife (CREW), both of which are active in the field and contribute specimens to the collection.

1915–1982

In 1915, Dr. Paul van der Bijl, a noted mycologist became the second Curator of the Herbarium following the death of Wood. For the next 50 years, the main focus of the unit was plant pathology, although plant taxonomy was never completely stopped. With the appointment of Strey as the Officer-in-Charge of the KwaZulu-Natal flora based at the Herbarium, there was a renewed interest in taxonomy. A few years later, ecologists joined the unit and stayed until 1979. However, a few taxonomists including Jim Ross, Charles Stirton, and Marie Jordaan worked in the collection, and a major output in 1972 was the *Flora of Natal* by Ross.

1882–1915

Wood collected extensively and he did this with the help of his assistants (Bayer 1971). He also exchanged specimens with herbaria and gardens, national and international, and had built the collection up with ±43,000 specimens. In 1913, due to lack of funds, the Botanical Society split the land on which the herbarium stands and the herbarium was then transferred to the newly formed Department of Botany and Plant Pathology. The rest of the Botanic Gardens was transferred to the Durban Corporation which is now the eThekweni Municipality. Wood continued as Director of the herbarium until his death in 1915. One of his assistants, John Wylie was appointed Curator of the Durban Botanic Gardens.

1848–1882

The history of the KwaZulu-Natal Herbarium is inextricably linked to that of the Durban Botanic Gardens. This is shown in the timeline for 1848–1882, taken from Schrire (1983) (Fig.7).

FOUNDER OF THE KWAZULU-NATAL HERBARIUM: Dr. John Medley Wood at a glance (Fig. 8):

He was a self-trained botanist started his career as a botanist in 1875. He published a popular book on Natal ferns (Wood 1877) and is often referred to as Father of Natal Botany. He was appointed as the Curator of the Durban Botanic Gardens in 1882 and founded the Natal Herbarium

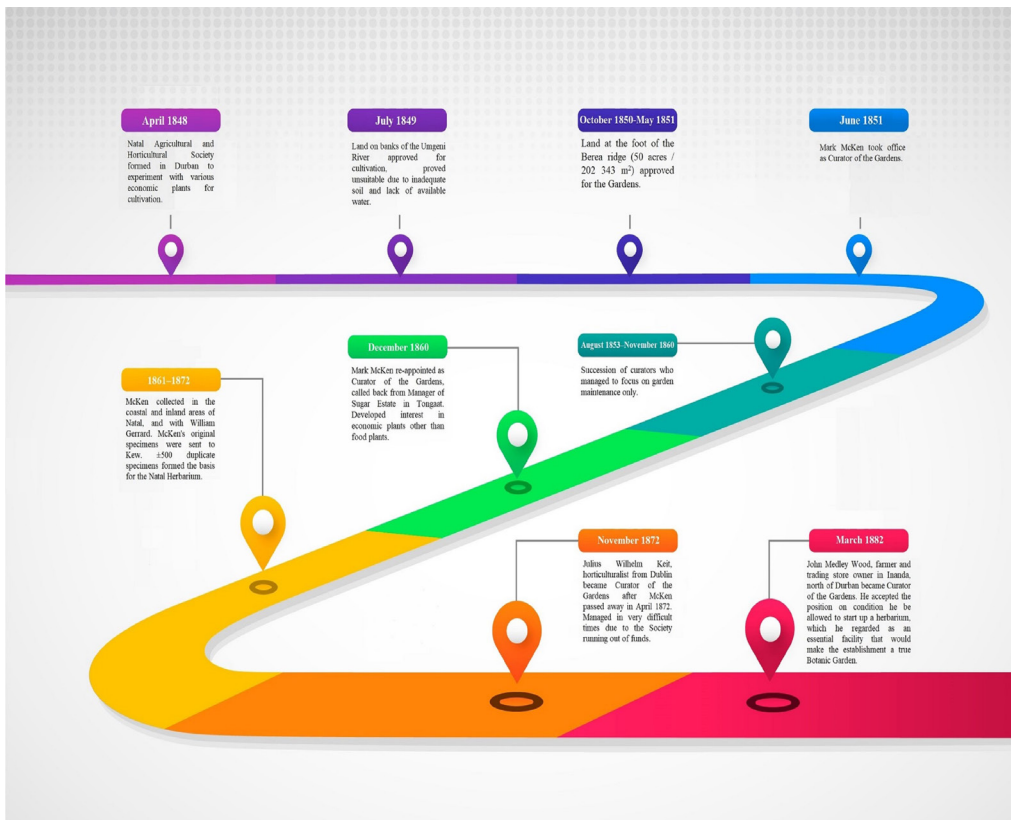


Figure 7: Timeline showing developments from 1848 to 1882 when the KwaZulu-Natal Herbarium was started

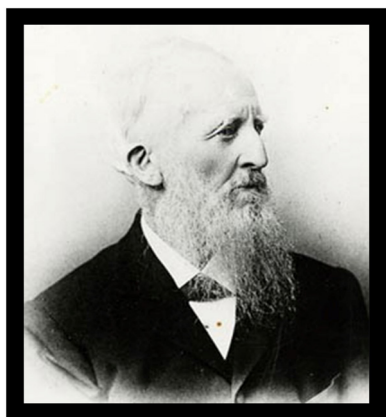


Figure 8: John Medley Wood

in 1882. Dr. Wood also served as the director of the Natal Herbarium in 1913 and published six volumes of Natal Plants with illustrations, covering 600 species and was honoured by Schlechter in the genus *Woodia* Schltr in the Asclepiadaceae. He is also recognised in *Encephalartos woodii* Sander or Wood's Cycad, which is now extinct in the wild. In 1913, at the age of 86, he was awarded an honorary doctorate from the University of Cape Town.

LOOKING AHEAD

As we celebrate the Herbarium's past, we look forward to transforming its future. The Herbarium's building expansion project will resume this year. This will provide additional space to support the rearrangement of the collection according to the Angiosperm Phylogeny Group (APG) classification. Tied-in with changing to a modern classification is the replacement of

wooden cupboards with steel cabinets for improved security against fire and floods. A scientific curation plan for the next five years is being rolled out and the Herbarium's data cleaning and digitisation workflows are designed to support the plan. The Flora of KwaZulu-Natal is being updated with contributions from plant family experts, and this will be published as part of the SANBI Strelitzia series.

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