

With deep roots and expanding collection, herbarium offers window into plant history

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Deb Lewis is curator of the Ada Hayden Herbarium inside Bessey Hall at Iowa State University. She is handling historic specimens collected by George Washington Carver and Ada Hayden. Iowa State's herbarium absorbed the University of Northern Iowa's herbarium last fall. Credit: Christopher Gannon/Iowa State University

The offices on the perimeter of the third floor of Bessey Hall on the Iowa State University campus have windows. A complex of four adjacent interior rooms across the hallway from those offices is a window, albeit a figurative one.

That's where you can find the Ada Hayden Herbarium, a collection of preserved plant, fungal and algal specimens established in the university's earliest days and built in part by contributions from some of its most celebrated scholars. It's akin to a plant library, a resource for documenting and conducting research.

While widespread collection of specimens has slowed as new methods of studying plants have emerged, those same advancements can use herbarium holdings in powerful new ways.

"This wasn't done when I first started, but nowadays herbaria are incredible repositories for DNA sampling. And they're a really important resource for studying biodiversity," said professor and interim chair of ecology, evolution and organismal biology Lynn Clark, director of the herbarium since 1989. "The information you can extract is irreplaceable."

At Iowa State, the herbarium has more information to extract than ever. The collection has more than 700,000 specimens, roughly twice as many than at the start of Clark's career. The growth in recent decades has come largely from absorbing the University of Iowa's 220,000 specimens in 2004 and the University of Northern Iowa's 50,000 last fall. Adding those collections has made the Ada Hayden Herbarium a one-stop shop for studying Iowa's native plants.

Clark said it's bittersweet to grow due to other facilities closing, but centralizing the collections of the Board of Regents institutions has some benefits. Iowa State now has a sample of every known plant native to

Iowa, she said.

"There's a little bit of sadness, but without a doubt, adding those specimens makes us stronger," she said. "It really rounds out our Iowa collection."

Historic holdings

Most herbaria are found at research organizations, such as universities, botanical gardens and museums. Ada Hayden Herbarium is among the 25th largest in the U.S., which has about 750 herbaria holding 79 million specimens.



Historic specimens collected by George Washington Carver stored within the

Ada Hayden Herbarium inside Bessey Hall at Iowa State. Credit: Iowa State University

Stored in about 250 large metal cabinets spread across the facility's 4,300 square feet, Iowa State's collection includes specimens from some of its best-known scientists: George Washington Carver (renowned agricultural researcher and Iowa State's first Black graduate and faculty member), Charles Bessey (herbarium founder and namesake of the building where it's located) and Ada Hayden (preservationist who was Iowa State's first female doctoral graduate and, since 1988, the herbarium's namesake).

"For many different reasons I have many different favorites, but I'm pretty amazed whenever I come across specimens from our most historic collectors," said Deb Lewis, the herbarium's curator.

The majority of the herbarium's holdings are plants that have been dried, pressed, labeled, affixed to archival paper and stored for reference. Mounted and kept correctly, they can last for centuries.

One of the most significant collections at the Ada Hayden Herbarium comes from Davenport physician-turned-botanist Charles Christopher Parry. Medical doctors of the era often studied plants to make their own medicines, but Parry was an especially enthusiastic botanical explorer. He collected 15,000-some specimens in the upper Midwest, Rocky Mountains and Mexico, starting in 1848. His collection includes numerous "types," the initial documentation of a new plant species.

First-of-their-kind specimens are scientifically important, and Parry's are part of the roughly 2,000 plant types and another 600 fungal held by Iowa State, Lewis said. As plant science progresses, however, scholars

may end up valuing samples that seem inconsequential now.

"We don't know which specimen will be important to someone's research, so we give great care to them all," Lewis said.

Practical purposes

One of the primary uses of an herbarium is solving plant identification mysteries, a surprisingly common conundrum, Clark said.

"We're the plant identifiers of last resort. If the horticulture or weed science people get something and they don't know what it is, they bring it over here. That's an issue because invasive species are showing up all the time," she said. "People think it's easy to identify a plant species, but sometimes it actually isn't."

Iowa State's herbarium also is a powerful opportunity for hands-on student instruction. Biological and premedical illustration students use specimens as subjects, and students in Clark's plant systematics courses tour the herbarium as they learn how to navigate sources of plant information. A small team of students works part-time at the herbarium, helping with ongoing tasks such as specimen mounting and filing.

Herbarium specimens are used frequently in research projects. Lewis recalled a post-doctoral researcher in chemistry who tested new methods for sampling DNA from a plant that was more than 100 years old. Clark recently had a graduate student who rehydrated grass flowers to create 3D digital models. The models were used as a teaching tool and to study wind pollination, with testing done in a virtual wind tunnel.

"That's something you wouldn't even have imagined was possible 20 years ago," Clark said. "There's no limit to the creative research ideas."

An herbarium can play a key role in studying biodiversity and climate change impacts due to the granular details included in specimen annotations, Clark said.

"There have been some interesting studies related to flowering times. They've been getting earlier and earlier," she said.

Digitizing that information to make it easily accessible remains a work in progress, as is better integrating the Iowa and UNI specimens, Lewis said.

"We want to maintain continuity for the future and keep making the [herbarium](#) more usable now," she said. "That's probably a forever project."

Provided by Iowa State University

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