Digitized Prairie Natural History Collections Available Through K-State's New Biodiversity Web Portal

MANHATTAN -- The biodiversity of the prairie ecosystem of Kansas and the Great Plains in the 19th century fascinated peers of Darwin. They collected specimens avidly and cataloged the collections, looking for patterns and interactions.

The importance of understanding the natural world led Kansas State University to establish a plant museum, or herbarium, in 1877, and an insect museum in 1879, well before farming and ranching dominated the prairie.

Scientists ever since have relied on these K-State collections as a primary source of vouchered information about what species once existed in Kansas and about species distributional changes, including changes across a significant portion of the North American prairie ecosystem that's now imperiled.

Today, the K-State herbarium ranks among the oldest, largest and most diverse plant collections in the Great Plains with holdings of preserved plants estimated at 200,000 specimens. The insect collection contains approximately 835,000 specimens, including some extinct, endangered or declining species.

K-State has now opened an ambitious digitization project that makes about all of its core historical natural history collections accessible to anyone from anywhere in the world. The biodiversity information system Web portal BiodIS is available at http://biodis.k-state.edu

"The K-State Digital Prairie Plant and Insect Collection: Elevating Biodiversity and Bioinformatics to the Next Level" is a four-year, $800,000 project funded by the university through its Targeted Excellence program. Directing the project are Greg Zolnerowich, associate professor of entomology and curator of the insect museum; Carolyn Ferguson, associate professor of biology and curator of the herbarium; Mike Haddock, professor and chair of the sciences department for K-State Libraries; and David B. Allen, associate professor and head of the K-State Libraries digital initiatives department. Early-stage support for the project came from National Science Foundation and its EPSCoR program, the Kansas Agricultural Experiment Station and K-State Libraries.

K-State's project parallels similar efforts worldwide to digitize collections at natural history museums, herbaria and universities, and eventually to link, via common access points, all the resulting databases to ever-larger networks of like collections.

The K-State databases will link via the BiodIS portal to the vast Global Biodiversity Information Facility, which currently includes 47 countries and 33 organizations as participants.

By scientific custom, every plant or insect specimen is labeled with its scientific name, where and when it was collected, the habitat associated with it, the collector's name and other details. In year two of the K-State project, data about 56,000 of the 800,000 pinned insects and 107,000 herbarium records have been entered into the database, and specimens are being moved to modern storage cabinets for safekeeping.

"Each of the million specimens in our holdings can be seen as a little snapshot of the flora and fauna of the spot where it was collected," said Mark Mayfield, the herbarium's databasing coordinator and plant identification specialist. "One of our aims in digitizing is capturing all the data from the specimens and making that data available to anyone in the world."

For example, portal software can generate distribution maps of a particular plant or insect species. An ecologist in Kenya who studies savanna grasses could compare Africa's grasses with the prairie grasses of the K-State collection; another scientist might study grass-feeding insects.

"Some day we hope to be able to go to some collective portal that holds records from say 1,000 herbaria in the world and from them bring back all the records for a species, a county or a certain author," Mayfield said. "Without digital access, we would otherwise be required to visit many different institutions around the world and slog through all their millions of specimens to answer our questions."

Zolnerowich thinks the Web portal is on the wave of using information in new ways. "Technology is moving so quickly, and, consequently, we now have methods to analyze distributions using spatial and temporal information for many different kinds of analysis," he said.

Allen said the digitization project demonstrates the enormous value of reusing datasets. "We're offering 100 years of data," he said. "For example, a climate change researcher might use the K-State biodiversity portal to study the interaction of an insect with a particular plant and do that over time. That could not be done before now."

"The digital environment is almost instantly a two-way interaction," Haddock said. "As librarians, we are learning to think of the physical plant and insect specimens as another kind of library collection, and we are grappling with how to disseminate all this information in a variety of user-friendly ways."

To Harish Maringanti, systems analyst at Hale Library, the information needs of the many potential users are helping shape the portal. The K-State team plans to add social networking tools, for example, and a wiki for K-12 teachers to collaborate on lesson plans.

"We hope to create an interface that's somewhat variable in order for K-12 users, specialists, conservationists, and biology teachers to be able to work with the data in their own ways," Maringanti said.

An additional portal feature will be its access to digitized, searchable versions of selected botanical and entomological historical volumes from the library and herbarium holdings.

Jenny Oleen, K-State science reference librarian, is directing the literature scanning component, beginning with the Frank Gates collection of books about wildflowers, grasses and trees. Gates was K-State herbarium curator from 1919 to 1955 and a prolific botanical writer. "His books are historical and Kansas-centric, making them a great place to start for this project," Oleen said.