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Smithsonian Leads Effort to Make Vital Biodiversity Information Available on International Scale

The Smithsonian Institution Libraries (SIL) has received \$594,000 from the Smithsonian's Atherton Seidell Endowment Fund to complete the first stage of a multi-phase project that will create a model set of electronic tools and resources for biodiversity studies.

This phase of the project consists of scanning, rekeying, and coding in eXtensible Markup Language (XML) the contents of 58 volumes of the *Biologia Centrali-Americana* (BCA), a fundamental resource for the study of Central American flora and fauna compiled from scientific surveys and explorations conducted during the late 19th and early 20th centuries. Many of the period's eminent biologists contributed to the scientific content of the BCA, and the accompanying illustrated plates are often the only images of Central American biota in existence.

The coded text will be mapped to a database and linked to other vital biological datasets, including the Smithsonian's National Museum of Natural History (NMNH) collections information system (the NMNH Multimedia Catalogue System), so that scientists worldwide can study specimens and other materials in the context of the published scientific record. This model research device will support the work of scientists, conservation groups, land planners, natural resource managers, and quarantine officials.

The project originated as a high-priority recommendation from the October 2001 conference, *Toward Collaborative Biodiversity Informatics: Mobilizing Collections and Research Data*, organized by the Smithsonian Institution and funded by the Andrew W.

Mellon Foundation. Key representatives from the American Museum of Natural History, The Natural History Museum (London), the Royal Botanic Gardens (Kew, UK), Missouri Botanical Garden, and the Smithsonian Institution (National Museum of Natural History, Smithsonian Tropical Research Institute, and the Smithsonian Institution Libraries) met to address the problems of managing and accessing the information embedded in large biological repositories.

Production of a digital version of the BCA is the initial step in a larger, worldwide effort to facilitate access to the range of data necessary to understanding the world's biota and their environmental and evolutionary relationships. With NMNH staff providing scientific guidance, the project will serve as a model for several other major bioinformatics projects pursued by the world's leading biological repositories. Together these may speed the pace of scientific investigation into the nature of our rapidly changing biological environment.

What makes the endeavor such an improvement on existing research tools is that it integrates data from previously disparate sources, some of which exist in electronic form but many still exist only on paper. This will require intelligent linking between major biological datasets throughout the world, specifically:

- *Specimen collections in large repositories*
- *Taxonomic databases*
- *Published taxonomic literature*
- *Geographical information systems*

A scientific advisory committee, including scientists from NMNH will guide the project to ensure it will meet the special needs of the scientific community.

“Natural history museums and their libraries hold a wealth of information about the diversity of life on earth, but these data need to be made more available to a variety of users.” says Scott Miller, Chairman of Systematic Biology, at Smithsonian's National Museum of Natural History and one of the BCA project advisors. “Mining these data for purposes like conservation efforts, managing invasive species, protected area management, and disease will now be made easier and more streamlined.”

“The Smithsonian Libraries is delighted to explore the possibilities of digital technology to create new uses for previously published scientific work, which will then be available through our Web site, ‘Galaxy of Knowledge,’ says Nancy E. Gwinn,

Libraries' Director. "The lessons learned will help point the way to making the Internet even more fundamental to global scientific research."

SIL and NMNH anticipate that the digitized BCA will engage the systematic biology community by offering an experimental testbed for determining the best ways of linking different, yet complementary data sets. Discussions are already underway with possible partners such as the Flora Mesoamericana Project at the Missouri Botanical Garden and the Natural History Museum (London).

"A large part of this testbed will consist of determining the practices and standards needed to ensure effective linkages are made among relevant biological data systems," explains project head Thomas Garnett, Assistant Director for The Digital Library and Information Systems at Smithsonian Libraries. "An XML-based standard for coding taxonomic literature must be defined as part of this project."

The Smithsonian Libraries is a 22-branch system with online exhibitions, rare books, and information services online at www.sil.si.edu. The Libraries serves the Smithsonian and the public with information and reference support. Its collections include 40,000 rare books, 2,000 manuscript groups, 180,000 microfilm and microfiche, and nearly 300,000 commercial trade catalogs dating back to the 1850s and representing over 30,000 companies.

Opened in 1910, the National Museum of Natural History, located at 10th Street and Constitution Avenue, NW, is dedicated to maintaining and preserving the world's most extensive collection of natural history specimens and human artifacts. Its collections are being made available online at www.mnh.si.edu/mcs. It also fosters critical scientific research as well as educational programs and exhibitions that present the work of its scientists and curators to the public. During the year 2001, it welcomed more than 8.4 million people, making it the most visited natural history museum in the world.