



EMBARGOED FOR RELEASE: Sunday, Sept. 16, 2007; 8 a.m. Eastern Time

Media only: Michele Urie (202) 633-2950 or UrieM@si.edu
Carolyn Martin (202) 633-5197 or MartinCL@si.edu

Smithsonian Scientists Help Lead Effort to “Barcode” World’s Species

Smithsonian researchers are among the leaders in a worldwide effort to revolutionize the way scientists identify species in the laboratory and in the field with a technique called DNA barcoding. Similar to the barcode that identifies an item at the grocery store, a DNA barcode is used to identify and distinguish biological species.

This month, scientists are gathering in Taiwan for the Second International Barcode of Life Conference (Sept. 17-21). They will discuss potential applications for using DNA barcodes, including food safety, disease prevention and better environmental monitoring. There are now more than 280,000 DNA barcode records representing about 31,000 species.

“DNA barcoding is emerging as a global standard for identifying species in basic taxonomic research, biodiversity studies and in government regulation. The Smithsonian’s scientists are important leaders in the Barcode of Life Initiative, and the National Museum of Natural History is demonstrating the importance of museum collections,” said David Schindel, executive secretary of the Consortium for the Barcode of Life, based at the Smithsonian’s National Museum of Natural History.

Each of the world’s estimated 1.8 million species is genetically unique—its unique identity is carried in its DNA molecules. DNA barcoding rapidly sequences the DNA from a single, standardized gene on the DNA molecule. The technique can quickly identify species from larval forms or tissue samples that can sometimes be nearly impossible to identify through traditional methods.

Accuracy and speed are especially important, as much of world’s biodiversity is disappearing faster than scientists can tally species in rainforests and other threatened tropical ecosystems. Beyond tropical forests, DNA barcoding has practical applications for the public. Health and government officials are using DNA barcoding to help track disease vectors, monitor the environment and make the skies safer by reducing aircraft collisions with birds.

The Smithsonian has been involved in DNA barcoding since the technique was first proposed in 2003. The Smithsonian houses the Laboratories of Analytical Biology (LAB)—one of two North American “barcode factories” with the capacity to generate hundreds of thousands of barcodes per year.

The Smithsonian also plays a key role in coordinating the growing international research network and in making the technology available to scientists in other countries. Many of the countries where the need is greatest lack the scientific infrastructure for barcoding research.

“We need to take the biotechnology to the biodiversity,” said Lee Weigt, director of the LAB at the Smithsonian. The lab has developed inexpensive field kits for extracting DNA and Web-based training videos. “Whether you are working in a building with electricity, off the hood of your vehicle in the jungle or on a research boat, we have experience at all levels that we can pass on,” he added.

Smithsonian scientist Carla Dove and colleagues recently completed barcoding North American bird species, with support from the U.S. Federal Aviation Authority and the U.S. Air Force. Aircraft collisions with birds are hazardous; knowing which birds are most often struck and the timing, altitude and routes of their migrations could avert some of the thousands of annual collisions between birds and military and civilian aircraft. Scientists use barcoding to identify species from blood and tissue on the aircraft.

“DNA barcoding is the newest tool in the feather identification toolbox and allows us to obtain species level identifications in about 68 percent of the cases that we submit for DNA analysis,” Dove said. “That is a major breakthrough for this field of study and will benefit aviation safety on a global scale.”

The Mosquito Barcode Initiative is one of the largest projects under way. Mosquitoes are important vectors of disease, but even specialists can have trouble distinguishing disease-carrying species from harmless species, which may be identical in outward appearance. Better identifications will lead to more efficient control of vectors.

“DNA is a fantastic tool for sorting these things out,” said Richard Wilkerson, a research entomologist at the Walter Reed Army Institute of Research working at the LAB with Smithsonian scientists. There are 3,400 known species of mosquitoes, but Wilkerson suspects barcoding will reveal many more. “In one case in Australia there turned out to be 23 species going under one name. Only one or two are probably vectors,” he said.

The Smithsonian’s LAB also is working with the Environmental Protection Agency and the Maryland Department of Natural Resources to develop “better, faster, cheaper” ways of monitoring water quality in streams, Weigt said. Currently, water quality is assessed by identifying insect larvae living in the streams. But traditional methods are very time-intensive and subject to error. “It’s very difficult to pick up larvae of an insect and identify it all the way to species; but with DNA it’s easy,” Weigt said.

###