The way of the digital dodo

February 20 2009, Alvin Powell

An early version of the scanned dodo rendered by project research technician Abby Drake and students in Leon Claessens' lab.

(PhysOrg.com) -- The laser light glowed brilliant red, forming a moving line as it bounced information from the dodo's bones back into the high-tech scanner sitting on a tripod on the Museum of Comparative Zoology's (MCZ) fifth floor.

Again and again, the red line traced the contours of the skeletal bird, one of just a handful of complete skeletons of one of the world's most famous cases of human-caused extinction.

The flightless bird, about the size of a large turkey, was native to the

Indian Ocean island of Mauritius. It became extinct in the mid- to late-1600s from a combination of human hunting, habitat destruction, and predation by introduced animals, including rats, cats, pigs, and dogs.

The laser's tracings were creating a 3-D digital model of the skeleton, compiled as part of a joint effort between the MCZ's ornithological collection, overseen by Professor of Organismic and Evolutionary Biology Scott Edwards, and Holy Cross College biologist Leon Claessens, an assistant professor whose doctoral work at Harvard and familiarity with the MCZ's collections led to the collaboration. Claessens received his doctorate in 2006.

The National Science Foundation-funded, three-year effort aims to create 3-D digital models of each species represented in Harvard's collection of 12,000 bird skeletons. It will make those digital models available on the Internet for researchers around the world. The collection's digitization will not only vastly expand access to the collections for researchers who can't afford to travel to Cambridge, it will also make analysis of the specimens far more rapid, using powerful engineering software that creates thousands of data points on each bone that can be manipulated, measured, and used in calculations.

"This project will be useful for people studying the basic morphology of birds," Edwards said. "In this era of genomics, the size and shape of bones is still very important."

Claessens, who has been scanning with a group of his students since the "Aves 3D" project got under way in August, said much of the effort is aimed at disarticulated bones of specimens, so that the scanner can image the entire bone, including the ends and surfaces that might not be accessible in an assembled specimen. Researchers interested in the shape and size of a particular bone across different species will be able to call up those bones digitally, rather than traveling to individual museums

with calipers, pencil, pad, and camera, as would be required today. Those interested in other aspects of anatomy can manipulate the bones digitally, even reassembling the bird if needed.

“Once you have the digital model, you can take many, many measurements from fixed points,” Claessens said.

For specimens like the dodo, however, which Edwards said was one of the jewels of the collection, scanning the complete skeleton is the only option.

Claessens said the dodo skeleton, which was assembled of collected bones rather than those from a single individual, is one of just a handful — perhaps 10 — known around the world. That rarity makes it an important addition to the digital database. Having a digital model of rare skeletons will provide a backup should the original deteriorate or be damaged.

Having a scan of a complete dodo skeleton may also serve to widen the base of people interested in the online database, which is still under construction. While the digital database would be of obvious interest to ornithological researchers, Edwards and Claessens agreed that they would like it to also be of broader use. Digitization may provide new ways for students at Harvard and other universities to interact with the collection, while the presence of such rare specimens as the dodo may draw in the broader public, such as high school teachers and high school students interested in a particular aspect of avian anatomy for a science project.

The MCZ skeleton collection is not the largest around, Claessens said, but it is significant for its quality, holding several rare specimens like the dodo.

“The Harvard skeletal collection is a respectable one with a few gems, a few real rarities,” Claessens said. “These are amazing specimens.”

Provided by Harvard University

Citation: The way of the digital dodo (2009, February 20) retrieved 10 April 2024 from https://phys.org/news/2009-02-digital-dodo.html

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