CU-Boulder helps tap crowds to digitize museum records of bugs and plants

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Inside the natural history museums of the world are billions of animal and plant specimens from birds, fish and beetles to flowers, mushrooms and grasses, all stacked, stored and preserved in jars and collection drawers.

The rich and diverse collections could be critical to understanding how the Earth's biodiversity is changing in the face of a growing human footprint—if only the information were easily accessible.

A new online project, brought to life with the help of a team from the University of Colorado Boulder, is using citizen scientists to help solve the problem. Notes from Nature, http://www.notesfromnature.org, allows anyone with a curiosity for natural history, a computer and a little time to transcribe the often hand-scrawled tags attached to each specimen, which typically record the date, time and place where the plant or animal was collected, among other details.

"You can look at maps of the globe and you can see spots where we just don't know anything about vertebrates, let alone insects or plants or mollusks," said Robert Guralnick, associate professor in the department of ecology and evolutionary biology and CU-Boulder's point person on the Notes from Nature project. "We can fill in the gaps with these kinds of data that come from those drawers."

The concept that underpins Notes from Nature grew out of a collaboration among the University of Colorado Museum of Natural

History, the Natural History Museum of London, the South Eastern Regional Network of Expertise and Collections, or SERNEC, and University of California Berkeley's Calbug project, an umbrella for the nine major insect collections housed in California.

The vision was crafted into a reality by data-visualization specialists from Vizzuality and by Zooniverse, a web portal that already hosts online citizen science projects that allow the average person to comb through cosmic data in search of far-off planets, transcribe old ship logs to glean historical climate records, or listen to audio clips of nighttime bat calls to help identify and track the flying mammals.

"Our projects help answer research questions that can only be solved by a significant amount of human attention—they require people, not computers," said Arfon Smith, director of citizen science at the Adler Planetarium in Chicago and the technical lead for Zooniverse. "People have responded in a way that is truly great. There is an appetite for contributing to something real."

When Notes from Nature launched in late April, cyber citizen scientists had access to two collections for transcription: insects from Calbug and plants from SERNEC. In the future, the project plans to add the London museum's bird ledgers and possibly other museum collections as they become available.

The University of Colorado Museum of Natural History's zoology records have largely been entered into a database already. However, major digitization efforts are currently underway in the museum's botanical, entomological and paleontological collections, work that is being supported through a nationally funded initiative to increase access to museum records.

Almost immediately after the website went live, hundreds of people

started transcribing thousands of records, contributing a person-year's worth of work in just a handful of days. A month in, more than 2,100 people have completed more than 101,000 transcriptions.

Guralnick, who is the curator of invertebrate zoology at CU-Boulder's museum, is working to determine the cost-benefit tradeoff of crowdsourcing the transcription of museum collections as well as checking the quality of the resulting data and monitoring the time it takes to do the transcriptions online.

To create a baseline for his research, Guralnick paid a student to transcribe more than 1,000 records from the vertebrate zoology collection and logged how long the transcriptions took, as well as the quality of the student's work. He is now providing Zooniverse with the same records so they can be transcribed as part of Notes from Nature and the results compared.

The costs associated with each method vary based on the rate for a student's time versus the cost to build the web infrastructure for the Notes from Nature site. The online transcription also requires a digital photo be taken of each specimen, though new whole-drawer imaging technologies may make that process cheaper and more efficient in the future.

Guralnick has yet to crunch numbers, but the overwhelming initial enthusiasm from citizen scientists is promising. "We think, even in the first week, we've paid it off," he said. "That's really cool."

Each record uploaded to Notes from Nature is transcribed by three different people. By comparing the results, Guralnick and his colleagues will be able to come up with a quality metric and compare that metric to the quality of records transcribed in the traditional manner.

Once all the records in a collection have been transcribed, the larger goal is to make the resulting data accessible to more people. For example, the data could expand existing projects, like the Map of Life, http://www.mappinglife.org, which already allows people to use mapping software to access hundreds of millions of natural history records from specific geographic areas.

"When I see transcriptions happening at Notes for Nature I'm really watching little points on a map fill in," Guralnick said. "That's really exciting to me."

Notes from Nature is part of an ongoing effort by CU-Boulder's museum to engage the public in citizen science projects. Earlier this year, the museum launched The Bees' Needs. The project involves 250 participants recruiting solitary wood-nesting bees to pollinate their backyard gardens and then monitoring the bees' nesting habits.

Provided by University of Colorado at Boulder

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