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More Than 100 New Species Described by California Academy of Sciences in 2010

Global biodiversity surveys over the past few years have provided increasing evidence that our planet is in the midst of its sixth mass extinction. Plants, animals, and microorganisms are disappearing thousands of times more rapidly than they have for more than 65 million years, and for the first time in Earth's history, human activity is the predominant force behind this mass extinction. As governments and conservation organizations around the world attempt to stem this tide of disappearing species, they face a number of formidable challenges, but perhaps the greatest among them is this -- we have only documented and described an estimated 10 percent of the species on Earth, and it's hard to save a species when you don't know that it exists.

In an effort to help address this critical need for data about the diversity and distribution of life on our planet, scientists from the California Academy of Sciences have spent the past year exploring some of the most diverse -- and often most threatened -- habitats on Earth, searching for new species and creating comprehensive biodiversity maps. In 2010, these scientists have added 113 new relatives to our family tree, including 83 arthropods, 20 fishes, four corals, two sea slugs, two plants, one reptile, and one fossil mammal. The new species were described by a dozen scientists from the California Academy of Sciences along with several dozen international collaborators.

Proving that science still requires a spirit of adventure and exploration, the scientists made their finds over five continents (the Americas, Africa, Asia, and Australia) and three oceans (Atlantic, Pacific, and Indian), hiked through rainforests and dove inside submersibles, and looked everywhere from their own backyards (San Mateo County, California) to the other side of the world (the Seychelles). Their results, published in 27 different scientific papers, come during a year of heightened international interest in the conservation of life on Earth. The United Nations designated 2010 as the "International Year of Biodiversity" and held a Biodiversity Summit in Nagoya, Japan this

October, in which 18,000 participants representing more than 150 countries adopted strategic goals to combat ongoing biodiversity loss compounded by climate change.

"Species loss has been accelerating in the last 150 years due to human activity, with extinction rates estimated to be thousands of times greater than average," says Dr. David Mindell, Dean of Science and Research Collections at the Academy. "Scientific exploration and discovery of new species are essential to characterizing our planet's ecosystems before they disappear forever. Preserving biodiversity means healthy ecosystems, and healthy ecosystems are crucial to human health and economic well-being."

A recent example of this intimate connection appeared in the December 2nd issue of *Nature*, in which a team of U.S. and British scientists found that the transmission of infectious diseases, such as West Nile fever and Lyme disease, increased in environments where the diversity of wildlife was low. While the exact mechanisms behind this correlation remain unknown, the study illuminated a real danger to humans that results from biodiversity loss.

Below are a few highlights among the 113 species described by Academy scientists this year.

Galapagos Legacy

The Academy sent its first scientific expedition to the Galapagos Islands in 1905 and has since organized dozens of return trips. As a result, the Academy is now home to the world's most comprehensive collection of scientific specimens from these famous islands. Most Academy field work in the Galapagos today focuses on the marine environment, where dozens of new species have been discovered in the last decade. In 2010, scientist John McCosker and his colleagues described a new species of scorpionfish (*Scorpaenodes rubrivinctus*), which was collected by submersible along the islands' steep volcanic slopes 200-400 meters underwater. Submersibles allow scientists to explore a vast part of the Galapagos that was not accessible to Charles Darwin or the first Academy scientists.

Old Spiders, New Family

Although discovering new species is a common occurrence at the Academy, describing a new family of animals is rare. Arachnologists Jeremy Miller, Anthea Carmichael, Charles Griswold, and their colleagues did just that this year, describing a new spider family called Penestomidae. These spiders have been known for 100 years, but they were initially placed in the velvet spider family, Eresidae. Only with the modern techniques of DNA sequencing and scanning electron microscopy did Miller et al. conclude that the penestomids belong in a family of their own. The scientists also added five new species, all from South Africa: *Penestomus egazini*, *P. kruger*, *P. montanus*, *P. prendinii*, and *P. zulu*.

A Wasp Opus 30 Years in the Making

Future entomologists working on the Australian wasp genus *Sericophorus* will have a much easier time identifying species, thanks to a 234-page paper by curator Wojciech Pulawski. A Danish scientist named Ole Lomholdt actually initiated this massive study in the early 1980s. However, following his untimely death in 1999, Pulawski picked up the mantle and finished this 30-year labor of love. Pulawski

conducted additional field work in Australia, studied more than 1,000 specimens, described 30 species unknown to Lomholdt, generated photographs, added distribution maps, and analyzed the wasps' evolutionary relationships. The result is the most comprehensive overview of *Sericophorus* ever published, including a key to 100 species.

California Hotspot

Besides hosting a diverse population of people, California is also home to one of the most diverse collections of plant and animal species on the planet. This rich diversity has earned California a title as one of the world's 34 biodiversity hotspots. Four species on this year's list were collected in the Golden State: two sea slugs (*Okenia felis* from Monterey County and *Flabellina goddardi* from Santa Barbara County); a cave-dwelling spider from the Mother Lode region of California (*Archoleptoneta gertschi*); and a sharp-tailed snake from the Coast Ranges and Klamath Mountains in the north (*Contia longicauda*).

Gigantic Extinct Otter

Ten years ago, anthropology curator Zeray Alemseged initiated the Dikika Research Project to explore the fossil-rich Awash Valley in Ethiopia. While the project has yielded several important discoveries related to early human evolution (including the oldest evidence of tool use and meat-eating in hominins, reported this year in *Nature*), the non-human discoveries provide equally important information about the valley's ancient environment. This year, Alemseged and his colleagues report the only new mammal species on the Academy's list: a gigantic otter (*Enhydriodon dikikae*) from approximately 4 million years ago. Described from part of a skull and lower jaw, *E. dikikae* was more imposing than the cuddly otters familiar to us today. With an estimated skull length of 25 cm and a body weight of 100 kg, the extinct otter was roughly twice the size of a modern sea otter. Its ancient diet is ambiguous, but a battery of robust teeth suggests shellfish, catfish, juvenile crocodiles, turtles, and ostrich eggs as possibilities.

Story Source: The above story is reprinted from materials provided by California Academy of Sciences.