

VOLUME 21, NO. 1 Spring 2003

What's in a Name?

Experts were telling us only a few years ago that the world was home to “almost 1,000” species of bats. Soon, those same experts will be assuring us there are 1,105 bat species. What’s going on here?

Discoveries using conventional methods added some of these new species, but most arose from new technologies and improvements in our approaches to taxonomy – the science of describing and classifying the many forms of life on Earth. The final tally will be hotly debated, for this is a controversial undertaking. And we believe the actual number of species remains vastly underestimated for bats, as for many other organisms.

The latest total comes from biologist Nancy Simmons of the American Museum of Natural History in the upcoming edition of *Mammal Species of the World*, edited by Don E. Wilson and DeeAnn M. Reeder. Simmons is providing the chapter on bats, based on a lengthy list of scientific publications on taxonomic changes and on her professional judgment about the status of some contentious species designations.

The last complete summary of bat species was published in 1993 by the late Karl Koopman, who recognized 925 species. A decade later, that number is up 19 percent, with 180 additional species. Where did all these bats come from?

“Fifty are truly new species discovered since Karl completed his manuscript,” Simmons says. “Most are from newly explored tropical regions and Southeast Asian islands. Many of them are ‘cryptic species,’ which look very much like other [previously described] species externally, but are actually different.”

“The pace of description of bat species truly new to science has remained remarkably constant over the last 100 years. Except for a dip during World War II, about 40 new species have been described every decade. Fifteen new species have already been described since the beginning of the year 2000.”

Simmons says most of the new species on her list (130 of them) “are animals that already had scientific names. Many of these were named by researchers around the end of the 18th century, when scientists were describing the biological riches sent back from voyages of exploration around the world. Until recently, many were considered subspecies of [existing bat species], but new studies have shown them to be distinct species.”

This is how science moves forward: New paradigms are presented, lively debate ensues, the ideas are tested, and the concepts refined.

NEW TECHNOLOGIES

The taxonomy of bats has relied historically upon the animal’s appearance: its size, color, and external characteristics, and its dental, cranial, and skeletal structure. Species distinctions among populations of bats with similar appearance were often based on ‘zones of overlap,’ areas inhabited by both groups. If differences between the populations remained distinct, with little or no interbreeding in these shared ranges, the groups would



 [View PDF version](#)
[4.23 MB]

usually be treated as different species.

Similar bats without zones of overlap usually required a subjective, often conservative, guess about whether they would interbreed and merge if they came into contact. If so, they would not constitute different species.

Things have changed dramatically. Revolutionary technologies now let us explore speciation at the genetic level. Such advanced tools as chromosomal analysis and DNA sequencing allow remarkably precise definitions of individual species and reveal the branching pattern of evolutionary relationships among species. At the same time, studies of morphology (an animal's form and structure) have become more innovative, detailed, and critically analytical.

The new tools and new understanding have changed our concept of species. Thirty years ago, an inability to interbreed was emphasized as the defining characteristic of a distinct species. Now a species generally is considered an independent genetic lineage with its own evolutionary direction, a path that is separate from other lineages.

This may seem on the surface like a minor philosophical difference, but it is leading to a sharp break from the overly conservative view of species and toward a recognition of species as truly independent evolutionary units. This is an exciting time for biologists seeking the true level of biodiversity and the evolutionary and geographic history of bats and other organisms. And our richer understanding provides critical raw data for better conservation planning.

Old-style discoveries

Despite the revolution in technology, there remains ample room for old-fashioned exploration and discovery. We know much less about the near and far reaches of our planet than many people realize. Much remains to be learned about species of bats in many parts of Latin America, Southeast Asia, Africa, and elsewhere, especially in the tropics.

To determine the species diversity of a new area (a critical part of any conservation strategy), we usually start with a list of likely species and a key or field guide for identifying them. But even with the best identification tools, not all bats are easily identified – as we found on a recent trip to Ecuador.

“I have a bat with white wings, looks like a *Peropteryx*!” Fiona called out as she carefully untangled her small prize. We were netting bats as part of an inventory of mammals along a new pipeline into the remote Yasuni National Park in Ecuador. We assumed the little white-winged emballonurid (sac-winged bat) was a rare bat that we had hoped to catch: *Peropteryx leucoptera*.

When Fiona examined the bat, however, she found that its ears were not joined over the crown of its head, as is characteristic of *P. leucoptera*. Its ears were separate, like those of *P. macrotis*. But that species has black wings, not the whitish, translucent wings of this bat. Although partial albinos can occur in most bat species, the possibility also existed that our animal might be a new species.

Indeed, additional museum-based study supports this possibility, and other examples of white-winged *Peropteryx* have been reported from Peru and Brazil. Our bat has not yet been formally described, but it probably represents a species that's new not only to Ecuador, but to science.

NEW UNDERSTANDING

While species are still being discovered from time to time, most changes in the species lists are less dramatic. On our Ecuador survey, for example, we caught several free-tailed bats of the genus *Molossus*, some of them slightly smaller than the others. The problem: One taxonomic arrangement would call the smaller bats *Molossus coibensis* – a distinct species from the larger ones, which are classified as *M. molossus*. However, a more conservative approach would group them all together as a single, variable species with the name *M. molossus*.

In addition to determining the number of species at single localities, researchers and conservationists must also decide if the ‘house bat’ classified as *M. molossus* in Ecuador, at the western edge of the Amazon Basin, is really the same species as smaller bats in Guyana, at the basin’s northeastern fringe. These interpretations matter because they affect our estimates of local diversity and our understanding of differences among geographic areas, both of which are important factors in conservation planning.

A standard reference, such as Simmons’, is therefore essential. For conservationists to make sense of inventory data, they need a list of recognized species so everyone is discussing the same animals. We also need detailed studies of individual species, species groups, and higher taxa to determine biodiversity and areas with concentrations of unique species.

The widespread bats often lumped together as *Molossus molossus* almost certainly comprise a complex of several distinct (but morphologically similar) species. A complete review of this species complex, which ranges from Mexico and the Caribbean into South America, is needed to resolve this taxonomic puzzle. Such a review should include genetic data as well as detailed morphological studies and geographic sampling.

These kinds of studies will increase the number of recognized species. We might find that many of the bats in Ecuador or Guyana are distinct species unique to those regions, rather than representatives of a single, widespread species. Such findings have important implications for conservation. If 20 percent of Guyana’s bats are unique to that region, it becomes more important to conserve key forests there than if the area’s bats mostly are members of a ubiquitous Amazonian fauna.

Species diversity is not well documented in many parts of Latin America, but even North America lacks a ‘final’ list of species. When Roger W. Barbour and Wayne H. Davis published their classic text, *Bats of North America*, in 1969, they described 40 species. In 2001, a committee of BCI staff and prominent biologists listed 45 species, adding six species and subtracting one, *Myotis occultus*, from Barbour and Davis’ list. This bat was assigned to a subspecies of little brown myotis (*Myotis lucifugus*). This year, however, *Myotis occultus* was reinstated following convincing new evidence that these bats represent a distinct species, raising the total to 46.

Our latest list recognizes both an eastern (*Lasiurus borealis*) and western (*Lasiurus blossevillii*) red bat (which had been considered a single species); a western (*Lasiurus xanthinus*) and southern (*Lasiurus ega*) yellow bat (formerly a single species); and separates Keen’s myotis (*Myotis keenii*) from the more widespread northern myotis (*Myotis septentrionalis*).

DOES IT MATTER?

All these changes might seem like little more than nitpicking, but they have serious consequences for bat conservation. The two ‘new’ myotis bats on the list – Arizona myotis

(*Myotis occultus*) and Keen's myotis – are very local in distribution, unlike the species in which they had been included as subspecies. In the real world, subspecies may be afforded less stringent protection than species, so these two bats' new status could have a significant impact on efforts to conserve habitat in their limited ranges.

So where did all those new bats come from? They were here all along. Species are natural units that exist regardless of our ability to find, recognize, and name them. Nancy Simmons and the many other researchers whose work is summarized in her listing have accomplished a critical service to bat researchers and conservationists.

Yet that total of 1,105 is hardly final. Some future edition of *Mammals of the World* will likely tell us there are many more species of bats. The changing list reflects the progress of science, a better understanding of nature, and a closer approximation of the true measure of biodiversity.

Dr. MARK ENGSTROM is Senior Curator of Mammals at the Centre for Biodiversity and Conservation Biology at the Royal Ontario Museum in Toronto. FIONA REID writes and illustrates field guides to mammals and leads some BCI field trips and workshops. She is a Departmental Associate at the Centre for Biodiversity and Conservation Biology.

All articles in this issue:

- [What's in a Name?](#)
- [The Bats of Israel](#)
- [Tracking Woodland Bats](#)
- [The Vampire's Gift](#)
- [A Children's Crusade](#)
- [Bats Lose an Old Friend](#)
- [BCI Earns Top Rating Among Nonprofits](#)