Modern genetics undermines neat boundaries of species

What is a species? It's a question that will get you a variety of answers from a variety of sources. The "standard" definition goes like this: "a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding." The question may seem academic, but it has real world importance for conservation. Public conservation efforts and broad understanding of ecology is still locked on to the species as a fundamental unit of consideration.

Modern genetics has been undermining the neat boundaries of our species almost since its inception, and we longer requires that naturalists observe plants and animals interbreeding. In fact, it no longer requires live animals at all.

This is why the story Christopher Kemp tells at Popular Science is about tropical bats yet takes place almost entirely inside Chicago's field museum.

Kemp's subjects are Bruce Patterson, curator of mammals at the museum, and *Sturnia lilium*, the little yellow-shouldered bat.

> A medium-sized, fruit-eating bat with distinctive yellow-brown oval patches on its shoulders. At the end of its blunted muzzle, a spear-shaped nose-leaf points vertically into the air, as if balancing an inverted heart there. It is one of the most common Phyllostomid bat species in the New World tropics, found all the way from Sonora and Tamaulipas in northern Mexico, through Central America, and southward to Argentina and eastern Brazil. It occupies an enormous bell-shaped footprint. Except, says Patterson, that it doesn't.

When Patterson and his colleagues examined the the genomes of little yellow-shouldered bats collected at the museum and in the wild, looking for variation based on the location, they found several — seven, in fact — genetically distinct species.

> *Sturnira lilium* — regarded for decades as a single, well-defined species — is a complex of seven different species, each occupying its own circumscribed range. "It turns out that *Sturnira lilium* is actually restricted to the Brazilian shield of Brazil, Paraguay, and Argentina," says Patterson. Ironically, almost none of the researchers who have studied *Sturnira lilium* — either in the thin air of the Andes, or beneath the wet green canopy of the rainforest — have actually seen one.

Three of the species in identified by Patterson and his team were new to science. One is found only in a narrow swath of coastal habitat currently threatened by deforestation; a widespread and common species has been broken up, and some of the pieces are of urgent conservation concern.

Kemp raises the darker implications:

> How many other species are nested like Russian matryoshka dolls within the name of another species they closely resemble? Perhaps other species mistaken for *Sturnira lilium* have already become extinct, disappearing even before taxonomists had the opportunity to describe them properly. It is unknowable now.

The species is still the fundamental unit of extinction, as well as conservation. The more sophisticated our ability to parse species becomes, the more we will need to revise our record books. All too often, we might need to make note of a new species *post mortem.*

Read the full article by Christopher Kemp at Popular Science: "How One Little Yellow-Shouldered Bat Became Seven Different Species"

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Additional Resources:

- "Genetics continues to garner attention as conservation tool," Kenrick Vezina | Genetic Literacy Project
- "New Report Reveals Many Zoo Animals Are 'Genetic Disasters'," Aaron Akinyemi | International Business Times
- "Genetic Forensics Wakes a Dragon," Nsikan Akpan | Science NOW