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## ANIMALS

# New monkey species found hiding in plain sight

Three Southeast Asian leaf monkeys are distinct species, new research shows, which makes two of them some of the rarest, most endangered primates.

BY RACHEL NUWER

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For more than a century, scientists considered banded langurs, a type of reclusive, tree-dwelling monkey, to be a single species—but new research points to three separate ones. They've been hiding in plain sight, due to differences that couldn't be readily observed.

Found throughout Myanmar, Thailand, Malaysia, Singapore, and Indonesia, the monkeys were not considered at risk of imminent extinction, in part because of this broad range. But the new findings, published in June in *Scientific Reports*, reveal that two of the new species are among the most endangered primates in the world, in urgent need of protection.

The research highlights the ability of cutting-edge genetic sequencing tools to correct centuries-old taxonomic errors that could be concealing conservation emergencies. In this case, the researchers worked with DNA found in monkey droppings, a non-invasive technique that could be more widely used in this field of science.

“We want this paper to encourage more research on these totally different species of monkeys in Asia,” says Andie Ang, a National Geographic explorer and research scientist at the Wildlife Reserves Singapore Conservation Fund. “There’s definitely a lot more diversity out there than we know of—and if we don’t know about it, we risk losing it.”

## A long-time hunch

A decade ago, Ang, a co-lead author of the new study, began studying Raffles’ banded langurs, a small, dark-colored monkey. Nineteenth-century records classified Raffles’ banded langurs as a subspecies of banded langurs, *Presbytis femoralis*, along with two other primates: the East Sumatran banded langur and the Robinson’s banded langur. Judging solely by looks, the classification error is understandable. All three subspecies are black, with only subtle differences in white markings around their faces and bellies.

From the beginning, though, Ang suspected that Raffles’ banded langurs were actually a distinct species. “Just looking at its morphology and the descriptions of it made in the past, it seemed like they were a different species, but I didn’t have any information to support that,” she says.

Following up on her hunch would not be easy. Langurs are notoriously difficult to observe—rare, flighty, spending most of their time in treetops. They usually depart at the first sign of human intrusion, making them difficult to photograph or dart to collect blood samples, a method that also risks stressing or injuring them.

To get around these challenges, Ang and a team of international colleagues turned to fecal samples. Animal scat, Ang says, is an underutilized resource for scientists: It contains a wealth of information ranging from an animals' DNA to evidence of its diet, microbiome, and parasite load.

## Searching for scat

But doing so is easier said than done: collecting these samples is difficult and time-consuming. The researchers located groups of langurs in the forest, then quietly waited, sometimes for hours, until the troop moved on so they could check beneath the trees for feces.

"Sometimes we'd go the whole day and they didn't poop, or we couldn't find the poop because the forest floor looked exactly like the poop we're looking for," Ang says. "Or sometimes the flies and dung beetles would get there before us."

By processing these samples, Ang and her colleagues managed to sequence the whole genome of 11 individual langurs, and compared them to a genetic database of prior samples as well as to each other. To be considered different species, the mitochondrial sequences of mammals typically must differ by about five percent. In this case, the researchers found a six to 10 percent difference among the three langurs.

They calculated that the species diverged from one another three million years ago, prior to the Pleistocene. "They're not even closely related," Ang says.

## Saving species

For two of the monkeys, the Raffles' banded langur (*Presbytis femoralis*) and the East Sumatran banded langur (*Presbytis percura*), the new species classification brings urgent conservation concerns, as they now qualify as critically endangered due to small populations and limited ranges.

Ang estimates that the Raffles' banded langur's total population hovers around just 300 to 400 individuals, about 60 of which live in Singapore. The rest live in the southern states of peninsular Malaysia, where forests are quickly being converted to oil palm plantations. Researchers have no idea, however, how many East Sumatran banded langurs are left. They live only in the Riau Province of Sumatra, in an area at high risk for forest fires and poaching, and also experiencing steep rates of deforestation.

The Robinson's banded langur (*Presbytis robinsoni*), on the other hand, is more widespread, and is still classified as "near threatened" by the International Union for Conservation of Nature.

"At the moment, they're not really under threat" of extinction, Ang says. But with urban development and deforestation accelerating, the Robinson's banded langur will likely eventually find itself in the same urgent predicament as the other two species, she adds.

While the threats facing these monkeys aren't new, the full species label might mean the primates' survival will be taken more seriously.

"Public conservation awareness is mainly on species, not subspecies, so showing that previously classified subspecies are actually distinct species helps to raise money for conservation work," says Christian Roos, a primate geneticist at the Leibniz Institute for Primate Research in Göttingen, Germany, who was not involved in the research. (Related: What we lose when species go extinct.)

Ang and her colleagues are now working with partners at universities and nonprofit organizations in Malaysia, Indonesia, and Singapore to encourage more studies of the new species and to campaign for heightened protections at the governmental level.

The researchers also suspect that many more species, including primates, are hiding behind the subspecies label, awaiting discovery. They are currently pursuing a follow-up study of an additional langur subspecies, the Riau pale-thighed langur, also found only in Sumatra's Riau Province, that likely constitutes another new, critically endangered species. Fecal samples, as the new study shows, can be key to unlocking such revelations.

“This method is currently used infrequently in taxonomy, but it has a huge potential,” says [Vincent Nijman](#), a conservationist at Oxford Brookes University and coauthor of the new paper. “If it poops, we can collect DNA.”

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**Rachel Nuwer** is a freelance journalist. She is the author of [Poached: Inside the Dark World of Wildlife Trafficking](#).

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