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TRACKING ENDANGERED MAMMALS WITH THE LEECHES THAT FEED ON THEM

NEW RESEARCH ON LEECH BLOOD MEALS CONFIRMS VALUE OF iDNA METHODS IN BIODIVERSITY SURVEYS, INCLUDES FIRST IDENTIFICATION OF BATS AND BIRDS

A broad survey conducted across southern Asia reinforces the idea that the mammal biodiversity of an area can be determined by looking at the DNA found in leeches' blood meals. The new study, led by researchers at the American Museum of Natural History, also shows for the first time that DNA found in leeches can be used to identify certain ground birds and, possibly, some bats. The research was published this month in the journal [*Systematics and Biodiversity*](#).

"Our recent work has demonstrated that we can determine what mammals are in a protected area without hunting, without trapping, without the use of scat or hair samples, and especially without camera traps – all of which are problematic methods for one reason or another," said study author Mark Siddall, a curator in the Museum's Division of Invertebrate Zoology. "Instead, by sequencing the host DNA that remains inside of terrestrial jungle leeches for months after feeding, we can out-perform all other methods of biodiversity monitoring in terms of accuracy, completeness, speed, and cost. We even get the small mammals that most other methods miss."

The usefulness of invertebrate-parasite-derived DNA, called iDNA, was first shown in a 2012 study on 25 leeches found in Vietnam. Siddall and lead author Michael Tessler, a postdoctoral fellow in the Museum's Sackler Institute of Comparative Genomics, were

interested in examining how dependable leeches can be as an identification tool when surveying a broader range of geographic locations. The researchers led a team that collected and genetically analyzed about 750 terrestrial leeches in the genus *Haemadipsa* from the forests of Bangladesh, Cambodia, and China. They found that the leeches feed at least somewhat indiscriminately on a large variety of mammals, including small deer called muntjacs, macaque monkeys, wildcats, rodents like porcupines and rats, as well as a vulnerable species in the area, a gaur, or Indian bison. They also recovered DNA from three types of ground-dwelling birds and one species of bat – there are only a few previous and somewhat anecdotal reports of those animals being targeted by *Haemadipsa* leeches.

In addition, Siddall and Tessler were authors on a [recently published study](#) based on leeches in Bangladesh that compares the iDNA method to camera traps. They found that the methods complement one another, and that, when used together with camera trapping, leeches can be used to survey more rapidly and to more confidently identify small mammal species.

“This work is turning out to be an extremely useful tool for conservation purposes, and it’s quick and easy to survey a park in this way as you don’t really need to search for the leeches – they come to you looking for a meal,” Tessler said. “You just go on a casual hike and make sure you get the leeches before they get you. A snapshot of the vertebrates in an area can be taken with just one day’s worth of sampling; the current standard for surveys, camera traps, takes months or longer.”

The new research also looks at the genetic diversity of the leeches themselves, revealing that there are most likely many new species yet to be described.

Other authors on this work include Douglas Yu, from the Kunming Institute of Zoology in China and the University of East Anglia in the United Kingdom; Sarah Weiskopf and Kyle McCarthy, from the University of Delaware; and Lily Berniker and Rebecca Hersch, from the American Museum of Natural History.

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Systematics and Biodiversity paper:

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AMERICAN MUSEUM OF NATURAL HISTORY (AMNH.ORG)

The American Museum of Natural History, founded in 1869, is one of the world's preeminent scientific, educational, and cultural institutions. The Museum encompasses 45 permanent exhibition halls, including those in the Rose Center for Earth and Space and the Hayden Planetarium, as well as galleries for temporary exhibitions. It is home to the Theodore Roosevelt Memorial, New York State's official memorial to its 33rd governor and the nation's 26th president, and a tribute to Roosevelt's enduring legacy of conservation. The Museum's five active research divisions and three cross-disciplinary centers support approximately 200 scientists, whose work draws on a world-class permanent collection of more than 34 million specimens and artifacts, as well as specialized collections for frozen tissue and genomic and astrophysical data, and one of the largest natural history libraries in the world. Through its Richard Gilder Graduate School, it is the only American museum authorized to grant the Ph.D. degree. Beginning in 2015, the Richard Gilder Graduate School also began granting the Master of Arts in Teaching (MAT) degree, the only such freestanding museum program. Annual visitation has grown to approximately 5 million, and the Museum's exhibitions and Space Shows are seen by millions more in venues on six continents. The Museum's website, mobile apps, and MOOCs (massive open online courses) extend its scientific research and collections, exhibitions, and educational programs to additional audiences around the globe. Visit amnh.org for more information.

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