

TRILOBITES

Bat Cave Footage Offers Clues to How Viruses Leap Between Species

Video from a national park in Uganda depicted a parade of predatory species feeding on and dispersing fruit bats that are known natural reservoirs of infectious diseases.

By Anthony Ham

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Bats carry an assortment of viruses, including infectious diseases that have jumped into humans in a process known as zoonotic spillover. In some cases, the aerial mammals have infected people directly. But in other cases, scientists believe, bats have passed deadly viruses onto other animal species, which subsequently infected humans.

A remarkable new video from Uganda provides direct visual evidence of many different wild animals interacting with wild bats, revealing just how many opportunities there are for potentially deadly bat viruses to jump into new species. It was published along with a paper posted online on Monday but not yet peer reviewed.

On Feb. 17, Bosco Atukwatse, a young Ugandan wildlife biologist working with the Kyambura Lion Project, set up solar-powered camera traps near the mouth of Python Cave in the Maramagambo Forest, in Queen Elizabeth National Park in Uganda. He was collecting data about leopards and spotted hyenas in the forest.

Through a mixture of what he called “curiosity and luck,” he filmed far more than leopards. Hundreds of nights of footage revealed a steady procession of 13 additional predator species, among them large-spotted genets, African civets, African fish eagles, African rock pythons, L’Hoest’s monkeys and baboons. Python Cave is home to as many as 50,000 Egyptian fruit bats, and the predators emerged from the cave with a winged snack, which they either hunted or scavenged, in their mouths.

“It was amazing how many animals come to eat bats at that specific spot,” Mr. Atukwatse said. He added, “It’s basically a free meal for everybody in the area.”

That is significant in part because the fruit bats, including in the area’s caves, are known to be a natural reservoir for infectious diseases, including the deadly Marburg virus.

“It’s a really important observation, because we think speculatively about how wildlife comes into contact with each other, but we rarely ever observe it,” said Jonathan Epstein, an epidemiologist with expertise in viral zoonoses and founder of One Health Science who was not involved in the study. “It helps us paint the picture.”



Bosco Atukwatse, a wildlife biologist working with the Kyambura Lion Project, holding one of the trail cameras he worked with. “It was amazing how many animals come to eat bats at that specific spot,” he said. Alexander Braczkowski

While the Marburg virus does not need an intermediate host en route to infecting humans, other novel viruses could follow such a path of first passing from bat to predator where it mutates into a form that infects humans.

Although Mr. Atukwatse observed “how these predators timed themselves in a way that they didn’t encounter and disturb each other,” they were, he said, “actively taking pieces of the bat and dispersing them.”

He continued, “These animals interact with other animals elsewhere in the park.”

In a forest full of wildlife, “there are hundreds of thousands of viruses in there being shared all across the animal spectrum, and they’re shedding, eating each other, pooping on each other, sharing saliva,” said Chris Walzer, executive director of health at the Wildlife Conservation Society in New York. “The interface that is shown here contributes, like thousands of other interfaces in the forest, to a viral exchange or pathogen exchange.”

He added, “It’s a cool example of what’s happening all the time and has been for eons.”

Dr. Epstein said that “Spillover requires a lot of things to line up.” Seeing the direct contact between bats and other predators is valuable, because “that’s often something we don’t understand very well.”

“It is important to understand what other wildlife get exposed,” he continued, “and the baboons are probably the most interesting here because we know that primates are susceptible to viruses.” He described a scenario in which perhaps a significant baboon die-off in the forest was linked to Marburg virus.

“This observation becomes important, because we can look back and see that these baboons are hunting these bats and that explains how they would be infected,” he said.

Alex Braczkowski, scientific director of the Kyambura Lion Project and a co-author with Mr. Atukwatse, compared it to stumbling upon a crime scene.

“We know we’ve found something,” he said. “We are not claiming to know what it means. We just know that it’s a portal to somewhere.”

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