

Disease poses risk to chimpanzee conservation, study finds

March 10 2015, by Carol Clark



A study finds that the infectious disease Crypto poses a risk to endangered chimpanzees in Gombe, the site where Jane Goodall pioneered her behavioral research of wild chimpanzees. Credit: Thomas Gillespie

Infectious disease should be a key consideration in wildlife conservation, suggests a study focused on primates in Tanzania's Gombe Stream National Park, published by *PLOS Neglected Tropical Diseases*. The study investigated the parasite *Cryptosporidium* and cross-species transmission

risks among humans, wild primates and domesticated animals within the greater Gombe ecosystem.

"We found that people are likely exposing the endangered [chimpanzees](#) of Gombe to a particular species of *Cryptosporidium*, which may be contributing to their decline," says Michele Parsons, a PhD student in Emory University's departments of Environmental Sciences and Environmental Health. "It appears to be a case of spillover, or exchange of a pathogen, from humans to animals, instead of the other way around."

The spillover of any one pathogen between species, Parson adds, "is an indicator that an ecological connection exists, with potential for other pathogens to emerge."

The study also revealed that some of the chimpanzees are infected with a species of *Cryptosporidium* associated with pigs. "No domesticated pigs reside in the village just outside the park, so we think it's likely that the source of infection is wild pigs living in the forest," Parsons says.

In addition to being a student in Emory's Population Biology, Ecology and Evolution Graduate Program, Parsons is a research microbiologist at the Centers for Disease Control and Prevention's Division of Foodborne, Waterborne and Environmental Diseases.

She led the study with her PdD adviser, disease ecologist Thomas Gillespie, a professor in Emory's Department of Environmental Sciences and Rollins School of Public Health's Department of Environmental Health.



The research team gathers stream water samples for analysis.

"When it comes to protecting endangered species, the focus is often limited to providing habitat and preventing hunting," Gillespie says. "But disease also matters in conservation, and that's a relatively new message. Our research shows that if we're going to keep these iconic chimpanzees on the planet, we need to address the spread of [infectious diseases](#)."

Gombe is the site where Jane Goodall conducted her pioneering research into the behavior of [wild chimpanzees](#), beginning in 1960. Goodall's project is now the longest field study of any animal. Each individual chimpanzee has been identified, and its maternal line is known.

Despite the fact that Gombe became a protected wildlife park in 1968, the chimpanzee population there is on the decline, down from about 150 chimpanzees 20 years ago to 100 today.

The Gillespie lab is one of the few investigating the ecology and epidemiology of infectious disease in natural systems where [domesticated animals](#), humans and wildlife overlap.

Cryptosporidium, or "Crypto," is one of the most frequent causes of waterborne disease in the United States, and is among the top four cases of moderate-to-severe diarrheal disease in young children in developing nations. Crypto is particularly dangerous for people infected with HIV, who tend to have more severe cases that can be fatal. Studies have also shown that chimpanzees infected with SIV (the ancestor of HIV) have a reduced lifespan and may be more vulnerable to opportunistic infections.

The researchers collected fecal samples from a cross-section of chimpanzees, baboons, humans, and domesticated dogs, goats and sheep within the greater Gombe ecosystem. The results revealed Crypto infection rates of about 16 percent in the wild primates, 4 percent in humans and 10 percent in the goats and sheep.

DNA sequencing uncovered a complex epidemiology for Crypto in this system, with humans, baboons and a subset of chimpanzees infected with *C. hominis* (which is most closely associated with humans), and another subset of chimpanzees infected with *C. suis*, (usually associated with pigs). All the positive sheep and goats were infected with *C. xiaoi* (a subtype associated with livestock).

"The dominance of *C. hominis* among humans and non-human primates suggest cross-species contamination," the study authors write.

The baboons are known to raid human homes and trash for food, while the chimpanzees raid agricultural fields just outside the park boundaries. These behaviors expose the wild primates to the potentially contaminated feces of livestock or exposed human sewage.

Although water samples screened in the study were negative for Crypto, waterborne outbreaks of Crypto as a result of human and animal fecal contamination are common. "Homes with positive livestock had a tendency for increased risk of human infection, suggesting contribution of environmental factors or behaviors that may place the household at increased risk," the study authors write.

The findings highlight the complex nature of zoonotic parasite transmission and stress the need for further studies, Parsons says. "It's important to understand the ecology of diseases for both [wildlife conservation](#) and for human health. We need good baseline data in order to monitor emerging pathogens."

More information: *PLOS Neglected Tropical Diseases*, [journals.plos.org/plosntds/art ... journal.pntd.0003529](https://journals.plos.org/plosntds/art...journal.pntd.0003529)

Provided by Emory University

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