



National Center for Ecological Analysis and Synthesis

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NEWS

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Predicting Infectious Disease Crossovers Between Wild Animals and Humans

Santa Barbara, California –Many of the most deadly infectious diseases affecting humans are caused by pathogens that originate among wild animals and then cross species. Examples include AIDS (from chimpanzees), Ebola (from monkeys or bats), and avian influenza (or bird flu). A study to be published this week in *Proceedings of the Royal Society B* examines how these “host shifts” occur, and provides a critical first step in predicting when and where future host shifts may take place.

“Infectious diseases crossing species barriers pose a huge and increasing threat to human health and the conservation of wild species,” said lead author Jonathan Davies, a scientist at the National Center for Ecological Analysis and Synthesis (NCEAS) at the University of California, Santa Barbara. “The critical question we investigated is what determines the breadth of host species that a pathogen can infect.”

Davies and coauthor Amy Pederson, a research fellow at the University of Sheffield, explored patterns of pathogen sharing among primates. They found that closely related species of primates, those sharing similar biology and immune responses, are vulnerable to the same pathogens. Humans also follow this pattern, sharing many diseases with great apes, our closest living relatives.

The team’s research also demonstrates that living in close proximity to infected species can increase the risk of a disease jumping from one species to another. Their analysis is the first to demonstrate the role of both evolutionary relatedness and geographical proximity.

However, the team also found, according to Davies, that among pathogens, “viruses are more adept at jumping between distantly related host species, so that geographical proximity rather than evolutionary relatedness determines the spread of viral diseases. Bird flu (birds), West Nile virus (birds), and Hendra virus (bats), are all viral diseases that have jumped large evolutionary distances to infect humans.”





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Pedersen explained that their study is important, "because emerging infectious diseases are increasing in number, cause high mortality, and frequently originate from animal reservoirs. We suggest hotspots of future emerging diseases may be found where humans come into close proximity with wild primates, as is increasingly the case in the forests of Central and West Africa due to rapidly growing human populations and scarcity of resources in this region.

In addition, we are likely to see an increase in outbreaks of novel viral diseases as humans invade previously isolated habitats, and these may be just as likely to jump from a rat or a bat, as an ape."

The good news is that predicting host shifts would provide the opportunity to reduce mortality, morbidity and financial costs associated with disease outbreaks.

[Attachment: graphic]

About the National Center for Ecological Analysis and Synthesis

The National Center for Ecological Analysis and Synthesis (NCEAS) was established in 1995. The organization has hosted more than 3,500 scientists from over 50 countries, and supported more than 430 collaborative projects in ecology and related fields. NCEAS scientists develop new techniques in informatics, and apply general knowledge of ecological systems to specific issues such as the loss of biotic diversity, global change, and sustainability of marine ecosystems. NCEAS is among the top 1 % of 38,000 institutions evaluated for scientific impact in environmental research. NCEAS is funded by the National Science Foundation, the State of California, the University of California, and numerous other donors.

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Note to Editors

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