

Out of Africa: a baffling variety of diseases

Viruses: Marburg outbreak in Angola has scientists wondering about the root of emerging diseases in the sub-Saharan.

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Diseases elsewhere

Emerging diseases have spread from Asia, among them the Nipah virus, which killed more than 100 people in Malaysia in 1999; severe acute respiratory syndrome (SARS), which killed more than 700 people in 2003; and avian flu, which has killed about 50 people.

More than 100 million birds have died of the disease or been killed as a precaution.

South America, with conditions similar to those of Africa, has produced diseases, too, and experts expect that to continue.

"The changes going on in the Amazon are just as likely to produce significant disease as anywhere," said Peter Daszak, a disease ecologist who directs the Consortium for Conservation Medicine in Palisades, N.Y.

Many more new diseases appear around the world than anyone realizes, he said. In most underdeveloped countries, there is little disease surveillance: Many bugs might exist for long periods without being detected.

Daszak points to the Nipah virus. After it first infected humans in Malaysia, officials there watched carefully for its reappearance.

Last year, researchers in Bangladesh, several hundred miles to the northwest, realized that the virus had been infecting people in that country for four years. No one noticed because no one had really looked.

"These viruses emerge in different countries," said Daszak. "Sometimes they're recognized, and sometimes they're not."

Scott Calvert reported from Johannesburg, South Africa; David Kohn reported from Baltimore.

Researchers have long known that people can contract the viruses from monkeys. But how do monkeys contract them? Marburg and Ebola kill primates, which means those animals are not the viral reservoir.

The viruses cannot survive on their own; they exist inside the cells of other creatures that have acquired at least partial immunity.

Bats are one leading possibility. In the late 1990s, 128 gold miners in the Democratic Republic of Congo died of Marburg.

Tests on bats found genetic evidence of the virus, but subsequent tests have been inconclusive. However, when the mine flooded, depriving the bats of their underground habitat, the outbreak ended.

Three of the five other Marburg outbreaks also pointed to bats, Swanepoel said, including two in which the victims visited the same cave in Kenya seven years apart. He speculates that the victims came into contact with bat droppings and were infected after rubbing their mouths or eyes.

Formenty of the WHO said that there is no indication that bats are to blame for the outbreak this year in Angola.

The environment

Patz of Johns Hopkins and others argue that environmental degradation plays a key role in the emergence of new diseases. People all over West and Central Africa are moving into previously uninhabited ecosystems. Loggers build roads into the jungle; hunters and settlers follow, using the roads to reach new regions.

They come into increasing contact with microbes for which they may have little or no immunity.

Environmental degradation can also spread disease by increasing the prevalence of certain bugs. Patz has found that areas where dams are built often see increased incidence of mosquito-borne diseases, such as malaria and Rift Valley fever.

Dams raise the water table and increase the amount of standing water, creating ideal conditions for mosquitoes. As the mosquito population rises, so do rates of those diseases.

Such inadvertent shifts are widespread, Patz said: "We are disturbing natural systems more rapidly and in a more widespread way than at any time in history."

Even in the United States, not generally thought of as a source of new microbes, environmental deterioration can bring about disease.

Patz pointed out that forest fragmentation in parts of the United States has led to greater numbers of white-footed mice. Smaller animals tend to do better in disconnected parcels of woodland because they need less land than do larger creatures. The mouse is the prime reservoir for Lyme disease, and rates of that illness have increased in recent decades.

Many places have high biodiversity, but Africa has more primates than anywhere else, particularly species that are closest to humans, such as chimpanzees and gorillas. Infectious viruses have a relatively easy time hopping between species with similar genes.

"The more closely related to species you are, the more likely a disease will jump," said epidemiologist Nathan Wolfe, a professor at the Bloomberg School of Public Health. "What's key about that is almost all of our closest relatives are in Africa."

This mode of transmission has probably occurred. The most prominent example is the human immunodeficiency virus, which can cause AIDS. It is believed to have derived from a virus that infected chimpanzees.

Most experts believe the disease made its way into human beings over years through hunters who butchered chimpanzees and ate infected meat. At some point, the virus seems to have mutated inside humans, allowing it to survive and spread among people.

Ebola might have arrived by a similar route, Wolfe said. Over the past few decades, several Ebola outbreaks seem to have started after people ate dead primates they had found in the jungle.

"Once these diseases get into the human population, we know they can have awful consequences," said Wolfe. "We have to catch these diseases before they cost millions of lives and billions of dollars."

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