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Frog Killer Is Linked to Global Warming

By ANDREW C. REVKIN

Scientists studying a fast-dwindling genus of colorful harlequin frogs on misty mountainsides in Central and South America are reporting today that global warming is combining with a spreading fungus to kill off many species.

The researchers implicate global warming, as opposed to local variations in temperature or other conditions. Their conclusion is based on their finding that patterns of fungus outbreaks and extinctions in widely dispersed patches of habitat were synchronized in a way that could not be explained by chance.

If the analysis holds up, it will be the first to link recent climate changes to the spread of a fungus lethal to frogs and salamanders and their kin. The chytrid fungus, Batrachochytrium dendrobatidis, has devastated amphibian communities in many parts of the world over the last several decades.

But experts on amphibian disease and ecology are divided over the finding, which is being published today in the journal Nature. Several scientists criticized the paper yesterday, saying it glossed over significant sources of uncertainty; others said it was important evidence that warming caused by humans was already harming wildlife. Climate scientists have linked most of the recent rise in the earth's average temperature to the buildup of greenhouse emissions from smokestacks and tailpipes.

The new study was led by J. Alan Pounds, the resident biologist at the Monteverde Cloud Forest Preserve in Costa Rica. In an accompanying commentary, two scientists not involved in the research say it provides "compelling evidence" that warming caused by human activity was already disrupting ecology.

"The frogs are sending an alarm call to all concerned about the future of biodiversity and the need to protect the greatest of all open-access resources - the atmosphere," write the scientists, Andy Dobson, a Princeton University ecologist, and Andrew R. Blaustein, a zoologist at Oregon State University.

More than 110 species of brightly colored harlequin frogs, in the genus Atelopus, once lived near streams in the tropics of the Western Hemisphere, but about two-thirds of them have vanished since the 1980's.

A leading suspect is the chytrid fungus, which in recent decades has killed amphibians from deserts to lowland tropical forests to mountainsides. It is not clear whether the fungus has been spread around the world by human trade in amphibians or whether it has laid largely undetected and has only recently erupted.

Paradoxically, the fungus thrives best in cooler conditions, challenging the theory that global warming is at fault. But Dr. Pounds and his team, in studying trends in temperature and disease around the American tropics, found patterns that they say explain the situation.

Because warming increases evaporation, it can create clouds that tend to make days cooler by blocking sunlight, and make nights warmer by trapping heat. In an interview, Dr. Pounds said those conditions could have created favorable conditions for the spread of the chytrid fungus.

He said that because the seeming extinctions had occurred in lockstep over dispersed field sites, they were hard to attribute to anything other than the broad warming trend that scientists have linked to rising concentrations of greenhouse gases.

But some experts who have read the paper said they were troubled by definitive statements like "Our study sheds light on the amphibian-decline mystery by showing that large-scale warming is a key factor."

Cynthia Carey, an amphibian disease expert at the University of Colorado, said that while both climate and amphibian die-offs were serious problems, this particular paper failed to offer anything beyond circumstantial evidence.

"It is difficult to prove cause and effect on the ground where multiple factors interact in complex ways," she said.

Stephen H. Schneider, a climate expert at Stanford, who has worked with Dr. Pounds on other studies and consulted on this one, acknowledged that uncertainties remained but said the work was significant.

"It's like anything else that's complex," he said. "When you're in the early phases of learning you look for multiple lines of argument, and when they converge with basic theory, you increase your confidence in a connection."