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Worm, virus team up to boost infection

Though it may seem that little stands in the way of viruses, they are like all living things — they have to struggle to survive. And sometimes, according to research from a U.S. Army laboratory, they need a little help.

In the case of the mosquito-transmitted virus responsible for Rift Valley fever, the microbe does a much better job of going forth and multiplying with the assistance of *Brugia malayi*, a worm that is widespread in the tropics, report Michael J. Turell of the Medical Research Institute of Infectious Diseases in Frederick, Md., and colleagues in the Sept. 7 SCIENCE.

Rift Valley fever kills hundreds of thousands of sheep and cattle in sub-Saharan Africa, and causes flulike symptoms in humans. Until a recent, as-yet-unexplained outbreak in Egypt (SN: 3/15/80, p. 170), human deaths from the illness were rare.

When a mosquito dines in the laboratory on an animal infected with Rift Valley fever virus, the virus may settle in the mosquito's gut and not bother anyone or anything else. But when the host serves up both the virus and *Brugia malayi*, the virus can follow the worm through a hole it punches in the mosquito's gut and get into the rest of the body.

Several years ago, British researchers reported this sort of boost in similar insect species; the new study goes a step further, relating to the co-infection to increased likelihood that the mosquito will pass the virus on to its next animal victim.

The discovery unfortunately doesn't offer an easy way to stop the virus, says Turell. *Brugia malayi* can cause elephantiasis, a grotesque swelling of tissue, but most people harbor it with no ill effects, and an expensive treatment that makes healthy people nauseated is not likely to become a popular public health measure in poor, tropical areas.

The findings do point out the need to look for cofactors in other viral infections transmitted by mosquitoes, midges or flies, Turell says.

He and his colleagues presented mosquitoes with a gerbil infected with Rift Valley fever virus. They then found the virus in 64 percent of the mosquitoes, and only 5 percent actually transmitted the virus to hamsters. But 88 percent of the mosquitoes that fed on a gerbil infected with the virus *and* the worm became infected, and 31 percent transmitted it.

"That's a sixfold increase in transmission rate," says Turell. The virus, the researchers believe, follows the worm embryo through the mosquito's gut and into fluid that takes it to the salivary gland.

They have not yet checked whether the concept of co-infection holds for other viruses related to Rift Valley fever, such as yellow fever and La Crosse encephalitis. But, says Turell, "we strongly suspect that it would." —*J. Silberner*

CO_2 rises stretch tree-ring sizes

A rising concentration of carbon dioxide (CO_2) in the atmosphere appears to be working like an invisible fertilizer on high-altitude trees, causing them to grow at an increased rate. If this "fertilization effect" is widespread, growth patterns among numerous plants in natural forests may be altered, say scientists at the University of Arizona's Laboratory of Tree-Ring Research in Tucson.

"It's hard to anticipate changes in plant productivity or abundance," says geologist Valmore C. LaMarche Jr. "Some species of trees may benefit more than others from elevations of atmospheric CO_2."

Examinations of tree rings from pines growing at high altitudes in eastern California confirm laboratory predictions that increasing CO_2 from burning fossil fuels such as coal and oil is affecting plant growth (SN: 9/10/83, p. 166), LaMarche and co-workers report in the Sept. 7 SCIENCE. Bristlecone and limber pines growing at subalpine altitudes of between 11,000 and 12,000 feet above sea level show increased widths of their annual rings corresponding to global increases in CO_2, especially in recent decades. A similar trend has been observed in central Nevada, add the investigators.

These data indicate that an elevation of atmospheric CO_2 is boosting the efficiency of photosynthesis — the conversion of sunlight to energy — among high-altitude trees and plants, say the researchers. This leads to changes in growth, anatomical features and flowering and fruiting patterns.

The extent of the "fertilization effect" has yet to be charted, they note. "If natural vegetation is taking up an excess of CO_2 from the atmosphere, the process may lower projected increases of CO_2 and possibly slow the 'greenhouse effect' [SN: 10/22/83, p. 260]," says LaMarche. This theory holds that higher CO_2 levels trap heat in the atmosphere and result in warmer temperatures.

Furthermore, he observes, the findings suggest that scientists must develop techniques to remove the effects of CO_2 when analyzing tree rings to reconstruct temperatures and rain patterns from earlier time periods. —*B. Bower*