Viruses can move: Tale of a telltale tail

Viruses are nature's great hijackers. They take over a host cell's biochemical machinery to make their own proteins as well as new genetic material. Now, scientists report that when viruses are poised to infect something new, they sometimes also make use of protein filaments from the host to help them move from one cell to the next.

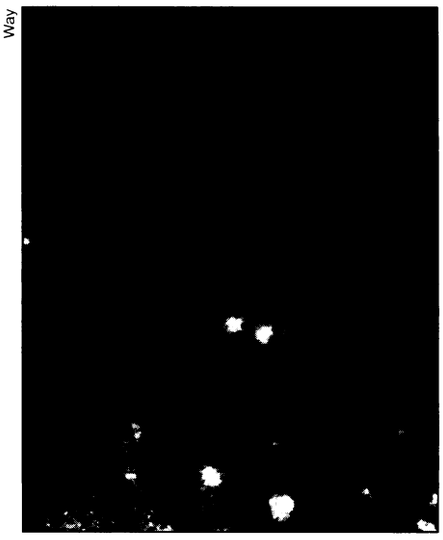
In the Dec. 7 NATURE, a research team led by Michael Way of the European Molecular Biology Laboratory in Heidelberg, Germany, describes electron microscope studies of vaccinia viruses in laboratory-grown human cells. Vaccinia viruses cause cowpox and are the source of the word "vaccine" because they are the basis of smallpox vaccines.

In the micrographs, vaccinia viruses appear to push through the surfaces of cells, propelled by long tails of actin, a protein normally part of the cell's internal skeleton. The viruses assemble these tails from intracellular actin filaments. When the researchers add agents to block assembly of the filaments, the viruses lose their tails and don't exit cell membranes.

The technique may not be exclusive to viruses.

"Similarities between what happens in vaccina and in some bacteria," Way says, "make us think they may use a basically common mechanism." Scientists already knew that actin tails propel the intestinal disease bacteria *Shigella* and *Listeria*. In the July 3 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, Julie A. Theriot of the Massachusetts Institute of Technology and Marcia Goldberg of Albert Einstein College of Medicine in New York described the role of a protein that bacteria use to turn on their actin motors.

Way



Propelled by actin tails, vaccinia viruses (white dots) leave a cell's surface.

Although researchers have not identified a comparable protein in vaccinia, Way says, the mechanism is likely to be similar in the two types of microbes because both viruses and bacteria amble through cells at 2.8 micrometers per minute, even though the virus is far smaller than the bacterium.

Vaccinia viruses spread either by rupturing the host cell and escaping or by exiting the cell without destroying it, says Way. The actin tails may explain the second route, he says.

Like vaccinia, the AIDS virus also exits without rupturing the host cell, says Theriot, who believes Way's work may prompt researchers to see if actin filaments play a role in AIDS virus release.

— M. Centofanti

Tamoxifen use limited

Officials at the National Cancer Institute in Bethesda, Md., last week recommended that doctors treat breast cancer patients with the drug tamoxifen for no more than 5 years. After that period, the drug provides no benefit and may actually cause harm.

The National Surgical Adjuvant Breast and Bowel Project (NSABP), a national network of cancer researchers, initiated the study known as B-14 in 1981 and accrued volunteers until 1988. After tamoxifen showed benefits when used to treat breast cancer patients for 5 years (SN: 2/22/92, p.124), the researchers began giving either a placebo or the drug for an intended period of 5 more years, in order to compare 5 years of treatment to 10 years.

A committee overseeing the study reviewed its data in late October and found that 92 percent of the 575 women who had taken tamoxifen for just 5 years were alive and free of cancer, compared to 86 percent of the women on track to take the drug for 10 years. NSABP stopped the trial early because it found that long-term tamoxifen use fails to save lives and may spur other cancers (SN: 9/25/93, p.207). The findings confirm earlier results from a smaller, Scottish trial.

NCI is sponsoring a controversial NSABP study of tamoxifen as a breast cancer preventive in 16,000 women at high risk of the disease (SN: 5/9/92, p.309). These volunteers are scheduled to take either the drug or a placebo for 5 years. An independent oversight committee for that clinical trial decided that because it limited tamoxifen use to 5 years, the trial should continue; NCI officials concurred. However, the B-14 findings are likely to intensify the debate surrounding the trial (SN: 6/4/94, p.356; 10/22/94, p.268). *— L. Seachrist*

Researchers access secret seismic data

International negotiators are making headway on a treaty to ban all tests of nuclear weapons. Yet even before countries reach a final agreement, expected next year, seismologists are benefiting from access to a new network of sensitive listening posts established to enforce the treaty. Capable of picking up vibrations from earthquakes as well as nuclear tests, the network includes once-secret seismic stations set up by the United States and the Soviet Union during the Cold War.

"These data are now available instead of disappearing into the classified arena," says seismologist Thorne Lay of the University of California, Santa Cruz.

Lay headed a National Research Council panel that considered how to design the new network of sensors, called the International Seismic Monitoring System (ISMS). The panel issued its report last month.

A prototype of the ISMS started up early in 1995 and currently has 37 stations around the world. The planned network would receive data from 50 stations and 100 auxiliary sites.

The prototype ISMS differs from all other seismic networks in that its worldwide stations provide data continuously via dedicated telephone lines, making possible extremely rapid analysis of earthquakes, even in remote regions. Other networks lack such access to foreign stations.

The U.S. Geological Survey is already taking advantage of the new system by piping data from the prototype ISMS to its National Earthquake Information Center in Golden, Colo. These seismic measurements help survey scientists locate quakes more accurately. Other seismologists have started viewing ISMS data directly through the Internet.

The ISMS can also aid seismologists by establishing high-quality monitoring stations in South America, Africa, and other parts of the world underrepresented in existing networks.

The U.S. Air Force has used seismic stations for decades to listen for nuclear weapons explosions, but it has kept such recordings classified or hindered access to unclassified data. "This is unprecedented—to have data from the nuclear verification arena actually flow out into the unclassified world," says Lay.

The test-ban negotiations call for establishing three other types of monitoring systems: hydroacoustic sensors in the ocean to listen for sound waves from underwater blasts, atmospheric receivers to monitor infrasonic waves in the air, and sampling stations to check for radionuclides produced by explosions. *— R. Monastersky*