elephant also kept at the National Zoo. Richman, Hayward, Montali, and their colleagues have found that the same virus that killed the Asian elephants is carried by African elephants. In these animals, however, the virus apparently causes only relatively innocuous skin or genital warts. The researchers also suspect that Asian elephants harbor a virus that is fatal to their African cousins.

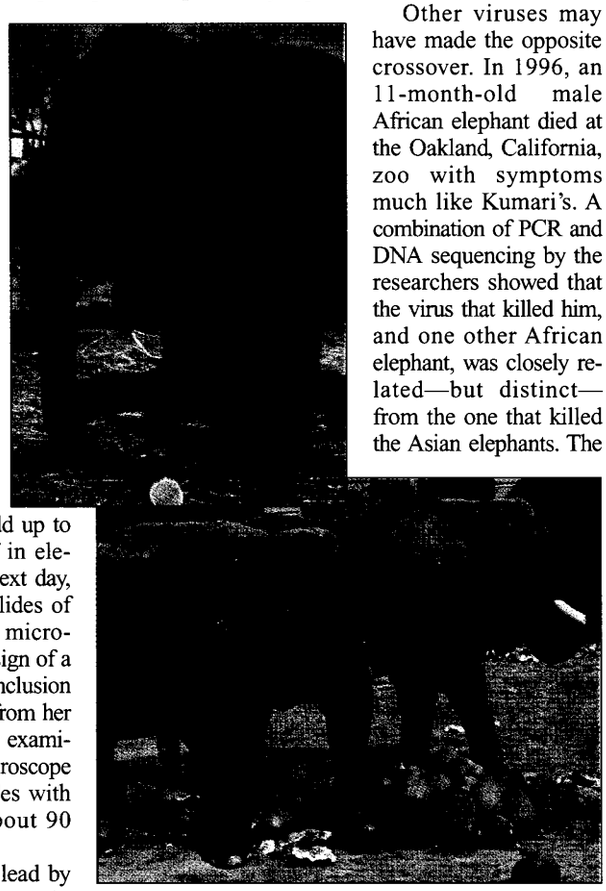
By raising the possibility of fatal crossover infections, the work could influence how the world's zoos take care of their elephants, which can no longer be imported from the wild because most populations are dwindling there. "This has tremendous implications for whether or not [zoos] mix these two species," says Michael Hutchins, director of conservation and science for the American Zoo and Aquarium Association, which oversees a species survival plan for the endangered animals.

The first clues to the cause of Kumari's death came in a postmortem conducted by veterinary pathologists Montali and Richman, who was then at the National Zoo. Their initial exam revealed that Kumari had suffered extensive internal bleeding—a finding that, along with other necropsy findings, "didn't add up to anything we were aware of in elephants," Montali says. The next day, however, while examining slides of Kumari's tissues under the microscope, they spotted a telltale sign of a virus infection: amorphous inclusion bodies in the nuclei of cells from her blood vessel linings. Further examination under an electron microscope revealed dark, round particles with the expected diameter, about 90 nanometers, of a herpesvirus.

The group followed this lead by hunting for herpesvirus genes in Kumari's infected cells with the polymerase chain reaction (PCR), a sensitive DNA amplification technique. The PCR allowed them to pull out the gene encoding an enzyme, called terminase, that helps to assemble the herpesvirus particle, thus confirming that Kumari had suffered a herpesvirus infection. "Of course, we're thinking [Kumari's] can't be the only case that ever occurred," Richman says. And indeed, a review of a century's worth of elephant studbook records uncovered 26 suspicious deaths at zoos throughout North America. After collecting preserved tissue from more than 20 long-dead elephants, Richman found that the damaged tissues of seven Asian elephants carried the same viral terminase gene as Kumari, indicating that they had succumbed to the same infection.

To find out where the virus came from, the researchers scrutinized herpesviruses obtained from skin and genital warts of several otherwise healthy African elephants. The viral terminase sequence turned out to match exactly that from the dead Asian elephants—strong evidence that both species were infected by the same virus, Richman says. She suspects that the virus causes only skin and genital sores in African elephants, but becomes lethal when it infects Asian elephants who were not previously exposed.

Other viruses may have made the opposite crossover. In 1996, an 11-month-old male African elephant died at the Oakland, California, zoo with symptoms much like Kumari's. A combination of PCR and DNA sequencing by the researchers showed that the virus that killed him, and one other African elephant, was closely related—but distinct—from the one that killed the Asian elephants. The team suspects that the virus that killed the African elephants originated as a mild strain in Asian elephants, although they haven't shown that directly.



Medical mystery. Did mingling of Asian and African elephants (*shown above*) lead to the fatal infection of Kumari (*top*, with her mother)?

CREDITS: J. COHEN/SMITHSONIAN NATIONAL ZOO

If cross-transmission of the herpesviruses does turn out to be causing the fatal infections, developing vaccines could be one solution. Until then, however, zoo keepers may have to consider keeping Asian and African elephants separated to prevent the lethal disease—a difficult task, Richman says, because some zoos don't have the space or the facilities and would have to build new barns.

But at least there's hope of treating the new disease, now that it has been recognized. Montali, Dennis Schmitt of Southwest Missouri State University, and other team members managed to save an infected female Asian calf in 1997 at the Springfield, Missouri, zoo, by giving her the antiherpes drug famciclovir, in elephant-sized doses.

–DAN FERBER

Dan Ferber is a writer in Urbana, Illinois.

BIOENGINEERING

Preliminary Data Touch Off Genetic Food Fight

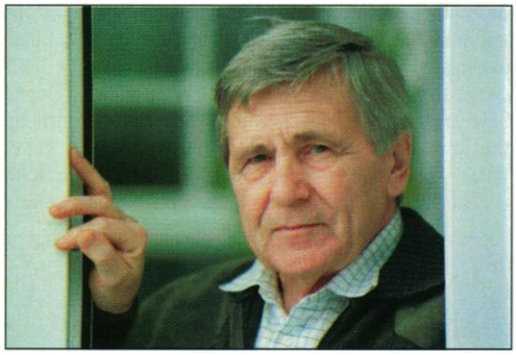
The controversy in Britain over genetically modified food reached a new high on 12 February, when preliminary data from experiments on potatoes made headlines for the second time in 6 months. The latest media frenzy was touched off when 21 European and American scientists released a memorandum in support of Arpad Pusztai, a protein biochemist who was suspended last year by the Rowett Research Institute in Aberdeen, Scotland, after he appeared on a TV show and sounded an alarm about potatoes altered to resist pests (*Science*, 21 August 1998, p. 1124). After reviewing the case, the scientists said Pusztai's statements were correct and demanded that the Rowett Institute exonerate him.

Their action immediately prompted members of the British House of Commons to urge a moratorium on genetically modified food and triggered allegations that the government or the biotech industry had a hand in suppressing the data. "This raises questions about the extent to which the biotech industry seeks to permeate every level of government," says Labour MP (Member of Parliament) Alan Simpson.

The Rowett affair erupted on 10 August 1998, when Pusztai appeared on Granada's TV show *World in Action* and declared that transgenic potatoes had stunted growth and suppressed immunity in rats that had eaten them for 110 days. The potatoes contained a gene encoding a lectin, a plant protein that can deter insect pests. The world press immediately besieged Pusztai's institute, which initially supported the claim; Rowett chairman and European Parliament member James Provan urged European Union (EU) President Jacques Santer and British Health Secretary Frank Dobson to require more rigorous testing of transgenic food. Just 2 days later, however, the institute's director, Philip James, said Pusztai's data turned out to be "a total muddle"; the disconcerting conclusions, James said, were based on experiments with nontransgenic potatoes spiked with a lectin. The institute apologized for spreading "misleading information," suspended Pusztai, and turned

over his data to a four-member audit committee for investigation.

That committee's report, released on 28 October 1998, didn't mention the alleged mix-up; instead, it acknowledged that experiments with lectin-transgenic potatoes had been carried out, but concluded they did not support the suggestion that the potatoes affected growth, organ development, or immune function in rats. Pusztai, who was forbidden by Rowett to talk to the press, sent copies of the audit report, his own rebuttal to it, and a transcript from the *World in Action* show to dozens of scientists who had asked for them, asking them to review the material.



In the news. Arpad Pusztai's data make headlines.

The responses, collected by protein chemist Edilbert Van Driessche of the Vrije Universiteit in Brussels, were presented along with a statement last week at a press conference in the House of Commons. The statement contends that Pusztai's data do suggest that the transgenic potato affected the rats' immune systems, affected their organs, and slowed their growth. The data in the audit report, it says, "appeared to be arbitrarily selected and biased towards brushing aside the conclusions of the experimental findings."

Pusztai's supporters also point to a follow-up study performed last fall by Stanley Ewen—a pathologist at Aberdeen Royal Hospitals who has worked with Pusztai for 10 years—who examined the guts of the rats from Pusztai's experiments under a microscope. Ewen, who presented the results at an EU-sponsored lectin meeting in Lund, Sweden, in November, found that the animals fed a transgenic diet had symptoms of infection, with white blood cells accumulating in their gut lining. The same reaction didn't occur in rats that had been fed a nontransgenic potato diet spiked with the same lectin. Although it's unclear how the diets could have had different effects, "they are profound changes," says Thorkild Bøg-Hansen, a lectin expert at the University of Copenhagen, "that require further investigation."

The audit committee's chairman, Rowett senior scientist Andrew Chesson, says he stands by his report but doesn't want to discuss the reviewers' findings, to avoid a debate about raw data in the press. Pusztai should publish his results in a scientific journal, Chesson says: "If the data are sound, I don't think he'd have any problem publishing them."

The new analyses of Pusztai's data immediately led Simpson to demand a "complete moratorium" on genetically modified food—a measure British Prime Minister Tony Blair said he wasn't ready to take, as he strongly believed the new food was safe. Simpson also says, "If the data are now being corroborated, someone has to explain the basis upon which his research was suppressed." Several MPs expressed suspicions about the government's role in the affair, which were stirred up even further when a newspaper revealed on 16 February that science minister Lord Sainsbury once had a financial interest in a company that owns a patent on the cauliflower mosaic promoter, a gene often used in plant genetic modification. Conservative MPs said Sainsbury was a biotech "advocate" and demanded his resignation. But Chesson says his institute was not influenced by the government or the industry and has "never ever" attempted to suppress any results. "The sooner the data get into the scientific journals, the happier we'll be," he says.

Whatever the fate of the findings, most parties agree on at least one thing: The affair has been an outstanding example of how not to communicate scientific findings to an already confused and worried public.

–MARTIN ENSERINK

CREDITS: (TOP) DAVE CHESKIN/PRESS ASSOCIATION NEWS; (BOTTOM) P. BAGLA

COSMOLOGY

Superheavy Particles From the Big Bang?

CHICAGO—Pity the poor Wimps. Although theorists have proposed that these Weakly Interacting Massive Particles—hypothetical slow-moving, exotic relics of the big bang—could account for much of the mass of the universe, no one has conclusively observed a Wimp. Worse, in their bid for the title as the unseen "dark matter" that astronomers believe our galaxy must contain in large amounts, they have to compete with big, brawny lumps of common stuff—stones or gas—that go by the acronym Machos. As if all that were not bad enough for the effete Wimps, a formidable new rival has just emerged: a Godzilla of a particle called the Wimpzilla.

Described here last month at a gathering of the world's leading cosmologists,* Wimp-

* The Pritzker Symposium on the Status of Inflationary Cosmology, University of Chicago, 29 to 31 January, with a closely related workshop from 1 to 3 February.

ScienceScope

Crops Chief Moves On After just 18 months on the job, Shawki Barghouti (below) has resigned as head of the struggling International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in Patancheru, India. The Jordanian agronomist says he has successfully steered the institute in "a new direction" and that it is time to move on.

Founded in 1972, ICRISAT is part of a global network of 16 centers aimed at improving agriculture in the developing world (*Science*, 2 January 1998, p. 26). Barghouti says he eliminated his institute's $5 million deficit by cutting spending by 20% and by coaxing donors to add $3 million to a $25 million budget. "Not a single research program was hacked in my tenure," Barghouti claims. But not everybody is convinced that ICRISAT is out of the woods. Yeshwant

Nene, an ex-deputy director-general of the institute, fears the current "peaceful" period could end with yet another changing of the guard. Barghouti plans to leave on 1 September.

Accelerated Recycling A dismantled Dutch linear accelerator will find new life in Russia. At the end of last year, particle physicists shut down the 20-year-old Medium Energy Accelerator and the 7-year-old Amsterdam Pulse Stretcher in response to the government's decision to cut back on high-energy physics. Now, the Netherlands' only linear accelerator—a 180-meter-long pipe that fires electrons into a 68-meter-diameter storage ring—will be recycled into a synchrotron radiation source at the Joint Institute for Nuclear Research in Dubna, Russia.

Though the Dutch machine is free, the Russian institute must raise millions of dollars for reassembly, a 4-year project. "Fortunately we have a building which just fits," says Dubna chief engineer Igor Meshkov.

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