

# Hippity Hop Goes the Virus

## The Australian war on rabbits just got a little wild

By TINA ADLER



In the 1800s, British settlers in Australia imported animals from their homeland, such as red foxes, blackbirds, sparrows, starlings, and rabbits. "They couldn't quite come to grips with gum trees and koalas," explains Brian Cooke, an Australian zoologist.

The rabbits lived up to their reputation and reproduced. A lot. Now, Australians can't come to grips with their 200 million to 300 million wild European rabbits, which reside primarily in the southern half of the country. They "are an ecological disaster," Cooke says.

Unchecked, they create deserts wherever they go, devouring plants, shrubs, and seedlings. They have also forced other small animals, such as the bandicoot, or bilby, a native marsupial, to retreat to northern Australia. Livestock, including sheep and cattle, struggle to compete with rabbits for pasture.

Keeping the bunnies in check is a Herculean task. Kill off 70 percent of their population, and they will recoup their losses in a year, Cooke reported in 1991. He is the field research leader in Canberra for the Australia and New Zealand Rabbit Calicivirus Disease Program (ANZRCDP), a government and agricultural industry group. But the Australians have certainly tried to turn back the tide of rabbits. They've shot and poisoned them; plowed up, blasted, and fumigated their warrens; sicced predators on them; and fenced their fields.

In the early 1950s, government scientists resorted to releasing myxomatosis, a virus that kills rabbits rather painfully. "It is not very nice from an animal welfare point of view," comments Sandra Bennett, a spokeswoman with the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) in New South Wales.

Although quite successful at first, myxomatosis gradually became less effective, particularly in the country's dry rangelands. Scientists are now trying to geneti-

cally engineer the virus to sterilize rabbits, but they have yet to succeed.

In 1991, Australian researchers supported by ANZRCDP began to test a different virus, a calicivirus. It kills quickly and fairly painlessly by causing blood clots in the lungs, heart, and kidneys. After completing laboratory tests of the virus' safety and efficacy, the scientists injected it into rabbits quarantined on Wardang Island, an uninhabited spot in Spencer Gulf, South Australia.

That's when things got a little out of control and some researchers really began to worry about the new virus and where it might hop to.

**S**ince the early 1900s, scientists have found a variety of caliciviruses in humans and other animals (SN: 2/22/86, p. 116). The rabbit version, originally called rabbit hemorrhagic virus, first surfaced in 1984 in China. Since then, it has spread throughout North Africa and Europe, as far north as Sweden, leaving a trail of dead rabbits.

In their recent laboratory studies, the Australian researchers demonstrated that the rabbit virus fails to infect any of the 28 domestic and wild animal species they tested, including such natives as bush rats and fat-tailed dunnarts. However, to use the virus as a control agent, the researchers needed to know how well it kills rabbits in the field and whether it disrupts the breeding success of survivors, lasts a respectable time, and interacts with myxomatosis.

So they quarantined 1 square kilometer of Wardang Island, built pens enclosing individual warrens, and in March 1995 began inoculating rabbits with the calicivirus. To reduce the risk of either beast or bug escaping, workers checked the fences daily for damage and tested the blood of wild rabbits outside the pens. They used insect traps and sprays "to minimize the spread of virus via insects," reports ANZRCDP, which hired scientists at CSIRO's Australian Animal Health Laboratory in Geelong to do

the research.

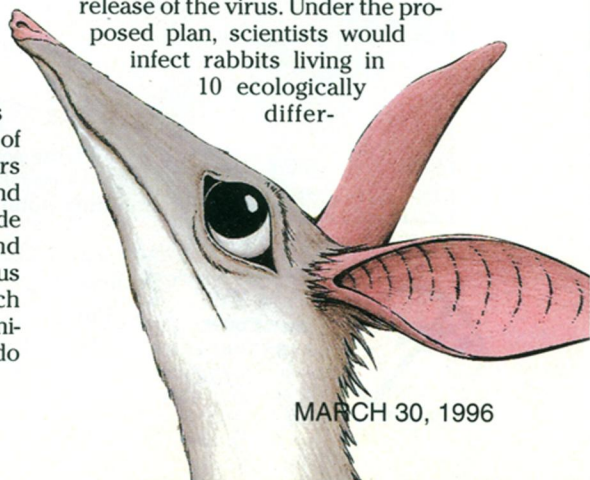
In late September, they discovered that, despite their efforts, the virus had evaded containment. Dead rabbits with signs of the calicivirus infection appeared outside the pens. By killing any that had survived at or near the site, they managed to stop the virus from spreading all over the island. But it had already spread to the mainland and infected rabbits hundreds of kilometers inland. Health officials decided that trying to contain it would be a losing battle.

Since then, the virus has been found throughout South Australia, just over the borders of New South Wales and Queensland, and at two sites in central Victoria. It appears to kill between 80 and 95 percent of the adult rabbits it encounters.

"We don't have a formal position on how the virus escaped," says ANZRCDP coordinator Nicholas Newland in Adelaide. He suggests that insects may have carried it. Almost anyone or anything that contacts even minuscule particles of contaminated fecal matter or rabbit meat could pick up the virus and inadvertently pass it on to rabbits.

Newland doubts that someone sneaked the potent bug off the island intentionally. However, "there has been some talk that people are aiding and abetting its spread [on the mainland]. . . . I can't say if that's just scuttlebutt or it's real," notes Harvey Westbury, a veterinary virologist with the animal health lab.

Government officials are now deciding whether to allow an organized release of the virus. Under the proposed plan, scientists would infect rabbits living in 10 ecologically different





ent regions throughout Australia and monitor the virus' spread. Between November 1995 and January 1996, the government invited the public to comment. Ninety percent of the 470 letters submitted support the release, says Bennett. ANZRCDP will probably get the go-ahead, Newland believes.

**T**he program "clearly had failed planning," argues David O. Matson, a physician at Eastern Virginia Medical School's Center for Pediatric Research in Norfolk, who studies caliciviruses in humans. The spread of the virus "could have been avoided. . . . We don't know what the outcome will be." He and others fear that the bug could infect animals other than rabbits, including people.

But CSIRO scientists say their studies and others demonstrate that the virus is quite complacent and highly unlikely to infect other species.

Many people have worked with infected rabbits, yet there have been no reports of anyone picking up the rabbit virus or developing antibodies to it. "Caliciviruses are noted for having narrow host ranges, and only a rare number of cases are known where a [calicivirus] has crossed species boundaries," CSIRO scientists report.

The Australians "are playing with dynamite," contends veterinarian Alvin W. Smith of the Laboratory for Calicivirus Studies at Oregon State University in Corvallis. He believes that caliciviruses readily venture beyond their original hosts. One that infects seals can also survive in marine animals, pigs, cattle, monkeys, and people, he says. And for many years, scientists mistakenly believed that the swine calicivirus would not sicken cattle.

"The Australian scientists may have shown that the rabbit calicivirus does not readily infect some test species, but they have in no way proven that it cannot adapt to and become established in these or [a] new host," Smith wrote to an Australian senator in December 1995.

Rabbits' crowded living conditions in parts of Australia are likely to allow the virus to reproduce extensively. That, in turn, increases the chance that mutants capable of infecting other species will appear on the scene, Matson argues.

Moreover, a recent genetic analysis by Matson and his colleagues, including Smith, suggests that animal and human caliciviruses "are not as different as we previously thought," Matson asserts. "There has to be some sort of barrier to human infection—we just don't know the strength of that barrier." The symptoms that the rabbit virus would produce if it could live in people remain unknown as well.

"I respect [Matson's] views, but there is no evidence that we can find that . . . this rabbit virus can infect other species,"

Westbury contends.

Virologists lack the know-how to determine whether a virus will move on to new hosts, argues Stephen Morse of Rockefeller University in New York City. "One thing we'd love to do in virology is to predict just this sort of thing . . . but it's still largely an art rather than something we can do scientifically."

"It's a risky business introducing a virus into a population with a lot of unknowns," says Douglas Gregg, a veterinarian with the U.S. Department of Agriculture's Foreign Animal Disease Diagnostic Laboratory on Plum Island, N.Y. However, this virus has remained very loyal to the rabbit and poses little threat to other creatures, particularly humans, he adds.

"We are a long way from a rabbit phylogenetically," he notes. "I think Al Smith is barking up the wrong tree."

Gregg, in fact, thinks that the Australians are dealing with a new type of parvovirus—not a calicivirus at all. The rabbits' symptoms resemble those caused by parvoviruses, not by caliciviruses, he asserts. Also, only Nian-Xing Du and his colleagues at the Nanjing Agricultural University in China have managed to isolate and grow in cells the virus that is killing rabbits worldwide, he says. So only they have a pure form of the agent—which looks genetically like a parvovirus. Gregg's and Du's studies on the rabbit virus appeared in the June 1991 *SCIENTIFIC AND TECHNICAL REVIEW*.

Westbury disagrees. "We know we only have calicivirus," and a lot of international research supports that finding, he argues.

**W**hile some Australians are rejoicing in the coming of the bunny plague, residents of other countries want only to shield their animals from it.

"I have a concern, and many in USDA do, that this disease could get into the United States easily," Gregg asserts. Rabbits are allowed to enter the United States only if they appear healthy, but they are not tested for disease. At least 324,000 pounds of rabbit meat and thousands of live rabbits enter the United States annually, he says.

Among U.S. domesticated rabbits, "the potential for an epidemic is tremendous," he warns. For example, the virus could spread easily at rabbit fairs, each of which can host as many as

10,000 show animals. However, two of the most common wild rabbits in the United States, the eastern cottontail and blacktail jackrabbit, do not catch the disease, Gregg's studies have demonstrated.

There isn't any widely available rabbit vaccine that has met U.S. Food and Drug Administration standards for safety and efficacy, Gregg says. Also, some countries choose not to use the available vaccine during an outbreak, thus ensuring that inspectors can detect sick rabbits with an antibody test. Vaccinated animals also produce antibodies.

The rabbit virus has plagued other countries. It took 5 years for Mexico to get rid of it. The problem began when, in 1989, a supermarket worker unknowingly handled contaminated rabbit meat imported from China. The worker also had his own rabbit-breeding business and spread the virus, Gregg says.

Australian scientists realize that if the virus works very well, rabbits' predators may turn to other animals. What happens, for example, if hungry foxes eat endangered species? "We can get rid of the foxes, I guess," Cooke says. "There may be a need for coordinated predator control," ANZRCDP acknowledged in a Dec. 4, 1995, press release.

**Q**uestions remain about whether the Australians should use the virus and where it will pop up next. But do ANZRCDP's efforts have a chance of making a dent in the rabbit population?

Scientists at CSIRO say yes, while acknowledging that the virus is no magic bullet. Australians must continue using the rest of their antirabbit arsenal, because young rabbits often resist the virus and then go on to develop lifetime immunity. Because of the immunity, Matson anticipates that within a few years the virus will have little effect.

But many Australians want to give the virus a chance. They think it's their best shot at subduing the wild, floppy-eared gangs uprooting their native plants and animals. □

### Easter Bunny Beware

The Anti-Rabbit Research Foundation of Australia wants everyone to say good riddance to the Easter Bunny and hello to the Easter Bilby. Easter what? Bilby—a native Australian marsupial that looks something like a rabbit but lacks the rabbit's flair for reproducing and devouring vegetation.

The foundation published in 1994 a children's book about how the sweet Easter Bilby beat out greedy bunnies to replace the retiring Easter Bunny. *Easter Bilby*, written by Ali Garnett and illustrated by Kaye Kessing, has sold 30,000 copies. Sales of chocolate Easter Bilbies have done well too. Shown from the book are the Easter Bunny (previous page, top), a bilby (previous page, bottom), and a greedy bunny (right).

