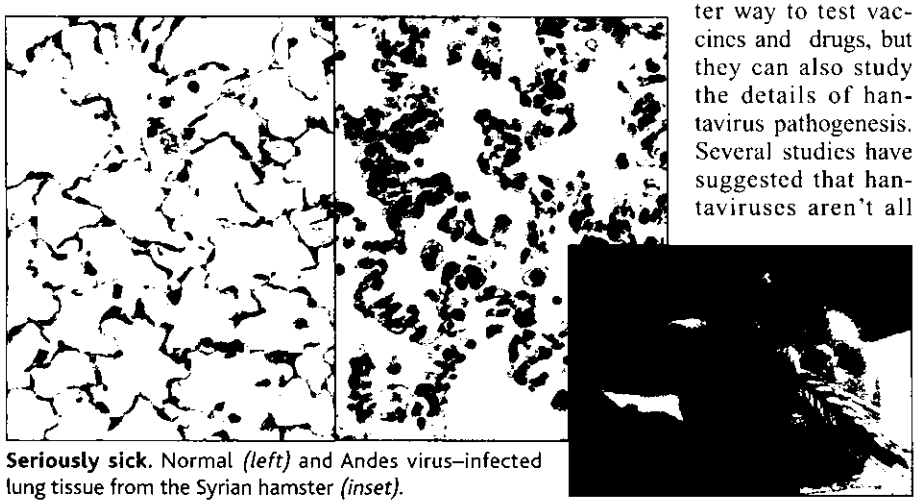
antiviral treatments exist, and usually between one-third and one-half of the victims die. In Europe and Asia, a quartet of different hantaviruses causes tens of thousands of cases yearly of a disease called hemorrhagic fever with renal syndrome (HFRS); mortality rates range from 0.1% to 15%. Hantaan virus, the first of that bunch to be discovered, caused more than 3000 cases of HFRS among United Nations troops during the Korean War between 1951 and 1954; the U.S. Army has had a keen interest in developing hantavirus vaccines ever since.



Seriously sick. Normal *(left)* and Andes virus–infected lung tissue from the Syrian hamster *(inset)*.

But Army researchers and others have been handicapped by the lack of animal models. No matter how many animals they injected with various hantaviruses, they could not produce anything resembling the ravages of either severe HFRS or HPS. For example, two teams have injected monkeys with a European hantavirus called Puumala, but it caused symptoms that would likely be too subtle for a vaccine trial, says USAMRIID team leader Jay Hooper.

Confronted with these obstacles, the team had to make do with another strategy. Instead of testing whether a vaccine protects against disease, they tested whether it could prevent infection altogether—a much stricter test because it flunks vaccines that let the virus enter the body and replicate but prevent illness.

The team recently started looking into vaccines for Sin Nombre and the Andes virus from South America, which together cause the great majority of HPS cases in the Americas. A key initial step was determining how much virus is needed to infect an unvaccinated animal. When Hooper injected hamsters with Sin Nombre, they became infected but stayed healthy. But after he injected adult Syrian hamsters with Andes virus, something unusual happened. One by one, the animals developed difficulty breathing, and most died within days—just as fast as human victims. Further studies of the hamsters by USAMRIID pathologist Tom Larsen revealed that after an incubation period of about 11 days, the microscopic blood vessels in the animals' lungs became permeable and their lungs and chest cavity rapidly filled with fluid, essentially causing them to drown. All these symptoms closely resemble HPS in humans, says Hooper.

Not only do researchers now have a better way to test vaccines and drugs, but they can also study the details of hantavirus pathogenesis. Several studies have suggested that hantaviruses aren't all that lethal to individual cells, says virologist Clarence Peters of the University of Texas Medical Branch in Galveston. Instead, the human immune system's response may wreak the real havoc. Researchers can now test that theory by blocking or stimulating the suspect immune messengers—studies that could provide new drug leads.

The model does have drawbacks, however. Because it works only with Andes virus (the team is still not sure why), it may not tell researchers much about the HFRS-causing hantaviruses. And the hamster, unlike the mouse, isn't a common lab animal, so researchers lack both an intimate knowledge of its biology and a wealth of reagents to study it. Even so, the dearth of models has been so frustrating that Peters predicts others will jump on the findings.

–MARTIN ENSERINK

CREDITS: (TOP TO BOTTOM) THOMAS LARSEN/USAMRIID; BOB SCHATZ/ANIMALS, ANIMALS; AP PHOTO/UNSCOM

ANIMAL CARE

Coulston Loses NIH Tie, Faces Hard Times

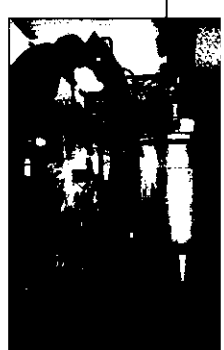
A major U.S. primate facility has lost its permit to house and experiment on federally owned chimpanzees, raising questions about its viability.

In June the National Institutes of Health (NIH) ended its funding of the Coulston Foundation of Alamogordo, New Mexico, after finding a new caretaker, Charles River Laboratories, for 300 chimps housed there (*Science*, 10 September 1999, p. 1649). Later that month NIH officials let lapse a document, called an Animal Welfare Assurance,

ScienceScope

Red Flight NASA engineers are celebrating the success of a prototype plane that one day could swoop over martian dunes and canyons, looking for water and providing a detailed view of the planet's complex surface. The small glider was dropped 9 August from a helium-filled balloon that carried it to an altitude of more than 30,000 meters above the Oregon coast. Designed at the Ames Research Center in Mountain View, California, the glider has a long, straight wing nearly 3 meters long to help it stay aloft high in Earth's atmosphere, an analog to the thin martian atmosphere at low altitudes. Both the recent flight and a low-altitude mission last month by another model met engineering expectations, agency officials say. But don't expect scheduled flights soon; NASA still must develop a craft with wings that could be folded up to fit inside a spacecraft as well as a suitable propeller propulsion system.

Going Nowhere Negotiations over measures to ensure compliance with the 30-year-old Biological and Toxin Weapons Convention have come to an ignominious end. Last month the U.S. delegation at the talks announced its staunch opposition to the measures, set out in a draft treaty protocol (*Science*, 20 July, p. 414). So the representatives from 55 nations instead tried to craft a consensus statement to preserve the current draft protocol as a basis for future discussions.



But even that document landed in the wastebasket in the final minutes of a monthlong negotiating session that ended 18 August. The U.S. delegation objected to language that hinted at its opposition to the protocol. The disagreement doesn't bode well for a November review conference at which treaty states are meant to take stock of potential bioweapons threats that have emerged during the past 5 years. Bioweapons expert Graham Pearson of the United Kingdom's University of Bradford predicts "a lot of recrimination" at that meeting. Others share the pessimism. "I hate to think you can't get countries to act unless a disaster strikes," says Barbara Hatch Rosenberg, chair of the Federation of American Scientists' biological weapons working group.

Contributors: Martin Enserink, Constance Holden, Andrew Lawler, Richard Stone

that allows Coulston to carry out federally funded research with animals.

The foundation was formed in 1993 when businessman Frederick Coulston united his several primate care ventures and created the nation's largest chimpanzee facility. At its peak, Coulston cared for more than 600 chimpanzees with a staff of 120.

Foundation spokesperson Don McKinney declined to comment on the number of chimps currently housed at the facility, the foundation's financial condition, or the size of its workforce. But available records suggest that the loss of federal funding will be a heavy blow. In the 1999–2000 fiscal year, 63% of the foundation's $4.1 million in annual revenues came from the government, according to tax returns obtained by animal-rights groups. And its ability to solicit contracts with private U.S. companies is restricted by a 1999 decision by the Food and Drug Administration that the center does not comply with good laboratory practice regulations, to which all advanced animal trials must adhere.

McKinney says the foundation has active private contracts but that all details are proprietary. According to tax records, the foundation's private contracts declined by 35% from the 1998 to 2000 fiscal years. Ronald Couch, former president of the foundation, says that investigations into possible animal welfare violations hurt the foundation's ability to attract private clients during his brief tenure in 2000. Coulston still faces an investigation by the U.S. Department of Agriculture (USDA) over the deaths of two chimps in 1999 and 2000.

If history is any guide, the foundation's future may depend on the size of Frederick Coulston's personal cash reserves. The 86-year-old Coulston has reported giving the foundation more than $7.5 million, according to NIH records and the foundation's tax returns. **–JOSH GEWOLB**

CANADA

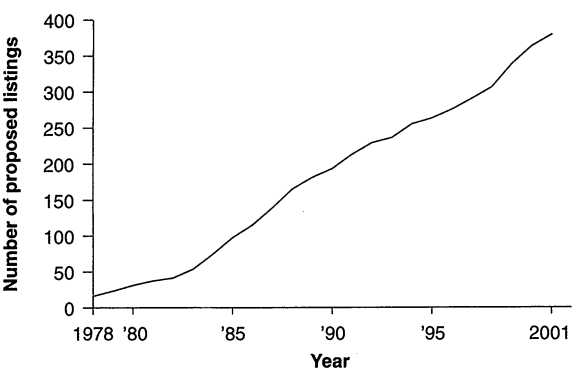
Scientists Want Tougher Endangered Species Law

Canadian biologists are trying to toughen proposed legislation designed to protect endangered species in Canada. Their stance puts them in the awkward position of resisting government efforts, almost a decade in the making, to pass the nation's first federal law on the issue.

After changes in government derailed two previous attempts (*Science*, 13 December 1996, p. 1827), the chances of passage of the proposed Species at Risk Act (SARA) this fall appear good. But many scientists believe that it doesn't do enough to protect species' habitat, and they want a scientific panel, not politicians, to have the final say in deciding which species are listed.

SARA differs from the equivalent U.S. Endangered Species Act in seeking first to work cooperatively with landowners and industry, offering incentives and financial compensation; enforcement of yet-to-be written regulations would be used only as a last resort. "We do not want to hamstring our own efforts to recover species with a confrontational and immediately prohibitive approach," Environment Minister David Anderson told *Science*. "We want to promote voluntary action, individual responsibility, and cooperative, community-based solutions." The goal, Anderson adds, is to produce "legislation that is effective on the ground, not just 'strong' on paper."

A house but no home? The nests of marbled murrelets, one of a growing number of endangered species proposed for listing *(inset)*, would be protected under the proposed Canadian law—but not necessarily their rainforest habitat.



But a number of scientists say that this particular carrot-and-stick approach is too much carrot and not enough stick. The bill provides no mandatory protection for species' habitats, they say, safeguarding "residences" such as dens or nest sites but leaving the designation of habitat and enforcement mechanisms open to influence from local and regional officials, landowners, and industry. "Anyone with Ecology 101 knows that without habitat, it is impossible for species to survive," says ecologist David Schindler of the University of Alberta, one of the organizers of a letter being drafted to Prime Minister Jean Chretien (www.scientists4species.org) that lays out their arguments.

Scientists also find fault with the proposed listing process. A panel of experts, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), has long maintained a list of species recommended for protection under the act (see graph), and scientists would like to see COSEWIC have the legal authority for listing species. But the bill leaves the decision on listing to Cabinet ministers.

Scientists also worry that the federal government will defer to provincial governments in enforcing the act. "Appeasing the provinces seems to be in vogue in Canada, so when the provincial bullies snarl, federal ministers turn and run," Schindler says. He and others say that federal control is key for the 70% of threatened and endangered species, such as grizzly bears, wolves, and migratory birds, whose ranges extend into the United States. "It's really embarrassing that both Mexico and the United States have stronger laws," says environmental lawyer Kate Smallwood of Sierra Legal Defense Fund, who is working with the scientists.

Not all of Canada's scientists oppose the bill, however, and many fear that too much criticism from biologists may derail it. "Anderson has gone an awful long way for this and is really doing a lot to make it happen," says Fred Cooke, an ornithologist at Simon Fraser University in Burnaby, British Columbia. Canada's collaboration with industry, he adds, seems to be working better than the U.S. approach in helping such species as the marbled murrelet.

In contrast, a prominent legislator suggests that scientists might want to make an even bigger fuss. Charles Caccia, a longtime proponent of strong endangered species legislation and chair of Parliament's Standing Committee on Environment and Sustainable Development, says that some members of his committee "wish that scientists would be more forthcoming, more politically explicit" in explaining what changes are needed. Caccia's committee will consider amendments to the bill next month before forwarding it to the House of Commons. **–JAY WITHGOTT**

Jay Withgott writes from San Francisco.

CREDITS: (TOP TO BOTTOM) GUSTAVO LONDONO; COSEWIC