Div. of Research Resources, NIH

Good immunity makes good neighbors.

Observations that woodrats can survive multiple rattlesnake bites prompted the laboratory experiments. John Perez and colleagues injected rodents with dilutions of rattlesnake venom. They found that 2 milliliters of full strength venom is required to kill half of a sample of woodrats. That dose is 140 times higher than that needed to kill the same proportion of mice.

"The natural resistance in woodrats is not surprising," says Perez, "since woodrats and rattlesnakes live in the same habitat — often in the same burrows."

The venom used in the experiments comes from caged rattlesnakes that are "milked" every week. Most of these snakes come to the laboratory from an annual rattlesnake roundup held in southern Texas.

"There is no good way to measure the amount of venom released in a rattlesnake bite," Perez says. "A large rattlesnake could release 3 milliliters. So a large snake could kill a woodrat, but a small snake couldn't."

Immunity to rattlesnake venom is transferable between animals. Perez and coworkers removed the cells from woodrat blood and injected one-half milliliter of the resulting serum into mice. "This increased protection by a factor of 3.6," Perez says. "The mice could then withstand about three times the amount of venom."

The scientists are now working to isolate and purify the protective factor. Preliminary experiments indicate that the agent is not just an antibody. Mixing woodrat serum and venom does not produce a visible antibody-antigen complex, as in a typical immune system response. The anti-lethal factor may instead be an enzyme that actually breaks down the venom components.

Perez proposes that factors isolated in these and other studies will be useful in snakebite treatment. Snakes are typically resistant to their own venom, and Perez also finds immunity in the Mexican ground squirrel, a vicious rodent that can kill a rattlesnake. "Venom is a very complex toxin. It destroys muscle and affects blood," Perez explains. A combination of factors isolated from the blood of rattlesnakes and rodents might be most effective against the many toxins and enzymes acting in the venom. □

And the neutrons go round and round

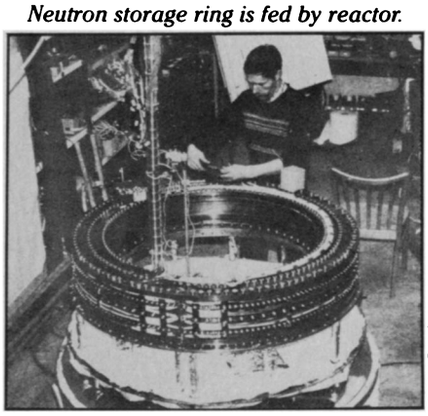
In the conventional technology of particle physics, electrically neutral particles are not affected by magnets. Magnetic fields will bend the paths of positive particles one way and those of negative particles the opposite way, but neutral particles go straight through. Among other things, this means that a storage ring for neutrons, in which the neutrons would circulate in a round path, should be impossible.

It turns out, according to a report in the November CERN COURIER, that a group of physicists at the University of Bonn in West Germany have designed and built a neutron storage ring which has been put into operation at the Institut Laue-Langevin in Grenoble, France. The ring comes about because neutrons, although electrically neutral over-all, have within them a distribution of positive and negative electric charge. Neutrons spin, and the spinning of this charge distribution gives them a small magentic moment, or intrinsic magnetic field. This magnetic moment is impervious to the influence of the magnets usually used for bending and focusing the paths of particles. When more complicated magnets are introduced (quadrupoles substituted for dipoles and sextupoles for quadrupoles), it proves possible to take hold of that magnetic moment and make the neutrons go in circles.

The ring is a small apparatus, 1.2 meters across, and accepts only neutrons with very low energy, about two millionths of an electron-volt. But the ring holds the neutrons well: Some neutrons are detectable in it up to 20 minutes after injection.

This will permit two important experiments, a more precise determination of the neutron's half-life (free neutrons decay radioactively with a half-life of about 15 minutes) and of whether it has a small electric dipole moment — that is, a slight imbalance in its electric charge distribution. □

Neutron storage ring is fed by reactor.



CERN Courier

WHO announces end to virulent smallpox

Halfdan Mahler, director-general of the World Health Organization announced Dec. 13 the global eradication of variola major, the blinding, maiming and often lethal form of smallpox. In an intercontinental news conference via satellite, Mahler and Donald Henderson, former head of WHO's smallpox eradication campaign, spoke from Dacca, Bangladesh with reporters in this country. They said that in signing the death certificate for variola major there was no longer any need for smallpox vaccinations, although vaccinations would probably continue as a safety measure for another decade in Asia. And they hope to see an end to smallpox entirely, within a few years, they said. A less virulent form of smallpox, variola minor, still officially exists, although the last known case occurred in Somalia more than seven weeks ago.

"The last case of variola major on earth" was identified Oct. 16, 1975, in Bangladesh, Mahler said. There has never been more than nine months between occurrences of the disease, but just to be sure, a team of 12,000 health workers and a staff of 100 WHO and international specialists made repeated house-to-house searches throughout previously afflicted areas for new cases during the past two years.

Henderson said that the variola major virus is extinct except for small quantities in research laboratories. And because it has "bred remarkably true and does not shift, as with influenza, every few years," it is not likely that a mutant variety will suddenly appear, he said. Although it's hard to prove whether the virus exists in animals, "in the past 10 years we've searched very hard and not found any," Henderson said. Twenty-nine cases of "monkey pox," a disease resembling smallpox, have appeared in Africa recently but do not appear to spread between humans. A major triumph of WHO's campaign is eradication totally through prevention; it had to be done that way, Henderson said, because the disease still lacks a cure. □

Holing the Ross Ice

Using a high-speed jet of hot gas, researchers in Antarctica have succeeded in drilling a 420-meter-deep hole through the Ross Ice Shelf into the chilly waters beneath the earth's southern cap. Besides lowering cameras, test instruments, sampling devices and fishnets to the bottom of the hole, scientists in the five-nation project intend to sample the overlying ice at different depths, representing many thousands of years of accumulated snowfall. An attempt nearly a year before had ended in failure when a different type of drill stuck in the ice. □