CHEMISTRY

Can Kill 300,000 Rats

ANTU, powerful poison, developed from taste tests in psychology laboratory. War restrictions lifted, will soon be available. Not dangerous to humans.

➤ ANTU, a rat poison so powerful that one pound could kill 300,000 rats but which is not dangerous to humans, will soon be available to the public.

Discovered through taste tests in a psychology laboratory, ANTU has been a closely guarded secret during the war. First inkling that security restrictions had been lifted came with publication in the U. S. Public Health Service's *Public Health Reports* of a scientific study by Drs. Wm. T. McClosky, M. I. Smith and R. D. Lillie of the National Institute of Health.

Credit for the discovery of ANTU as a rat poison, however, goes to Dr. Curt P. Richter, of the Phipps Psychiatric Clinic at Johns Hopkins Hospital in Baltimore.

The word ANTU is made of the initial letters of the rat poison's chemical name, alpha-naphthyl thiourea. It is a fine gray powder with very little odor or taste. Compared to other rat poisons, ANTU turned out to be twice as poisonous as thallium sulfate and more than 100 times as poisonous as arsenic trioxide and fortified red squill on the basis of the sizes of the killing doses of each.

ANTU has two remarkable features. 1. It acts almost exclusively on rats, leaving humans and most other species unharmed. 2. It kills rats in an unusual way, causing a dropsy of the lungs so great that the animals are drowned in this fluid from their own bodies. It is the only substance known to produce an edema, or dropsy, that is limited to the lungs.

For rat eradication, ANTU can be used mixed with finely ground corn or wheat; as a spray or dust on fruit or vegetables such as cut-up apples, sweet potatoes, tomatoes, and the like; as a dust, either pure or mixed with flour, on floors and runways; as a dust on the surface of water where rats are likely to drink; or blown as dust into rat holes and burrows with standard dust pumps used in rat eradication.

Large scale field trials in Baltimore showed that it can produce results very rapidly when properly used. In an emergency, such as an epidemic of rat-borne disease like typhus or plague, probably 95% or more of the rat population of a city could be wiped out in 24 to 48 hours, providing a supply of material and trained personnel were available.

The Baltimore trials also showed that ANTU must be used systematically to be effective. Rats that do not get enough of the poison to be killed outright grow wary about sampling ANTU-poisoned bait another time. The bait must carry enough poison and enough of it must be used to get every rat in the region at one time.

Dr. Richter recommends the city block as the smallest unit for rat eradication with ANTU, because, while rats move from yard to yard within a block, they rarely cross one of the streets to the next block. Complete coverage, with every rat hole, burrow and runway in every building, cellar and yard within the block containing adequate amounts of ANTU, is essential to success. So also is the cooperation of householders in the area. A preliminary clean-up of the block or area and use of alternate baits were also found important.

ANTU might be used to get rid of mice although it is less effective against these than against rats. Dogs may be poisoned by it and some were accidentally killed during the Baltimore campaign, although none of the more than 500,000 residents who had contact with ANTU were even made sick by it. Rabbits are not affected and chickens can be fed ANTU by the spoonful without harm.

Dogs, fortunately, are pretty well protected against ANTU poisoning by the fact that it causes them to vomit and so get rid of the poison. This and the fact that the chemical is almost insoluble furnish a guide to treatment of humans if any should ever be poisoned by it. No antidote has yet been discovered but immediate washing out of the stomach is advised by Dr. Richter. No fluids should be given. Dr. Richter also advises giving oxygen in case of ANTU poisoning.

ANTU was discovered as a result of studies Dr. Richter had been carrying on before the war, with no idea of developing a rat poison. He was working on the problem of taste as a guide to selection of food, seeking answers to questions such as why some persons develop an abnormal craving for salt or other diet items.

Rats were used in the studies and Dr. Richter found that these animals could

FROM OKINAWA—These "habu" snakes, patterned in yellow and green, are now at the National Zoological Park in Washington, D. C. Photograph by Fremont Davis, Science Service staff photographer. (See next page.)

select nourishing foods and avoid poisonous substances so long as their taste nerves were intact and functioning.

One afternoon he gave the rats a chemical often used for taste tests in humans. This is phenyl thiourea, which tastes very bitter to most persons though some cannot taste it at all. As is done in the tests on humans, a few crystals of the chemical were put on the tongues of rats.

All the rats in the test were dead the next morning. This was a surprise, because phenyl thiourea previously had been considered non-poisonous. It had been safely used for a long time for taste and inheritance studies in large numbers of people.

The war value of this discovery was immediately apparent. Red squill, which is imported, was no longer available and other rat poisons were either in short supply or dangerous. At the same time, the danger of epidemics of typhus fever and other rat-borne plagues might increase during the war. So, at the suggestion of Col. Perrin Long, Dr. Richter continued to study phenyl thiourea under a grant from the Office of Scientific Research and Development.

He soon found that although the rats in his laboratory would eat enough of the chemical in their food to poison themselves, wild rats in the city dumps and grocery stores of Baltimore were more wary. Apparently the bitter taste of the chemical warned the rats or at least kept them from eating bait poisoned with it.

A search for related chemicals was made with the help of the E. I. duPont de Nemours Company who quickly supplied over 100 chemicals. Of these, alpha-naphthyl thiourea turned out to be the best. It is made from alpha-naphthyl amine and ammonium thiocyanate. These chemicals, commonly used in the dye industry, are not expensive and were not on the list of critical chemicals during the war.

When first supplied, ANTU carried traces of a perfume made in the same building. This doubtless was a pleasing odor to the chemical company's human customers. To the rats, however, it evidently stank and they would have none of it. This difficulty was overcome and ANTU was put into large scale field trials.

Hundreds of thousands of residents of Baltimore, although ignorant of the identity of this new rat poison, soon were gratefully aware of its power to rid their premises of rats.

Surprising and somewhat disappointing was the discovery that while ANTU is very poisonous to the Norway rat, the Alexandrine or black rat commonly found in many parts of the world is not as much affected by the poison.

Science News Letter, October 6, 1945

ZOOLOGY

Snakes from Okinawa

They are now at the zoo in Washington. Called "habu" they are long and slim, patterned in yellow and green. Small collection of axolotls is also recent acquisition.

See Front Cover

➤ POISONOUS snakes from Okinawa, 20 of them, long and slim, patterned in yellow-and-green, are at the National Zoological Park in Washington, D. C. The Okinawan name for them is "habu". They belong to the pit-viper family, which makes them kin to the American rattlers and copperheads, rather than to the Old World cobras.

Director William M. Mann states that they are rather quiet and unaggressive, "though they do offer to snap at you once in a while." In their native haunts they are sub-arboreal in habit, which means that they are rather fond of slithering around in the branches of trees. When annoyed they have a way of puffing out their throats, like pouter-pigeons or bullfrogs.

They have been here at the Zoo for several weeks, but until now their presence was held as restricted information, at the request of the Army Medical Corps, which brought the specimens to Washington.

Another recent acquisition at the National Zoological Park is a small collection of Mexican axolotls. One of these is shown in the photograph by Fremont Davis, Science Service staff photographer, on the front cover of this SCIENCE NEWS LETTER. These are six-inch-long salamanders in a permanently arrested state of development. Unlike normal salamanders, which begin life as larvae in the water but eventually emerge to live on land in damp places, axolotls retain a larval form all their lives, breathing with external gills and never developing lungs.

Science News Letter, October 6, 1945

Black, blue, and other colors in *diamonds* are due to impurities.

Electronic blanching of vegetables, or using a shot of high frequency electricity instead of the flowing steam or boiling water method, results in retaining in cabbage 10 times the amount of vitamin C as in the older method.

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