PUBLIC HEALTH

Death Rides a Rat

Bubonic Plague's Ever-Menacing Invasion Keeps Forces of National and State Public Health Services on the Alert

By JANE STAFFORD

A FIERCE enemy with a new disguise has gained a foothold on California's shores and is crawling east and north, threatening two-thirds of the continent, from Alaska to the Ohio river.

Against this enemy there is a slender line of defenders—a handful of men, with headquarters in San Francisco, who spend most of their time roaming the valleys from California to Montana, catching squirrels and other rodents.

The Enemy Strikes

Last summer the enemy came from its hideout to make a strike. On Aug. 30, 1937, a man in Fresno County, Calif., died—a victim of bubonic plague.

Only two months before, the captain of the squirrel-chasing band of defenders had given public warning of the enemy's presence: Plague was abroad in the land, lurking in the bodies of ground squirrels and other wild rodents. True, it was wearing a disguise, was masked as sylvatic plague. But it was just as dangerous. The summer before, a lad died of bubonic plague three days after burying a pet chipmunk that had mysteriously sickened and died.

This warning was given to a gathering of scientists in Denver. There was some grave head-shaking. Alert newspapermen covering the meeting caught the implications. There were headlines in the afternoon newspapers. Next day there were different headlines—and the captain of the plague fighters, Dr. C. R. Eskey, senior surgeon of the U. S. Public Health Service, went quietly back to his squirrel-chasing under the hot Utah sun.

Two months later the Fresno County man died, a victim of plague. That was the summer of 1937. The summer of 1938 is with us now. In May of this year the U. S. Public Health Service reported plague infection among the ground squirrels in Santa Cruz County, Calif. Is the enemy ready to strike again?

The havoc that follows an extensive outbreak of plague is far worse than that of an invading army. If you recall the disastrous influenza epidemic during the World War and the terror that outbreak aroused, you will have just a faint picture of what a plague epidemic can mean to a country and its people. The plague that swept the world in the middle of the fourteenth century, described as the worst disaster ever experienced by man, is said to have been three times as severe in actual number of people killed as the frightful influenza epidemic of 1918-19.

Plague is caused by microbes or germs called *Pasteurella pestis*. This plague germ lives in the bodies of rats and is transferred to man by fleas that have first fed on the rat. As a nation, we are fortunately not much given to fleas. That helps cut down the chances of our getting plague.

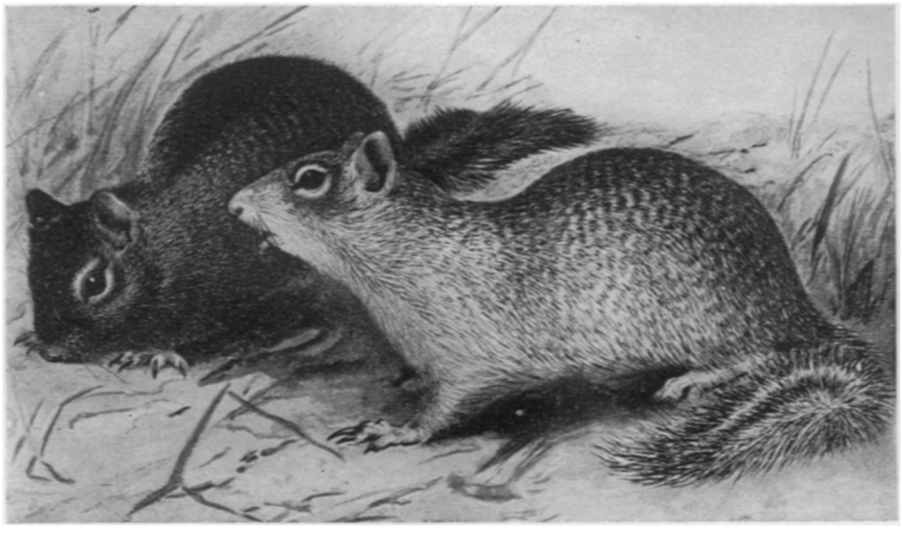
Our federal health men have for decades been alert to detect plague patients coming from foreign countries and to keep them out or isolate them so they could not spread the disease. These same health men—officers of the U. S. Public Health Service—have been equally alert and on the watch for plague-carrying rats at our seaports.

Plague was formerly carried from one country to another by swarms of rats that lived in the holds of ships and came ashore at every port. When the rat's villainous role in the plague situation was learned, wharves were rat-proofed. Ships known to have come from plague-infested ports are fumigated by quarantine officers. Modern ships are being built on rat-proof lines. As recently as 1925, half the ships coming to U. S. ports were rat-infested, but now only one-tenth of them harbor rats, and the number of rats per ship is much smaller than formerly.

So the danger of plague has grown less and less in this country. We read of the horrors of plague in the Orient, where it is still prevalent, with a very comfortable feeling of being far away and safe. We even read of plague on the loose among ground squirrels in our own country—and then a friendly gray squirrel taps on the dining room window for his breakfast. Cunning little fellow. He hasn't the plague, we think scornfully, as we watch him feeding out of our hands.

Twofold Danger

The danger in the present situation is two-fold. One part is the spread of plague among ground squirrels and other wild rodents over a constantly widening area of the country. Plague-infected wild rodents have been found not only in California, where the infection first got its start among them, but also in Nevada, Montana, Idaho, Oregon, Washington



INNOCENT MENACES

California ground squirrels, carrying plague germs in their bodies, constantly menace hunters, ranchers, and vacationists in the West, and by passing their deadly burden on to other rodents they may extend the zone of potential plague to the East as well.

and Utah. This sylvatic plague is probably spread over a much wider area, its existence being unrecognized because no search has been made for it. The possibility of its spreading as far north as Alaska and as far east as the Ohio river is based on the fact that these limits bound the territory in which the particular squirrel roams. Plague has not yet been found in other varieties of squirrels, though they may acquire it from their cousins of the West. Chipmunks and prairie dogs have acquired the infection, and health authorities believe that it is only a matter of time before domestic rats—the kind that are a nuisance around houses and barns and storehouses—will be infected. This will reintroduce plague into our cities and endanger all of us.

Pneumonic Plague

The second part of the danger is that undiagnosed cases of pneumonic plague may start epidemics of this very fatal type of human plague. Dr. Eskey called attention to one such epidemic of 13 cases that occurred in the United States and which could have been prevented if the proper diagnosis had been made in the case of the first patient who became ill a few days after hunting ground squirrels.

Pneumonic plague, which kills in a few days, does not need any flea as transmitting agent. You can get this just as you get a cold from breathing air that a plague patient has infected with the germs expelled in his breath.

Suppose a man is our hunting or trapping and gets bitten by a squirrel, or by a particularly hungry flea from a wild squirrel, or perhaps he handles the carcasses of dead squirrels or other wild rodents. A few days later he gets sick with fever and a cough and difficulty in breathing. He may have pain in his lungs. His spleen gets big. He rapidly turns blue and within four days he dies. That is the picture of pneumonic plague.

Unguessed Danger

This plague victim did not know that the squirrels he handled or the flea that bit him were infected with plague. Even if he had heard that there was plague among ground squirrels, he may have forgotten the flea bite, he may not have thought to tell the doctor that he had been squirrel shooting a few days before he got sick. And the doctor, unless he is extremely alert, is not likely to think, in this day in our country, of plague in a patient with fever and a cough. Even if he did, he probably could not have saved the patient, because pneumonic plague is almost always rapidly fatal.

The great danger, however, is that this patient, whose sickness was not recognized as plague, probably was not isolated, but was sick at home, where relatives and friends visited him and picked up the plague germs he was exhaling with every breath and cough. Some of these persons would get sick and in turn infect still others, before the epidemic would be recognized and steps taken to check it.

Path of Infection

Pneumonic plague, unfortunately, is the kind that is particularly likely to follow ground-squirrel infection. The reason is that whereas rat bites are usually on the legs, squirrel bites are usually on the hand or arm, as a result of handling the animal. The first bubo or swelling in plague from a rat bite comes generally in the inguinal region, but the bubo after the squirrel bite on the arm comes in the armpit whence the plague germs can travel directly to the lungs. The patient then coughs out the germs and anyone in contact with him is likely to get plague pneumonia directly.

Standing guard between us and this plague danger is the small band of men working with Dr. Eskey at the squirrel-chasing and catching job. Some of these men are part of the U. S. Public Health Service's force of disease fighters, some are special crews from the health departments of California and five other states, and some are recruited from the Bureau of Biological Survey of the U. S. Department of Agriculture.

Simple, But Hard

The defense plans are simple on paper, but not so simple to carry out. The idea is to locate the enemy—the foci of infected ground squirrels and other rodents—and if he is found near human dwellings or camp sites, to drive him out.

With shotguns and traps and motorized laboratories, the field crews travel about the western states, looking for plague-infected rodents. If they hear of a locality where large numbers of dead ground squirrels have been found, they hurry to the spot to examine the bodies and see if they were plague victims. Otherwise they roam the countryside, searching the rodent population for signs of plague. After they have shot or trapped or otherwise collected the animals, they remove all fleas from the bodies and the carcasses are examined for gross evidence of plague.

A fraction of the fleas obtained from each day's hunt are placed in alcohol for identification and the balance are placed in one per cent. salt solution. Those in salt solution, and tissues from animals with suspicious signs of plague, are inoculated into guinea pigs to determine the presence of plague germs.

DOTS OF DEATH

The deadly germ that causes plague, Pasteurella pestis, under the microscope.

This flea inoculation method, developed about two years ago, has more than doubled the chances of finding foci of sylvatic plague infection, Dr. Eskey says. It enables the plague fighters to find plague in regions where it was impossible to find any plague-infected animals. It has the advantage of being a method that can be successfully used by men who have had little or no training in a plague laboratory.

The material collected by the nine field units of the U. S. Public Health Service is sent to the Public Health Service's plague laboratory on the grounds of the U. S. Marine Hospital at San Francisco. This is general headquarters for the federal government's plague fighting force. Plague fighters of the state health departments and rodent control units of the Biological Survey cooperate with the Public Health Service, although each works independently.

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