THE ARTS AND SCIENCES

Epidemiology

BUBONIC PLAGUE IN AMERICA

By Tom S. Hyland

Unknown to most Americans, bubonic plague, the dread Black Death of the Middle Ages, is today entrenched in the United States. The disease has a firm foothold in the Western states and is now spreading eastward into the Mississippi Valley. It appeared most recently in North Dakota and may spread to the Atlantic Coast in another generation.

Though the plague is primarily an animal disease which claims human beings only incidentally as its victims, and fatal human cases of the plague in the United States have averaged only one or two a year for the last two decades, these facts by no means lessen the worries of public health authorities. The great plague epidemics of medieval Europe and modern Asia were caused by similar epidemics among rats whose fleas readily stray to bite human beings.

In the United States, however, the plague has taken a new and potentially even more dangerous form, for it is spread by wild rodents such as squirrels, rabbits, chipmunks, prairie dogs, etc. It has also been discovered in burrowing owls (which share the holes of prairie dogs) and hawks. The great danger is that at any time the diseased animals of the sparsely settled regions, driven, perhaps, from their habitat by drought or famine, will give their fleas to city rats and thus start great urban epidemics, a peril which increases as the disease insinuates itself eastward into the more densely populated part of the nation.

There is still another cause for worry. Rat plague, and its corresponding outbreak among mankind, appears in cycles, rising to its highest incidence and then dying out in the course of a century or less, a phenomenon not yet explained by science. Wild rodent plague follows no such cycle; it is everlasting and permanent. "Americans will have to learn to live with the plague," warns the nation's foremost plague expert, Dr. Karl F. Meyer of the University of California. And, he adds, the fact that the United States has so far escaped a catastrophic plague epidemic does not indicate that one may not occur sometime.

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The world has suffered three known major plague epidemics. The first swept the Roman Empire in its twilight years and hastened its fall. The second ravaged medieval Europe in what is probably the greatest single disaster in recorded history. Somewhere between one-fourth and three-fourths — no estimates are reliable — of Europe's people died, and historians have named the plague as cause for events as different as the Reformation and the obliteration of the Viking settlements in America. The plague slowly disappeared from Europe, for reasons still unknown. It made a brief return in the seventeenth century — Pepys and Defoe have described its outbreak in London, where 69,000 persons died in 1664 — but in general it retreated across Russia into Asia and back to the mountains of southern China.

The third great plague eruption, from which the world is still suffering, began in 1892. The disease emerged from the hills of Yunnan Province and extended into the rest of China and down into India, killing millions upon millions of people. In 1893 the bacillus was identified for the first time by the Japanese, Kitasato, in Hongkong and by the Frenchman, Yersin, in Indo-China. From Hongkong the plague spread to seaports on every continent. In the United States the first bacteriologically proved case of plague was discovered in 1900 in San Francisco, though experts think that sporadic cases had existed for several years in North America.

II

Then followed one of the most shameful episodes in the history of American public health. San Francisco's business interests and all its newspapers except one flatly denied that the plague existed there. So did California's governor. So did a group of prominent San Francisco doctors. Plague, they claimed, was a disease only of the Orient, where it was caused by overcrowding and bad sanitation such as could be found nowhere in America. (The rôle of rats and fleas in spreading bubonic plague was not discovered until 1904.)

The handful of physicians who found the plague in San Francisco were personally vilified and bitterly ridiculed in the press. Businessmen censured them as "meddlesome doctors seeking publicity." As a reward for finding plague bacteria, a state bacteriologist was not only discharged but deprived of part of his back salary. The state refused to print plague reports and statistics.

But the statistics continued to pile up as people in San Francisco's Chinatown died regularly of this supposedly non-existent disease. In 1900 at least 121 known cases appeared, all except six of them fatal; but scores of other cases were unrecognized, concealed by the victim's friends or hushed up by frightened officials. The plague controversy became so violent that President McKinley appointed a commission to dig into the facts. The commission agreed that plague had

invaded the city. All of Chinatown was quarantined, and surrounded by ropes and policemen. In 1901, when the plague petered out, many people still believed it had never existed.

The plague appeared again after the San Francisco fire in 1907. Rats fleeing from Chinatown spread the disease to every quarter of the city. Within six months the incidence of plague among rats tripled. But again business interests and newspapers refused to recognize the epidemic. At last the Federal government threatened to quarantine the whole city. A public health officer called a meeting of prominent businessmen. "Probably you do not realize what such a quarantine means," he said. "It means that each man in this room, and you are all millionaires, will go broke!" The threat of bankruptcy worked better than the threat of the Black Death. Businesses and the local government reluctantly cooperated to suppress the rats rather than the facts.

Then health officials made the most tragic discovery of all. Sometime during the years when San Francisco was denying that it harbored the plague, the disease had somehow crossed the bay and infected the ground squirrels in the region south of the Sacramento River. The state began a campaign to exterminate the infected animals. Squirrels were slaughtered until the disease seemed to be almost wiped out among them and by 1920 the anti-plague campaign was dropped.

For a while the plague lay dormant, then in 1933 and 1934 four people died of it. Federal investigators found that California's ground squirrels and other rodents were still widely infected. Then they made the alarming discovery that Oregon, Montana and other states had also been invaded.

III

Forty years ago the plague could probably have been driven completely from the United States. Now it is much too late. Too many animals over too wide a territory are infected. Continuous sentry duty against the plague is maintained by the U. S. Public Health Service and several state health departments. Plague hunters regularly scour the West, shooting squirrels, trapping rabbits, digging dead gophers from their burrows. With gloved hands they carefully put their catches into flea-proof bags and take them to their laboratory trucks. There they comb the fleas from the animals and cut out certain organs and tissues. These specimens are sent to the U. S. Public Health Service laboratories at San Francisco, where bacteriologists cautiously examine them for *Bacillus pestis*, the bacteria which cause plague. The plague patrols are now paying special attention to the neighborhood of the many new military reservations throughout the West. Their reports on the spread of the plague have long been published weekly by the Federal government. Forest rangers, the U. S. Biological Survey and many ranchers also cooperate in reporting evidence

of the plague among Western wild life.

Regions found to be infected with the Black Death are posted with warnings that "sylvatic plague" is present and that residents and visitors should avoid contact with rodents. These warnings are often misunderstood, since not everyone realizes that sylvatic plague is identical with bubonic plague except for the sort of animals which carry it — a distinction important chiefly to epidemiologists.

Statistics on the disease are unreliable because not only do many people in remote regions of the West become sick and die without being attended by a physician, but also many cases of plague undoubtedly have not been recognized as such by physicians.

A delayed diagnosis makes the victim's recovery very unlikely. The plague can often be cured if injections of serum are given in the early stages of the disease, but if the plague is not recognized for several days, the serum is useless. Anti-plague serum is always kept ready for emergencies at Federal laboratories in San Francisco and in Hamilton, Montana. Doctors have had some success in treating plague victims with various sulfa-drugs, but the number of trials has been much too small to be a valid proof of the efficacy of these compounds against the plague.

Besides its bubonic form, characterized by buboes or swollen lymph glands, usually in the groin, the plague may appear in two other forms, both caused by the same bacteria. These are even harder to identify. One is septicemic plague, in which the bacteria invade the blood stream. The other is pneumonic plague, in which the lungs are the center of infection. The latter is not only the most difficult form of plague to diagnose, since it resembles commoner respiratory diseases, but it is also the most menacing, since it is the only form of plague which can spread without the help of fleas. The victim's breath floods the air with bacteria-filled water droplets which may infect anyone in their path, and a major human epidemic could thus begin without rat carriers. A preview of such a disaster appeared in Oakland, California, in 1919 when an improperly diagnosed case of plague began a series of thirteen cases, all but one of them fatal. Again, in Los Angeles in 1924, an epidemic of pneumonic plague killed thirty out of thirty-two sufferers.

In spite of this, the see-no-evil chamber of commerce point of view has changed little since 1900. As plague-hunting crews have sought and discovered the disease in new states, counties and valleys throughout the West in the last several years, they have continued to meet hostility and lack of cooperation — as if the greater menace were not the plague but public knowledge that it exists. Businessmen fear that tourists will avoid infected regions.

There is no need for hysteria, either among residents or among visitors to