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MEDICINE

Laboratory Heroes Find New All-American Disease

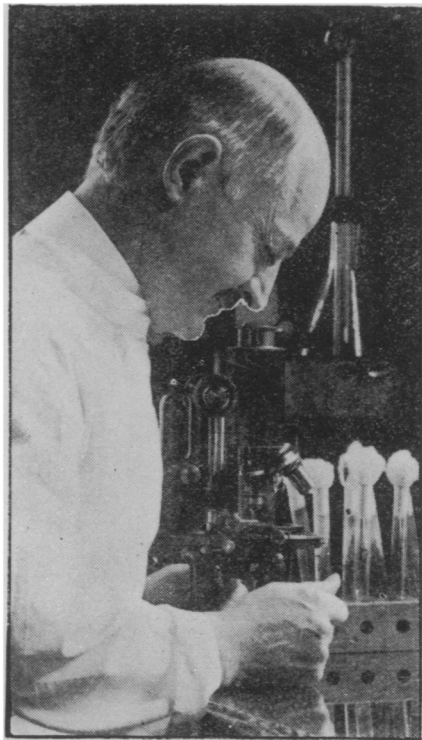
By MARJORIE MACDILL

Seven tubes of orange-reddish liquid standing in a row on the desk of Dr. Edward Francis of the U. S. Public Health Service were mute testimonials to a calamitous conclusion to several hunting parties.

"These little test tubes contain blood of people who have been taken sick with fever or swollen glands or both, after a day in the country shooting rabbits," explained Dr. Francis. "Local physicians take blood samples from suspicious looking cases and send them into us here at the Hygienic Laboratory so that we can see if they contain any traces of the little microbe known as *bacterium tularense*, one of the newest additions to the catalog of disease germs, responsible for what the local market men call 'rabbit fever'."

Dr. Francis probably knows more about this strange new disease of wild rabbits and man than any other living person. Tularemia is the name he has given it, and it is the only infection in man that has been elucidated entirely from beginning to end by American investigators alone. If it were not for the fact that some cases have recently been reported from Japan, it might with justice be called the only all-American disease.

Primarily it is an infection of rodents. In the West it has killed herds of wild rabbits and ground squirrels. Since it was first recognized, six or seven years ago, as a distinct disease in man, it has spread steadily across the continent until only about nine states in the extreme northeast are still uninvaded. In man it is not usually fatal but manages to put its victims out of working commission for a good three months. Fever and swelling of the lymph nodes are outstanding characteristics and convalescence is long and slow. It is not communicable from person to person but is spread by contact with



DR. EDWARD FRANCIS

a diseased animal or by insect bites. These limitations, nevertheless, do not prevent it from being dynamite in the laboratory, for practically every investigator who has worked with it has become infected in spite of the most elaborate precautions.

To begin at the beginning of a long story, that was pieced together bit by bit from happenings and research carried on in widely separated parts of the country over varying intervals of time, first knowledge about the disease came from an epidemic among the ground squirrels of California in 1910. Dr. G. W. McCoy, now director of the U. S. Hygienic Laboratory, was on the ground and managed to isolate from one of the squirrels, the causative organism of what is called a "plague-like disease of rodents" in 1911. This he called

Bacterium tularense, from Tulare County, California, in which he found it. While working on it, one of his fellow investigators fell ill with a rather obscure and unexplained (at the time) attack of fever which kept him off the job for a month.

Within the next few years many complaints were heard from the farmers of Utah of what they called "deer fly fever." The flies came out during the summer months and a definite infection seemed to follow the bites so that farmers were laid up all through the alfalfa mowing season and the time for plowing sugar beets. Finally in 1919 the authorities of the U. S. Public Health Service decided to send some one out to investigate the disease. The man they picked was Edward Francis.

His subsequent investigations showed two things: one, that the blood sucking fly really did transmit the disease, and second, that the germ that caused it was the same as the one that Dr. McCoy had found in the ground squirrels of California ten years before. Five more men were assigned to the work, some in Utah and some in Washington. Before they finished every single one of them, including Dr. Francis himself, had been infected with the disease. Such a record of illness among investigators who have been assigned to work on an infectious disease has probably never been duplicated in the history of experimental medicine.

The next phase of the problem that came to Dr. Francis' attention was the "rabbit fever" among the men handling rabbits at Center Market in Washington, D. C. This disease was apparently well known to the market men long before it came to the attention of the medical profession. Investigation showed that "rabbit fever" and tularemia were one and the same thing and that many of the wild rabbits shipped into the market

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New All-American Disease

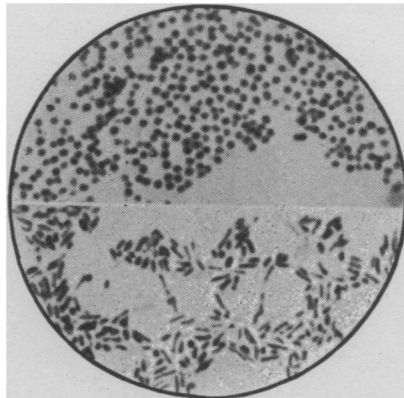
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from all parts of the country were infected.

Following the warnings issued by the U. S. Public Health Service, doctors are on the watchout for the disease. To date there have been 430 human cases, with 18 deaths. Any workers in an occupation in which rabbits are skinned, dressed or cut up are especially liable to the infection. Ticks and flies found on horses, cows and sheep may also carry it. About one per cent. of the rabbits on the market are infected but those which have been thoroughly cooked are safe to eat. Workers including cooks and housewives, who have occasion to handle the infected animals are advised to wear rubber gloves. The eradication of the ticks, flies and rabbits that carry the disease is practically impossible.

Since it does not spread from man to man, serious epidemics are improbable but in the country, where it is insect-borne, it is a serious handicap to the farmer who becomes infected during the busy summer season. One attack confers immunity and while there seem to be no serious after effects, it has taken one or two cases a year to recover. So far there is no known cure, though the scientists at the Hygienic Laboratory are working on a preventive serum. No drug has been found to have any special value in treating the disease, so that the only thing that can be done is to put the patient to bed and make him as comfortable as possible.

Recently owners of fox farms in the west, who have millions of dollars invested in the production of silver fox skins for the fur market, became alarmed over the possibility of their \$500 foxes becoming infected from the rabbit meat they require for food. Accordingly a plea for information, followed by a sacrificial donation of four magnificent silver foxes, was dispatched to the Hy-



Two forms of the germ, *B. tularensis*, cause of rabbit fever

gienic Laboratory. The regal creatures have been fed tularemia-infected rabbits every third day for nearly a month without showing any signs of the disease. Apparently foxes are immune, even though there is conclusive evidence that their relative the coyote is susceptible. As far as is known at the present time domestic rabbits raised in rabbitries have never been found naturally infected.

The Lister Institute of Preventive Medicine in London desired to have a culture of the bacterium of this strange new disease to add to their germ collection. Dr. McCoy accordingly packed up a virulent tularemia culture, sending with it instructions that it was dangerous stuff, since everyone over here who had handled it had become infected. In the light of this warning, the head curator of the repository of type cultures, (even in scientific institutions British titles are characteristically British) undertook to carry on the experiments with *Bacterium tularensis* himself. In one month he was in the hospital. A little later his assistant, who had supervision of his tularemia infected guinea pigs while he was in bed, went to the hospital too. After a third bacteriologist had followed suit, the director of the institution took

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Year's First Comet

The first comet of 1928, which will be known therefore as comet 1928a, has been found by an astronomer named Filipoff at the French Observatory at Algiers, in northern Africa. Announcement of this discovery has just reached the Harvard College Observatory, according to Dr. Harlow Shapley, director.

When discovered, on January 28, the new comet was in the constellation of Gemini, the twins, which is now overhead in the late evenings. It was of the eleventh magnitude, too faint to be seen without telescopic aid, and its position, in the astronomical equivalents of latitude and longitude, was 6 hours 24 minutes and 56 seconds right ascension and 20 degrees 16 minutes north declination. It is reported as having very slow movement, thus indicating that it is at a great distance from the earth. After two more observations have been made, astronomers will be able to compute its orbit and tell whether or not it is likely to become visible to the naked eye.

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New All-American Disease

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administrative charge of the situation and ordered the cultures and guinea pigs destroyed and the laboratory disinfected. He was taking no chances of letting this dangerous American infection get loose.

In all, twenty cases of tularemia have occurred in laboratory workers, including physicians, bacteriologists, entomologists and trained laboratory assistants. To these for the most part unnamed victims of scientific progress, the editors of the American Medical Association have paid the following tribute:

"Americans are prone to laud the enterprise and intrepidity of heroes who do not hesitate to risk their lives in attempts to reach the poles, to conquer the highest altitude, and to penetrate into danger zones of varied sorts. Why shall we not herald with equal pride the glory of those scientific workers who are daily facing unrecognized dangers of the gravest sort in their efforts to conquer insidious diseases? The mantle of distinction should fall on the shoulders of these modest medical explorers, many of whom have suffered severely through chance infection 'in the scientific line of duty'."

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Billion Dollars From Corn Wastes

A billion dollars of new wealth for the Corn Belt, through the annual utilization of its two hundred million tons of corn stalks and twenty million tons of cobs, now wasted, is the promise of engineers and chemists to the American farmer.

How the greatest agricultural waste, corn stalks and cobs, can be made into some three hundred useful products is told in a report to the Engineering Foundation by Prof. O. R. Sweeney of Iowa State College. In a decade or two they will be utilized on a large scale, he predicted.

"Before the many products of promising usefulness could be made even on a small scale in the laboratory," Prof. Sweeney said, "years had to be spent in patient, ingenious, fundamental researches to determine the exact chemical and physical natures of these raw materials and their constituents. Not only agricultural, but also industrial and economic problems had to be solved with the aid of engineering research, supplementing the work of the scientist. Much remains to be done.

"Iowa State College, in the midst of the corn belt, has been a leader in the attack. Knowledge being gotten in the cornfield will be useful also to growers of other grains, peanuts, flax and cotton, who have similar waste materials. Civilized men will be able to continue to feed and clothe the increasing populace and to supply many of their other wants by successful solution of just these problems.

"What does the laboratory offer to industry from these raw materials now wasted? Paper of several grades, papier maché, wallboard and other substitutes for building lumber, substitutes for hard woods used in furniture and finish, rayon, acetic acid, acetone, a sugar that can be used by diabetics, maple sugar flavoring to be combined with cane or beet sugar to make 'maple syrup,' oxalic acid, plastic materials, electrical and heat insulation, and furfural.

"Furfural was a laboratory chemical not many years ago, scarce at \$50 a pound. Now it is produced in large quantities at 14 cents. With increasing production, improved methods and development of co-products, even the latter price may be more than cut in half. Furfural is a fluid heavier than water, having many and various uses in plastics, dyes, paint removers, antiseptics, anesthetics, germicides, embalming fluids and motor fuels. It burns in lamps with a more brilliant flame

than kerosene and has not the unpleasant odor of the latter.

"If the chemist and engineer and farmer can solve the economic problems, new industries may dot the prairies. Among these problems one of the foremost has been the cheap collection of the stalk and cobs to a few places where they will be subjected to the first steps toward becoming saleable commodities. Special machines have been devised for gathering up the cornstalks in the field, or for cutting the standing corn, husking the ears and shredding the stalks. Another problem is the safe and inexpensive storage of the raw materials throughout the year, in order that the industrial operations may be continuous.

"As contrasted with forests, which, once cut, are not quickly replaced, and commonly in America are not replaced at all, the corn wastes would be produced year after year in great quantities within the same areas. As nearby forests have been consumed, for example, the saw mills and pulp mills have had to move to more and more remote locations from their markets.

"Lest the corn production should decrease, the fertility of the soil must be maintained. It has been learned that this can readily be done by growing soya beans as the 'rotation' crop. The soya bean is a strong nitrifier of the soil. After extracting the oil from the bean, the refuse, including the stalk and meal, can be plowed back in to the soil. The income from the oil, which has many uses, will partially offset the lack of income from corn in the years of change crop. Thus the cycle would become complete by the chemistry of nature, and the energy of the sun would be converted perennially to many uses of man.

"Depletion of forests and of mineral resources and advances in chemistry and engineering will have much to do with the measures of success which may be achieved in turning these agricultural wastes into wealth. At best, it will take much time, research and development.

"More than research, engineering, industrial development and financing will be required. Useful and valuable new commodities may be produced, but successful production at a fair price may not bring economic success. As has well been said: The fight for recognition for a new product is almost as hard to wage as is the fight for a new idea."

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