

ZOOLOGY OF DISEASES

By LETAR BLAIR

URGEON GENERAL WYMAN of the public health service has been buying such quantities of live rabbits lately, for use in his business, that, in response to inquiry, he has felt obliged to explain that the animals are wanted not for vivisection, but for the manufacture of serums and antitoxins. They are dosed with small quantities of disease germs again and again until, having been "hyperimmunized" by this means, their blood contains an anti-poison utilizable as a cure for the malady, whatever it may be, in human beings.

Mithridates of old, the celebrated king of Pontus, was so afraid of being poisoned, that he dosed himself constantly with small quantities of various kinds of poisons in order that he might become in a measure proof against them. Practically the same method is adopted by the public health service, which, in the manner described, "hyperimmunizes" such animals as sheep, horses, cows and rabbits, with a view to the subsequent employment of their blood for the cure or prevention of disease. It is by this means, for instance, that diphtheria antitoxin is obtained.

By the same means it is hoped to secure a satisfactory serum for the treatment or prevention of the bubonic plague. Already, in India, the plague "vaccine" has been obtained—made by breeding the germs of the disease in beef soup, and then killing them by heat, the resulting fluid being administered by hypodermic injection. This is a matter of extreme importance, inasmuch as the malady in question is at the present time threatening to ravage our own country.

Our government, during the last fiscal year, spent \$650,000 in fighting the plague on the Pacific coast, and within the next twelve months it will expend about \$1,000,000 for the same purpose. From this fact it may be judged that the situation in regard to the bubonic disease—or black death, as it is used to be called—in the United States just now is far from cheerful, notwithstanding the efforts of the health authorities to minimize alarm on the subject.

The truth is that this most dreaded and destructive of all human maladies seems to have obtained a secure foothold on the Pacific coast, where small epidemics of it have broken out in several of the larger cities within the last three years. But the most serious feature of the situation lies in the circumstance that the bubonic infection has already become widely spread among the rats of the towns and the ground squirrels of the rural districts in that region.

The plague is a rat disease primarily. It is conveyed to human beings (as well as to ground squirrels) by the flea. A flea bites a plague-sick rat and, later on, it bites a man, thus inoculating the latter with the deadly infection.

It is only through quite remarkable good luck that the malady has not already made its appearance at our principal Atlantic seaports. This may well happen, and the public health service (which has its headquarters at Washington) has had for some time past a complete plan of campaign mapped out to meet such an emergency.

Immense quantities of grain and other merchandise are constantly being shipped from San Francisco and other Pacific coast ports to the East. Rats are often transported with such merchandise, as involuntary passengers, hidden in grain sacks, or otherwise. Let one or two plague-stricken specimens be delivered in New York and the metropolis would be likely soon to have an epidemic on its hands—the first warning of the outbreak being afforded by the finding of large numbers of dead and dying rats about the wharves and in the streets.

To fight the mischief, if it once got started in New York, the municipality would be obliged to wage a war of extermination against rats. This would involve an expenditure of many millions of dollars—much money being required not only for the wholesale trapping and poisoning of the animals, but also for the ratproofing of sewers, houses and particularly buildings used for the storage of food supplies. Experience has shown that the only way to get rid of such vermin is to deprive them of food and hiding places. tribution among human beings on two animals—the rat and the flea. It serves very strikingly to illustrate what might be called the modern zoological aspect of diseases. The working laboratory of the public health service in Washington is today, indeed, a sort of station for natural history research, and an official zoologist, Dr. Charles W. Stiles, is in charge of one of its most important departments.

Nowadays, when the study of a disease is begun, suspicions are always entertained against one or more animals, as possibly accountable for the trouble directly or indirectly—just as, for example, the African crocodile is charged with maintaining in its blood the parasite of "sleeping sickness," which the dreaded tsetse fly (after biting the animal, as is alleged) conveys to human beings. Similarly, in our own country, the malignant anemia, which afflicts hundreds of thousands of people in the south, has been absolutely proved to be due to a minute "hookworm" that borrows through



THE TICK THAT CARRIES SPOTTED FEVER

the skin of the feet and, making its way to the intestine, establishes itself there as a bloodsucker. Such problems keep the government health authorities moving. As soon as one is solved another turns up—as, for instance, in the case of the mysterious "spotted fever," which has been making so much trouble lately in the mountainous regions of Montana and adjacent Rocky Mountain states. It is an entirely new complaint, but extremely fatal, four out of every five persons attacked by it in the Bitter Root valley (where it assumes its most virulent form) passing speedily from the sick bed to the burying ground. A characteristic symptom is an eruption of pimply red spots all over the body.

Investigation has proved that this disease is due to a "germ" of some sort—presumably a bacterium, but so minute as not to be visible under the microscope—which is carried by a certain species of wood tick. There is no question of the accountability of the tick, for the malady has been successfully transmitted, in an experimental way, through the medium of its bite, from guinea pig to guinea pig, from monkey to monkey and even from human being to human being (in two volunteer instances). Some of the insects were brought to Washington and encouraged to lay eggs, which were duly hatched by Dr. Stiles; but it does not appear that more than a very small minority of them, in a state of nature, are infected. These exceptional individuals probably acquire their infection by biting some animal which harbors the germ, but what animal that is, nobody knows.

Speaking of volunteers, there seems never to be any lack of them, where risks have to be run in the experimental study of diseases. It does not matter how deadly the malady may be, there are always men ready to take their lives in their hands for such purposes, often without reward. Such was the case when a call was issued in Cuba, in 1900, for soldiers willing to expose themselves to the bites of mosquitoes carrying the infection of yellow fever. It was the case again recently, when Capt. Charles F. Craig, of the army medical corps, wanted men in the Philippines for a practical test of his theory that dengue, or "breakbone" fever, owes its distribution to a mosquito of another species—the night-flying culex fatigans, an insect already positively known to be the carrier of the parasite threadworm which causes elephantiasis.

Wherever one looks, in the study of diseases, one finds animals of various kinds acting as the carriers of the germs which make the mischief. Science as yet has made only a beginning in this sort of investigative work. The Anopheles mosquito is known to be the sole conveyor and distributor of the malaria microbe; but where did the microbe of malaria come from originally? It is, as everybody knows, a protozoan—that is to say, an animal organism of a low form; but its origin is a puzzle.

The same thing might be said of the bacterial parasites that cause yellow fever and dengue. It is thought they are closely related, the symptoms they produce being somewhat similar, but nobody ever saw either of them. Like the germs of measles and scarlet fever, they are so minute as to be invisible, even under a high-power microscope.

As for dengue, to find some way of combatting it was of special importance from the viewpoint of the war department, because it was of very troublesome in the Philippines, breaking out in "explosive epidemics," and incapacitating entire companies for fighting purposes with a simultaneousness most distressing. The manner of its spread was such as obviously to suggest an insect agency, and culex fatigans, always most plentiful where and when dengue appeared, was naturally suspected.

To test the theory, Captain Craig exposed a number of soldiers (volunteering for the purpose in response to an offer of \$200 apiece) to the bites of mosquitoes of this species which had already bitten men sick with dengue. Twenty or thirty of the insects, hatched from eggs in the laboratory, were first liberated under the mosquito bar of a dengue-sick soldier, in order that they might attack him and become infected, and, a few hours later, they were removed and placed beneath the mosquito bar of a well man. In every such instance the malady was successfully reproduced; and, as a result, dengue patients are now treated in the wards of ordinary hospitals, no fear of contagion being entertained so long as mosquitoes are prevented from getting at the sufferers and thus acquiring the infection for distribution among other people.

The greatest of all medical puzzles at the present time is cancer. Mortality from other diseases is steadily diminishing, owing to improvements in sanitation and in methods of treatment, but this dreadful malady is killing people faster every year. Out of every eight women who pass the age of forty, one dies of cancer. In all likelihood the reason why the germ has never been discovered is that, like the microbes of yellow fever and measles, it is so tiny as to be ultra-microscopic. Probably it is carried by one or more of the lower animals, and science at the present time is engaged in a far-reaching inquiry with a view to solving this branch of the problem. Mice have been accused, and fishes likewise, but no near approach seems to have been made to a solution of the mystery. If only the secret, doubtless a simple one, were known, the discovery of a cure for cancer would not be long postponed.

A Good Retort.

It is told of a successful comedian that his first bit of popularity was gained in a rough mining town where he was giving "impersonations" in a hall to a large but unpleasantly critical audience.

He was young, and not exactly at his ease, and the freely-delivered comments which greeted him on his appearance were not reassuring; but he kept on, and gained in confidence. Some of the audience, however, had come prepared to amuse themselves, and did not propose to be balked.

After one really commendable impersonation there was a round of applause, but in the midst of it a great cabbage landed on the stage at the actor's feet.

He picked it up, examined it, and then gazing out over the audience with the bland and innocent expression which has since become one of his assets, he said:

"Thank you. This is more than I had any reason to expect. It is the first time any one has ever lost his head over my acting—Youth's Companion."

Documents in Unknown Tongue.

Some documents from central Asia have been acquired by the Asiatic society of Bengal from a Montenegro. They consist of five leaves of brownish yellow paper, measuring eight inches by 5 1/2 inches.

The significance of these five leaves, the genuineness of which cannot be doubted, is that scholars are here confronted with a number of consecutive passages in a language to which no clew has yet been found, and of which hitherto only fragments have been rescued from the sands of central Asia.

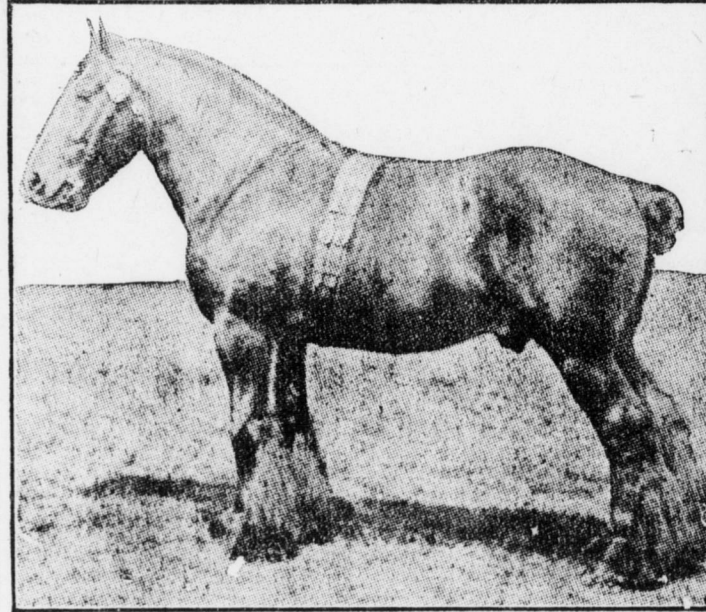
It is possible that by means of these five leaves an important literary language of whose existence the world had no suspicion may be rescued from oblivion. The paging on the reverse of each leaf shows that they once formed a part of an extensive work.

PROPER TREATMENT FOR OVERHEATED WORK HORSE

It Is Important to Know That Exhaustion From Summer Heat May Be Prevented—Clean Stable, Feed and Air Essential.

(By A. S. ALEXANDER, Wisconsin.)
When during the hot weather the hard worked horse suddenly stops sweating, lags, weakens, pants and has hot dry skin and extremely reddened membranes of the eyes, nose and mouth he is suffering from heat exhaustion and by using the thermometer it would be found that his temperature is over 105 degrees. Unless a horse in this condition is immediately rested, put in a cool, shady, breezy place and there cooled off he will be likely to fall and die of heat apoplexy or "sun stroke."

It therefore is well to know and look suffers fearfully from the direct rays of the sun. Also shade the polls of horses at work and in such a way that air can pass under the shading hat or other cover. When a horse shows symptoms of heat exhaustion stop work, stand him under a tree where there is a breeze, shower his body with cold water from a sprinkling can, keep cold wet packs to the poll of his head and give him large, frequent doses of stimulants such as whisky in strong cold coffee. Do not bleed him or give him acetic or other poisonous drugs. Repeat the dose of stimulant every half

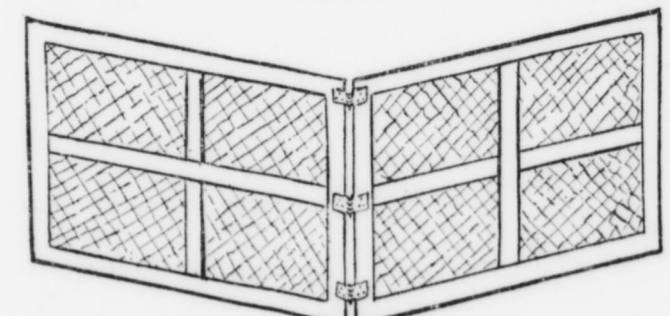


Babingley Good Luck.

out for the symptoms here outlined and then be able to treat them intelligently. In the first place it is important to remember that heat exhaustion may be largely prevented: By keeping the horse's stable clean, airy, perfectly ventilated, darkened and screened in summer time. Feeding the best of foods in adequate but not extreme quantities. Making no sudden changes of food. Allowing plenty of cool, pure drinking water. Permitting ample time for rest at noon. Removing the harness during such rest periods. Not overworking any horse and always changing frequently the middle horse of a three horse team, as he

hour at first and every hour or two as he gains strength and the fever abates. A good stimulant is prepared by mixing together one part of aromatic spirits of ammonia and two parts each of alcohol and sweet spirits of nitre. Of this give two ounces in a pint of water or cold coffee as one dose. If he is bloated give four ounces of hyposulphite of soda dissolved in water and inject soapy cold water and glycerine into the rectum once an hour until relieved. In case of sun stroke call in the graduate veterinarian as soon as possible. An excellent likeness of Babingley Good Luck, one of Lord Rothschild's famous shires, is shown in the illustration.

HINGED HURDLER FOR SWINE



Instead of chasing pigs and having them running in every direction, make a V-shaped hurdler as shown in the illustration, says Farm Press. The frame is light wood and the webbing is made by two thicknesses of close mesh wire fencing with water-proof building paper between. A stiff wooden brace runs each way through the center so the fencing may be stretched

tight. It is light and so strong that it is almost indestructible. With one of these rigs you can build a narrow lane on one side of the pen and move it ahead as the hog moves. He sees the opening ahead and walks that way to get out. Hogs may be coaxed with a rig of this kind when it is impossible to drive them where you want them to go.

EXTINCTION OF EARLY EQUINES

Much Mystery Surrounds Disappearance of American Horses—Attributed by Some to Increasing Cold

Over three centuries ago, at the time of the Spanish conquest, there was not to be found in the new world, so it has been practically proved, a single animal that answered to the description of the horse. Horses, indeed, which the Spanish brought with them, were objects of first of great terror to the natives, who took them to be four-legged supernatural beings come purposely to aid the conquerors. Yet recent research by the Whitney mission has established beyond doubt that long before Columbus the Americas were overrun by horses from the mountains of Alaska to the plains of Patagonia, says Harper's Weekly.

slopes of the Rocky mountains. Horses, too, must have been numerous in this country previous to the appearance of man, researches having brought to light their fossilized remains mixed up with pottery and the stone arms of cave dwellers. How is it, then, that the equine race, represented in America by kinds of fossils considerably more numerous than in Europe, came for a time to vanish from this country to reappear thousands of centuries later with the Spanish conquest? For but a century after Cortez there were already in existence herds of wild horses in the regions of the mata and the prairies of the far west.

By some this temporary extinction of the American horse has been attributed to the increasing cold and the encroachments of the glacial hemisphere. It is certain that the elephant and camel disappeared at the same time. Another explanation is that the horses succumbed to a malady such as the "rinderpest" in South Africa. Again, what brought about this exodus may possibly have been a species of the present-day Columbian vampire bat, which sucks the life blood of its victims, and in the districts it infests prevents the horse being used as a beast of burden.

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