

# AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE  
 MANHATTAN, KANSAS

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DEPARTMENT OF VETERINARY MEDICINE

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## RABIES—HYDROPHOBIA—DOG MADNESS<sup>1</sup>

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Rabies is an acute infectious and almost always fatal disease. It is characterized by increased irritability, disturbance of consciousness, and finally by symptoms of paralysis.

### HISTORY

This disease and the danger connected with the bites of mad dogs have been well known since the time of Aristotle, who, in the fourth century B.C. wrote: "Dogs suffer from a madness which puts them in a state of fury, and all animals that they bite when in this condition become also attacked by rabies." The very extensive investigations of Pasteur and his collaborators proved that the purest and most concentrated virus of rabies was contained in the central nervous system; they also established a method of attenuation of the virus, and solved the important question of protective vaccination against the disease. Negri (1903), through the demonstration of specific cell inclusions in the nervous system of the infected animals, has greatly facilitated the post-mortem diagnosis.

To show more recent history of rabies in Kansas and to give an

1. Contribution No. 85 from the Department of Veterinary Medicine.

idea of the increase in rabies throughout the state the following figures from the veterinary laboratories of the Kansas State Agricultural College are given:

Rabies examinations made during biennium ending June 30, 1920. . . . .	60
Rabies examinations made during biennium ending June 30, 1922. . . . .	66
Rabies examinations made during biennium ending June 30, 1924. . . . .	270
Rabies examinations made during biennium ending June 30, 1926. . . . .	728

### CAUSE

Rabies is caused by what is known as a filterable virus (poison), which means that the causative factor is a substance so small that it will pass through a fairly porous porcelain filter. It is present in greatest concentration in the saliva of mad animals. The virus is readily killed by the common disinfectants, drying, sunlight, etc. Fluid saliva is capable of infecting for a period of 24 hours after leaving the gland of the diseased animal, while dried saliva will not infect after 14 hours. Natural gastric juice kills the virus of rabies in 4½ to 5 hours, and bile kills it in a few minutes. The poison of rabies travels only in the nervous tissue, and is eliminated through the nerve supply by glands into the saliva, the tears from the eyes, milk, and the secretions of other glands. The virus or poison of rabies may be present in the saliva of an animal as many as 15 days before it shows any signs of the disease, but 2 to 5 days is the usual period. The virus is transmitted from animal to animal by means of the bite, in which infectious saliva is carried into the resulting wound and into the nerves of the part wounded.

There are many false ideas prevalent among people regarding this disease, such as the belief that the warm “dog days” of July and August are the only time that dog madness develops; or that the so-called “madstone” will prevent or cure it. The season of the year makes very little difference, as the virus of rabies will cause the disease as readily in the winter as in the summer.

### SUSCEPTIBILITY

There is no considerable difference in susceptibility among mammals. The veterinary laboratory of Kansas State Agricultural College has examined brains from rats, squirrels, mice, coyotes, skunks, etc., and found positive cases of rabies. These animals may be responsible for cases of rabies developing in dogs or cats that have not been in contact with other dogs or cats.

### SYMPTOMS

The symptoms seldom develop in less than two weeks after the animal has been bitten, usually they appear in six weeks, but sometimes delay as long as six months or a year. This variation depends on where the person or animal was bitten; in general, the nearer the brain the sooner the symptoms will develop. Bites through heavy clothing are less dangerous than when inflicted on bare skin.

There are two forms of symptoms of rabies—the furious and the dumb.

**Furious Rabies.**—A dog developing furious rabies will act about as follows: He will be noticed to have changed his usual disposition, becoming more friendly or very shy. He will hunt dark, secluded corners. He will make sudden starts toward objects; snap at the air as if catching flies. This stage may last for a day or two, when he becomes restless and will wander many miles over the countryside. While wandering he is likely to bite cattle, horses, hogs, and strange dogs. Unless he happens to be killed, he usually returns home. He is very irritable; will not eat or drink. He is not afraid of water; but because his throat is paralyzed, he cannot swallow. Sometimes he bites his own leg or body. In two or three days his legs become paralyzed, and then his entire body, with resultant death. This chain of symptoms may last four to ten days.

**Dumb Rabies.**—A dog developing the dumb form of rabies seeks the company of his master, or tries to hide in dark places. Soon his lower jaw becomes paralyzed and hangs down, leaving the mouth open. He is unable to eat or drink. He acts as if he had a bone in his throat. This condition is followed by complete paralysis of the entire body, and then death in four to ten days after the first symptom was noticed. A dog may develop either form of rabies or change from one to the other.

Rabies in cats resembles the disease in dogs; but cats, being of a less confiding nature, generally seek seclusion in the early stage. Then they become more aggressive, and attack persons and animals, including dogs, jumping at their faces and inflicting severe wounds with their teeth and claws. Their voice, like that of the dog, becomes hoarse. In two to four days paralysis sets in.

Cattle developing rabies often chase chickens, or any other moving object about the farm. They may fall down from no apparent cause; show symptoms of great excitement, during which they may

rush about and break their horns while attacking a post or building. They often show signs of increased sexual excitement, even though pregnant. These manifestations are followed by paralysis and death.

In general the symptoms of rabies are ushered in by a first stage of melancholia lasting about two days, followed by a period of excitement which lasts two or three days and then a period of paralysis, with termination in death. The entire attack occurs inside of ten days after the first symptoms are observed.

**Diseases Having Symptoms Somewhat Similar to Rabies—**

There are a number of diseases of animals that appear to resemble rabies at various stages. Dogs that froth at the mouth and go into convulsions, due to poisoning from intestinal worms, might be thought rabid by an untrained person. Nervous attacks due to brain disturbances, caused by the nervous form of canine distemper, may be mistaken for rabies. Attacks of indigestion due to wrong feeding come in this class of errors. If a dog should get a bone or other foreign body caught in its throat it might simulate the dumb form of rabies. Hot, thirsty dogs anxious for a drink have been accused of being "mad" by misguided people. Brain disturbances of various other kinds also show symptoms similar to those observed in rabies.

**DIAGNOSIS**

The first step in an attempt, to diagnose rabies is to pen up the animal securely, if possible, and keep it under close observation. The observation should be by one skilled in diagnosing rabies and closely allied diseases. The graduate veterinarian is best qualified to serve in this capacity, because if the animal's brain is finally sent in for laboratory diagnosis the laboratorian should be given the precise clinical symptoms shown by the dog before death.

A microscopical examination is of value only when the dog has died of the disease, or has been killed after it has shown well-developed symptoms of suspected rabies. The microscopic diagnosis of rabies is based upon the presence or absence in the brain of Negri-bodies, and those bodies are generally lacking in the initial stages of the disease. Therefore, if an animal is kept under observation by a graduate veterinarian and the symptoms permitted to develop, this will guide the practitioner in the proper disposal of the animal and render it easy for him to get a confirmatory microscopic examination of a positive or negative nature. If an animal is killed

in the initial stages of the disease it is impossible to make a negative diagnosis for rabies unless one inoculates a rabbit with brain emulsion from the suspected case. This method of diagnosis (inoculation method) will demonstrate whether or not the animal had rabies, but it is necessary to wait 15 to 21 days or longer for the rabbit to develop the disease. This method, while sure, is too dangerous, for if at the end of 21 days the rabbit showed indications of rabies there would be the danger that the individual bitten may not have sufficient time left in which to take the treatment for rabies. Thus, this method is expensive and impractical in all but experimental work.

The method of procedure for the owner to use with rabies suspects should follow this summarized outline:

1. Do not shoot.
2. Securely confine or "pen up" the animal.
3. Call your veterinarian.

#### PREPARATION OF DISEASED SPECIMENS FOR SHIPMENT

The rules and regulations governing the shipments of heads of dogs or other animals by express to laboratories of the State Board of Health, to the Veterinary Laboratory of the Kansas State Agricultural College, or to other laboratories, are:

1. Agents must not accept for transportation the head of a dog or any other animal sent to the state boards of health for rabies examination unless it shall have been prepared for shipment as hereinafter provided.
2. The head of a dog or other animal so shipped must be placed in a tin or other metal container which will not permit the leakage of fluids; such container shall then be placed in a wooden or other container with ice and sawdust packed around it. Such outside container must be so constructed that it will not permit the leakage of ice water.
3. All such packages must be labeled: "CAUTION.—This package contains the head of a dog (or name of other animal) suspected of having died of hydrophobia."
4. Such shipments tendered on Saturday, which cannot reach destination early enough for delivery on that day, and would, therefore, remain in the express office over Sunday, must be refused, and shipper requested to pack in ice and hold until Monday, so that they can be delivered without delay at destination.
5. Require prepayment of charges on shipments of this kind.

#### TREATMENT FOR RABIES

When an animal develops symptoms of rabies there is no curative treatment, and because of the infectiousness and dangerous nature of the disease no treatment should be attempted.

### PREVENTION OF RABIES

All animals bitten by a rabid animal, and all that may be in the immediate vicinity of known rabid animals should be immunized by an injection of *rabies vaccine*. The single-injection method is most practical with animals. It is reasonably certain to protect unbitten animals, and may be of considerable protective value to those animals that are contaminated with the virus. When a rabies outbreak occurs in a community that area should be quarantined.<sup>2</sup> An effective quarantine would embrace: (1) the destruction of all stray dogs; (2) the immunization of all dogs, this to be evidenced by a vaccination tag worn on the collar. Unvaccinated dogs must be effectively muzzled for a period of 60 days, or confined on a chain to their owner's property. These latter methods are not always practical or safe, and inflict misery on the dogs. Immunization lasts for one year.

### TREATMENT OF BITTEN PERSON

All wounds caused by the bite of a dog or other animal should be cauterized as quickly as possible by the family physician. This applies to bites from either rabid or nonrabid animals. If bitten by an animal having rabies, in addition to the cauterization mentioned, the individual should also immediately be given the Pasteur treatment by the family physician. The Pasteur treatment for people is a series of injections varying in number from 14 to 21. These injections are administered beneath the skin at daily intervals, with the exception of the first day, when two injections are usually given. A Pasteur treatment is shipped complete to the family physician and it is not necessary for one to leave home to be given the treatment.

When persons are bitten on the face it is recommended that the Pasteur treatment be started immediately, because rabies virus or poison travels very rapidly to the central nervous system under these conditions. It is absolutely essential that, to be effective, the treatment be started before any symptoms appear. Therefore, the patient must not wait for a report from a laboratory before starting the Pasteur treatment when bitten on the head or face.

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2. In Kansas all animal quarantine regulations are formulated and enforced by the State Live Stock Sanitary Commissioner, whose office is in Topeka.