



R A B I E S

(Hydrophobia, or "Mad-Dog")

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Circular 475

UNIVERSITY OF ILLINOIS • • COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION AND EXTENSION
SERVICE IN AGRICULTURE AND HOME ECONOMICS

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COVER ILLUSTRATION

This dog is affected with the "dumb" type of rabies. He is weak and depressed. A few days after the onset of symptoms he was unable to walk or stand, and paid little attention to his surroundings.

RABIES

(Hydrophobia, or "Mad-Dog")

BY ROBERT GRAHAM and G. L. DUNLAP¹

THERE IS LITTLE EXCUSE for the continued existence of a disease that causes the anxiety, suffering, and expense that rabies does when measures for its control and even its complete eradication are known and are comparatively easy to carry out. Yet thousands of dollars' worth of farm stock and many valuable dogs are destroyed each year as the result of animals being bitten by rabid dogs. Furthermore the number of persons required to take the Pasteur antirabic treatment because of having been bitten by rabid dogs or otherwise exposed to the disease is each year becoming greater. At least fifty-five lives were sacrificed to this disease in Illinois during the past ten years.

All warm-blooded animals are susceptible to rabies, but dogs, because of their biting habits and their close association with other animals and with man, are the most common disseminators of the disease. The ultimate suppression and control of rabies in both man and animals is therefore dependent upon the adoption of measures that will effectively check the disease in dogs. This requires the active and intelligent cooperation of dog owners, public-health and livestock sanitary officials, police officers, veterinarians, physicians, and the general public.

Rabies has apparently at one time or another existed in practically every civilized country of the world. It is one of the oldest recognized contagious diseases of man and animals. A fatal case of canine rabies was recorded as early as 1300 B.C. Aristotle described the disease in 300 B.C., saying, "Dogs suffer from madness. It throws them into a state of fury, and all animals which are bitten are also attacked with madness."

That rabies can be completely eradicated from a country has, however, been proved in England, Ireland, Denmark, Norway, Sweden,

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Holland, Australia, and Hawaii. England's work toward the eradication of the disease thru compulsory muzzling of all dogs and a six months' quarantine of all imported dogs has become almost a classic in medical history.¹

CONTRACTED ONLY THRU SKIN ABRASIONS

Rabies is almost invariably associated with the bite of a rabid animal, tho it may possibly occur occasionally as the result of the licking of a skin abrasion by a rabid animal. The infective virus is contained in the saliva and is introduced into the subcutaneous tissues, muscles, or nerves, thru the wound made by the bite.

Very slight abrasions are regarded as sufficient to introduce the virus into the body, altho the deeper and more numerous the wounds the greater is the danger of infection. Bites on the lips, cheeks, or nose, or on other parts of the body where nerves and lymph glands are plentiful, are especially dangerous. From shallow wounds the virus may possibly be removed by bleeding or cauterization, but it is practically impossible to remove it from deep wounds. Likewise a bite on the bare skin is more dangerous than one thru hair or clothing, as the saliva may have been prevented by the covering material from entering the wound.

Saliva has been reported to be infectious as long as 15 days before the animal showed symptoms of the disease. Persons or animals who have come into contact with the saliva of an infected animal may therefore be endangered even tho the animal has not yet given any symptoms of being infected.

Altho milk from rabid animals may contain rabies virus in infective amounts, and some writers believe that rabies may be transmitted thru this medium, there is little convincing evidence on this point. Furthermore it is recognized that the virus will not pass thru the unbroken skin or the unbroken mucous membrane.²

Some evidence has been presented that meat from rabid animals is capable of transmitting the disease. But whether the disease can or cannot be transmitted by eating meat or drinking milk from rabid animals, the potential danger of such products is such that they should always be regarded as unfit for food.³

¹Jour. Amer. Med. Assoc. 104, 1349. 1935.

²In observations at the Illinois Agricultural Experiment Station young rabbits nursed a rabid doe up to the time of the doe's death without themselves acquiring the disease.

³The meat inspection regulations enforced by various countries provide for the total condemnation of the carcasses of rabid animals.

INCUBATION PERIOD VARIES

The average time between the exposure of a dog or other animal to rabies and the development of the disease appears to be between 21 and 40 days. Some may, however, develop the disease in 5 to 10 days after exposure; whereas others may not show symptoms before three or four months. Some observers have reported incubation periods of a year or more, tho it is possible that in such cases there may have been an unknown exposure that intervened.

In general, as was previously stated, the nearer the bite to the central nervous system and the deeper the wound, the shorter the incubation period is apt to be and the greater is the danger. Following is a list of the many factors that may influence the length of the incubation period:

1. Virulence and quantity of the virus
2. Nature of the wound—whether it occurs on the bare skin, is deep or shallow, or bleeds profusely
3. Nature of the injured part, including nerve and lymph supply
4. Location of the wound—whether on or near the head or on the extremities
5. Size and general health of the animal
6. Age of animal—for young dogs are more susceptible than older dogs
7. External influences such as exposure and overexertion
8. Manner of infection—whether by a bite or scratch or by licking

BEHAVIOR OF RABID DOGS

Symptoms of rabies in dogs may at times resemble those of other diseases, and final diagnosis therefore requires a skilled clinician and laboratory examination. There are, however, certain general symptoms that can be observed by untrained persons, and these will be described here.

First it should be clearly understood that there are two types of canine rabies, so far as clinical symptoms are concerned. These are furiously rabies and dumb rabies. In either type, and even in the first stages, the saliva is infectious, and if it comes in contact with any cuts or scratches on the hands of human beings, the virus may be introduced into the body.

Furious Rabies. In the furious form of rabies there are three stages. In the first the dog appears melancholy; this is called the prodromal stage. In the next stage he is excitable, or furious. In the third stage he becomes paralyzed.

First or Prodromal Stage.—A marked and sudden change in disposition is the first indication that a dog is affected with rabies. This, with other preliminary symptoms, may persist for one to three days.

A friendly, good-natured dog may become morose, sullen, and disobedient, or he may display unusual friendship and affection as tho to gain attention or sympathy. Even a vicious, cross dog may become affectionate or unusually attentive and playful.

During this first stage the animal is continually subject to sudden changes of manner, appearing normal, then becoming irritable and gloomy, avoiding noise and light, often hiding behind furniture or under porches. A tendency to play may be followed by marked uneasiness of manner—scratching with the forefeet, biting at the air as tho trying to catch a fly, or shifting position from one resting place to another. The animal avoids or resents being touched, particularly by a stranger.

Occasional periods of heavy breathing, vomiting, dilation of the pupils of the eyes may be noted, and frequently, but not always, saliva drools from the mouth in long strands. Intense itching at the site of the wound may cause the animal to scratch, bite, and tear the wound open to the bone.

Probably one of the most noticeable symptoms in this first stage is a perversion of the appetite. The regular diet will often be refused, and yet foreign, indigestible articles will be swallowed. Pieces of wood, stones, dirt, hair, feathers, and rags have been found in the stomach of rabid dogs at post-mortem examination.

Rabid animals frequently seek water during this first stage of the disease, but the throat being partially paralyzed, swallowing is difficult and the attempt to drink may be followed by paroxysms of coughing.

Second or Furious Stage.—It is this stage that gives the names "mad dog" and rabies¹ to this disease. Unrest and excitement increase until the animal becomes furious. A peculiarly hoarse voice develops and the bark ends in a long-drawn-out wail or howl, owing to the paralysis of the muscles of the throat and larynx. This howl is said to sound like the yelp of a coyote; and to those familiar with the disease, the strange howl is recognized as a suspicious symptom.

A morbid, uncontrollable desire to bite is displayed as the disease progresses. Objects of any type may be torn to pieces, and the animal may attack other animals or man without apparent cause. It is during this period that rabid dogs most commonly communicate the disease to other animals and to human beings by biting them.

A strong urge to run often accompanies these symptoms. Familiar quarters are avoided. If the animal is securely confined, he will make repeated attempts to escape. If free, he runs aimlessly from place to

¹Rabies comes from the Latin word *rabere*, which means to rage.

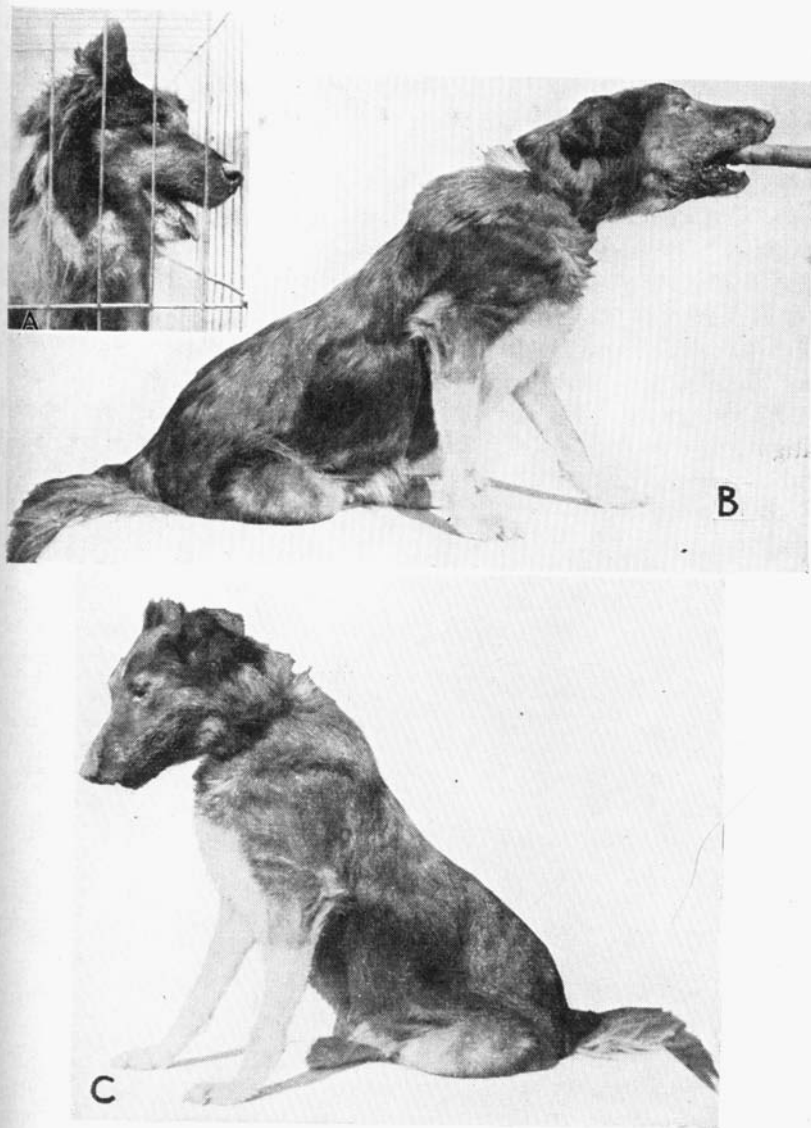


FIG. 1.—THREE STAGES IN THE FURIOUS TYPE OF RABIES

The dog appears nervous and ill at ease during the first or furious stage (A), also called the prodromal or melancholic. During the second, or excitable, stage (B) a beginning of paralysis can be observed in the hind legs and tail. Affected dogs will bite sticks or any objects within their reach—in fact, objects from which they would recoil at other times. During the third, or paralytic stage (C) the appearance is one of dejection, the gaze becomes fixed, and complete paralysis of the lower jaw and hind extremities takes place.

place, sometimes traveling ten to twenty miles or more, his main object apparently being merely to keep moving. If paralysis does not develop too far, the dog may eventually come creeping dejectedly back home, emaciated, exhausted, dirty, often with fresh wounds from fighting with other dogs.

A rabid dog that is caged during this second stage becomes particularly furious. He may jump sidewise against the bars of the cage, grab the cage bars between his teeth and viciously attack materials used for bedding, all the time without growling or barking. He will bite viciously sticks or rods thrust into the cage, sometimes with sufficient force to break his teeth (Fig. 1). There seems to be little, if any, sense of pain during this period.

As the disease advances, the dog shows periods of depression and fatigue. He lies down, breathes with difficulty, or stands in one spot with staring eyes and dilated pupils, until, without apparent cause, another furious attack occurs. Food or water, if offered, may excite a rage of biting. Salivation may increase and symptoms of paralysis gradually develop.

Death may occur during this stage, in two to four days, or the third, or paralytic stage, may intervene.

Third or Paralytic Stage.—In this final stage partial paralysis of the lower jaw, tongue, and eyes is followed within a short time by complete paralysis. The mouth is held open and the protruding tongue becomes dry and dirty.¹ The animal loses its voice, its eyes have a dull and troubled expression, and its gaze becomes fixed.

As general paralysis develops, the hind legs and tail are affected, and the animal has difficulty in walking or standing. Finally it can no longer move. Death occurs as the paralysis reaches the respiratory centers, or it may result from degenerative changes in the central nervous system.

The paralytic stage may last for one to two days. The entire course of the disease, from the time the first symptoms appear until death, may be five or six days, seldom more than ten. In the early stages the body temperature may be 104° to 106° F.; later it may be subnormal.

Dumb Rabies. In the dumb type of rabies the furious stage is either very short or entirely overshadowed by paralytic symptoms (see cover). Marked weakness and depression are evident from the beginning. A dog affected with this type of rabies can neither bark

¹The prominence of the tongue at this stage is partly responsible for some cases of rabies being erroneously called "black tongue."

nor bite because of paralysis of the lower jaw, tongue, larynx, and pharynx.

A dog with dumb rabies behaves very much as tho it had a bone lodged in its throat, and people have frequently become infected while attempting to examine the throat of such an animal.

In this dumb type of rabies a dog may be too weak to run, and may crawl to some cool, dark place where it will remain quietly except for occasional muscular cramps. A peculiar expression may be noted in the eyes as in the furious type of rabies. Paralysis progresses with varying degrees of rapidity until the entire body is involved. Death generally occurs in one to four days.

In most cases of dumb rabies no nervous or excitable symptoms are shown, but occasionally an animal may display early symptoms of the dumb type and then develop symptoms of the furious form. Some believe that the dumb type is merely a more severe form of the furious since it is the more common type produced in animals that are inoculated experimentally.

OTHER ANIMALS ALSO SUBJECT TO RABIES

Altho dogs are the animals most frequently affected with rabies, the disease is by no means limited to them. Cats, cattle, horses, sheep, goats, swine, rats, mice, skunks, monkeys, wolves, foxes, or any other warm-blooded animal may contract the disease when bitten by a rabid animal.

Cats are probably second to dogs in importance in the transmission of rabies to man. Cats usually have the furious type. A rabid cat is not so prone to seek sympathy as a dog but generally hides in dark corners, from which it may suddenly spring to attack persons or animals by scratching and biting the hands, face, or legs. It appears to have a special desire to spring at strange objects and even at animals of which it is ordinarily very much afraid. It may spit and mew at the same time. Its voice has a peculiar hoarse sound that is caused by partial paralysis of the throat.

Cattle are more likely to have the furious type of rabies than the dumb type. A cow which is usually very docile and mild, if affected with rabies, may show an unusual state of unrest and aggressiveness. During the first stage of the disease loss of appetite, stopping of milk flow, restlessness, and change in disposition are apparent. During the second stage the animal becomes more violent, drawing the upper lip backward, pawing the ground and violently butting any moving object, sometimes with so much force that its horns are broken. Its eyes become wild and staring, and it may indulge in periods of bellowing

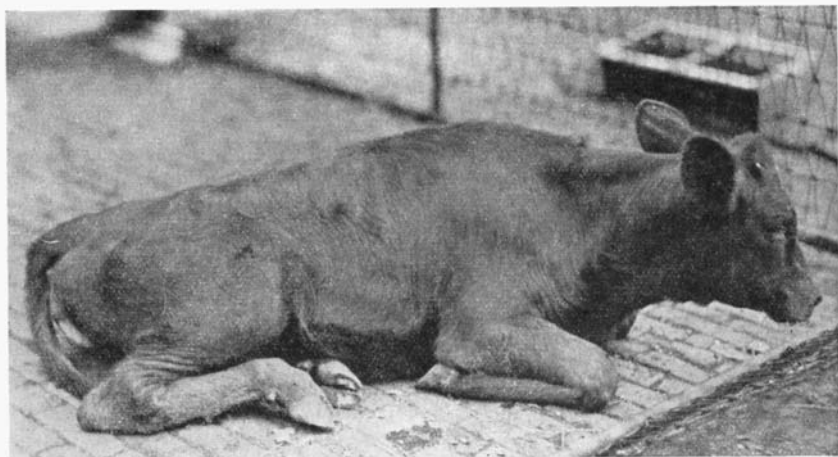


FIG. 2.—CALF INFECTED WITH STREET RABIES

This calf had been inoculated in the laboratory with a brain suspension from a rabid dog. As the disease developed the symptoms that were observed were excitement and bawling, incoordination and awkwardness in walking, loss of appetite, and paralysis, first noticed in the hind quarters. At the time the photograph was taken the calf was partly paralyzed in the hind quarters. The rabies was in this case induced by inoculation, cattle bitten by rabid dogs show the same or similar symptoms.

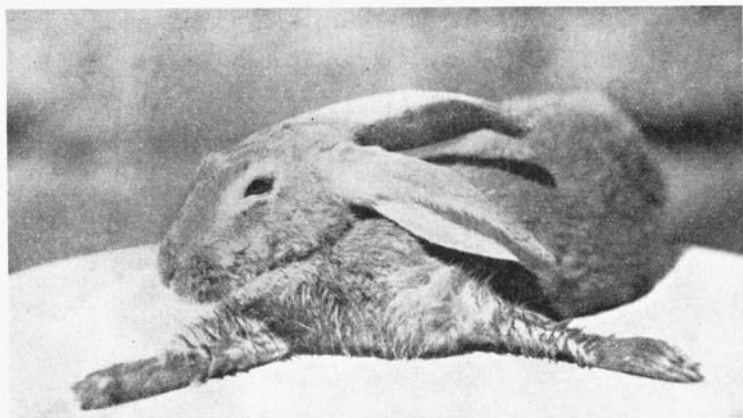


FIG. 3.—RABBIT INFECTED WITH STREET RABIES

In the rabbit shown here rabies was likewise induced by laboratory inoculation with the brain suspension from a rabid dog. The inoculation and observation of such animals as this serves as a valuable check upon the microscopic diagnosis of suspected animals. The symptoms observed in the rabbit were weakness, marked salivation or drooling, and paralysis of the legs. Note position of front legs.

which last for hours. Other symptoms, such as rapid loss of flesh, salivation, and paralysis, are much the same as those which have been described for dogs. The calf shown in Fig. 2 is in the paralytic stage.

The first indication of rabies in *horses* is usually an increased sensitiveness at the point of infection. As the disease progresses, the horse becomes restless and excitable, paws the ground, gnaws the manger, attempts to attack moving objects, bites and kicks other animals, and sometimes even tears off bits of its own flesh. The lips are occasionally drawn back, showing the teeth and allowing saliva to run from the corners of the mouth. Symptoms of paralysis develop quite rapidly. In one to five days after the onset of the disease the animal falls to the ground and death follows in a few hours.

Symptoms of rabies in wild animals and other domestic animals resemble those of either the dumb or the furious type in dogs, cats, cattle, or horses. A rabbit infected by inoculation is shown in Fig. 3.

DO NOT KILL SUSPECTED ANIMALS

Except in some emergency, a dog suspected of having rabies should not be killed, but should be strictly confined for at least 14 days so that the symptoms and the course of the disease, if present, may be observed. During this period the dog should be given his usual food and water and closely watched.

If at the end of the 14 days the suspected animal is still alive and well, one can be reasonably certain that it does not have rabies, and a person who has been bitten by the animal need have no fear of developing rabies from the bite. If, on the other hand, the dog shows symptoms of rabies and dies, the head should be detached immediately and sent to a laboratory for diagnosis (see page 12), and all persons who may have been exposed to possible infection by the dog should consult a physician immediately (see page 15).

The utmost care should be taken in handling dogs suspected of having rabies, for the body fluids and tissues of rabid animals are known to contain the rabies virus, and a small scratch or abrasion on the hand is enough to furnish an opening for the virus into the human body. Rubber gloves should always be used.

KILL OR VACCINATE EXPOSED ANIMALS

The safest thing to do with an animal that is known to have been bitten by a rabid animal is to destroy it as humanely as possible. If not destroyed, the animal should be given a multiple vaccination treatment and kept under strict quarantine for not less than three months and preferably for five or six months.

While treatment is effective after exposure but before definite symptoms develop, there is no treatment that will cure or modify the course of rabies in an animal after the animal has once displayed symptoms of the disease.

Some individual animals appear to have a degree of natural immunity against rabies; for not more than 35 to 45 percent of the dogs bitten by known rabid animals actually develop rabies. But this is much too high a percentage to warrant the taking of any chance that the disease will not develop in a given case.¹

HEADS OF RABID ANIMALS EXAMINED FREE

As soon as possible after the death of a dog or other animal suspected of having rabies, the head should be delivered to a laboratory for microscopic examination. Any of the following state-supported laboratories will examine such heads free of charge.

1. Laboratory of Illinois Department of Public Health, Capital Building, Springfield, Illinois
2. *Same*, 1849 West Polk Street, Chicago
3. *Same*, Holden Hospital, Carbondale
4. University of Illinois, Laboratory of Animal Pathology and Hygiene, Urbana

Various city laboratories also will make free examinations of heads of animals coming from their own municipalities, and there are a number of private and clinical laboratories thruout Illinois that will make such examinations on payment of a fee.

HOW TO SHIP HEADS OF RABID ANIMALS

If the laboratory to which the head is directed is some distance away, the head should be packed in ice or in dry ice, in a tin or other metal container, and carefully labeled in order to give proper warning to those who are to handle it at its destination. If packing the head in ice is not practical, the brain should be carefully removed and preserved in a 33-percent aqueous solution of buffered glycerine.

The American Railway Express Company will accept animals' heads for shipment under the following conditions:

"The head of the dog or other animal . . . must be placed in a tin or metal container, which will not permit the leakage of fluids; such container shall then be placed in a second wood or metal container with ice packed around it; such outside container must be so constructed that it will not permit the leakage of the ice water.

¹The existence of some degree of natural immunity against rabies is also suggested by the fact that laboratory animals will sometimes withstand doses of rabies virus that are fatal to other animals of the same species.

"All such packages must be labeled:

"CAUTION: THIS PACKAGE CONTAINS THE HEAD OF A DOG (OR OTHER ANIMAL) SUSPECTED OF HAVING DIED OF HYDROPHOBIA.

"Such shipments tendered on Saturday, which cannot reach their destination early enough for delivery on that day and would, therefore, remain in the Express Office over Sunday, must be refused, and the shipper requested to pack in ice and hold until Monday, so that they can be delivered without delay at destination."

Prepayment of charges on shipments of this kind is required.

Under no circumstances will the United States Postal Service accept such materials for shipment.

EXPERT HELP NEEDED TO DIAGNOSE RABIES

Prompt diagnosis of rabies in animals is extremely important, especially if the animal is known to have bitten a person. One or all three of the following methods are necessary for positive diagnosis: (1) observation of clinical symptoms, (2) microscopic demonstration of Negri bodies, and (3) inoculation of experimental animals with a brain emulsion of a rabid suspect.

1. Clinical Diagnosis. The clinical symptoms of rabies in dogs and other animals have already been described on pages 5 to 9.

Expert appraisal of the important clinical symptoms (such as altered behavior, urge to bite, inclination to travel or keep moving, changed voice, drooping lower jaw, and post-mortem findings which appear to exclude other diseases) is of great value in making an early tentative diagnosis of the disease. But these symptoms cannot always be depended upon to give a correct final diagnosis, for some of the clinical symptoms of rabies are very similar to those of other diseases. Encephalitis, cerebral canine distemper, poisoning, acute internal parasitisms accompanied by inflammation of the intestines, together with chronic gastroenteritis, foreign bodies in the esophagus and stomach, facial paralysis, infectious bulbar paralysis, tumors of the brain, acute meningitis, and epilepsy, all may cause symptoms that resemble rabies.

The presence of sticks, stones, leather, and other indigestible material in the stomach may also be taken as presumptive evidence of rabies, but such evidence is not conclusive since dogs frequently have hair balls in the stomach or other foreign materials that have been accidentally swallowed.

Laboratory methods are therefore essential for final diagnosis.

2. Microscopic Diagnosis. The finding of Negri bodies in the brain cells of a suspected animal, by means of microscopic examination,

is considered absolute evidence that the animal was rabid, and Pasteur treatment should be obtained at once for all persons who have been exposed. (See illustration of Negri bodies, page 23.)

The probability of finding Negri bodies in the brain of a rabid animal is greatly increased if the animal dies a natural death or dies very late in the course of the disease. This is another reason for not killing a suspected animal in the early stages of the disease.

In killing animals for rabies examination, damage to the head should be carefully avoided. In removing the head for shipment to a laboratory, care should be taken not to injure or contaminate the brain with dirt or bacteria. The head must be iced for preservation in shipment (to a laboratory) in conformity with shipping regulations (page 12) and because Negri bodies can seldom be found in a putrefied brain. Furthermore it is impracticable to use contaminated or putrid material for the third diagnostic test, animal inoculation.

3. Animal Inoculation. If Negri bodies are not found in the brain of an animal that has shown clinical symptoms of rabies, inoculation of laboratory animals with suspensions of the brain may help in making a positive diagnosis. When rabbits or guinea pigs inoculated with such material show typical rabies symptoms it is evidence that rabies was present in the original animal. Further confirmation of the diagnosis should be made by searching for Negri bodies in the brains of the test animals.

The disadvantage of animal inoculation in rabies diagnosis is the length of time that one must wait for results. The dumb type of rabies is the kind most frequently encountered in inoculated laboratory animals, and while it may develop within two to three weeks, sometimes a month or more is necessary, and occasionally the disease does not develop at all even tho the original animal suffered from rabies. Further delay may be caused by the death of the inoculated laboratory animals from causes other than rabies, as sometimes happens when contaminated brain tissue is used for inoculation.

EXACT NATURE OF RABIES VIRUS NOT KNOWN

All attempts to isolate and cultivate the virus of rabies have been unsuccessful; but since the disease may be produced by inoculating animals with a filtrate of a suspension of the brain of an infected animal it is generally classified as "filterable virus." The fact that the virus is capable of multiplying in a susceptible animal and the fact that its virulence may be reduced by air, light, and drying suggest that the causative agent is organic in nature.

So far as known, rabies virus multiplies only in the living body and occurs in concentrated form in the central nervous system, salivary glands, and saliva. It has, however, been found occasionally in other glands, such as the lachrymal, pancreatic, and mammary, and in the aqueous humor, the cerebrospinal fluid, and in the blood.

RABIES VIRUS REMAINS INFECTIVE FOR DAYS

The virulence and incubation periods of the natural, or "street," virus are variable. Pasteur has shown that rabies virus becomes non-virulent when dried in the air for 14 or 15 days, tho in the tissues of the central nervous system it retained its virulence for months at ice-box temperature. The virus appears to be very little affected by cold and very slowly affected by putrefaction. In fact the brains of rabid dogs buried as long as 44 days have proved infective. The virus in brain tissue remains active for weeks or months in buffered glycerin.

Rabies virus is destroyed by (1) heating it to the boiling point; (2) keeping it at 58° Centigrade for 30 minutes; or (3) by contact with 3-percent liquor cresolis for 15 minutes, with 1-percent formalin for 15 minutes, with 5-percent phenol for 30 minutes, or with a 1:1000 bichlorid of mercury solution for 15 minutes.

The incubation period of "fixed virus" (virus that has been modified and stabilized by long passage thru laboratory animals) is shorter and more constant than that of street virus. When, for example, rabies street virus is first inoculated into rabbits, the inoculation period may be about 18 days. On repeated passage thru rabbits the disease develops regularly in 8 days. The virus is then said to be "fixed."

Fixed virus is much less virulent for man, dogs, and other animals than is street virus. In fact when properly attenuated, fixed virus injected in suitable doses produces immunity against exposure to street virus. (See further discussion on this point on pages 16, 18-20).

PASTEUR¹ TREATMENT FOR MAN

Persons who have been exposed to rabies should consult a physician and obtain antirabic (Pasteur) treatment at once, particularly if the bite is on the face or hands. If the wound is not on the face or hands,

¹The treatment is named for the great scientist Pasteur, who in 1881 first attempted the artificial immunization of dogs against rabies. He used a series of inoculations, starting with an avirulent vaccine and using an increasingly virulent vaccine with each successive inoculation. Finally in 1885 he applied the treatment with equally good results to a nine-year-old boy who had been bitten by a rabid dog. This treatment, with various modifications, has now been adopted by the medical profession thruout the world.

treatment may be delayed until a diagnosis of the suspected animal has been obtained.

The following outline, adapted from Tice,¹ indicates when antirabic treatment should be given:

I. If a person is bitten by a dog, has the unbroken skin soiled with froth or saliva from a dog, or is scratched by a dog—

It is advisable to start antirabic vaccination *at once* and continue it until the dog can be observed for 14 days, *if there is rabies in the community.*

It is not necessary to give antirabic treatment if the dog is known, or is observed promptly and shows no disturbance, *provided it is known that there has been no rabies in the region for six months.*

II. If, under the above circumstances, the dog dies or is killed in less than 14 days after biting the man; or if the dog is unknown or disappears; or if the dog develops rabies or dies under suspicious circumstances—

Antirabic vaccination should be administered.

III. If the dog is sick but lives more than 14 days—

It should be observed further, and antirabic vaccination carried out if rabies develops.

IV. If the dog remains well at the end of 14 days' observation—

Antirabic vaccination should not be administered.

The Pasteur treatment should not be given carelessly or indiscriminately. If there is no reasonable indication that the animal with which the person has been in contact is rabid, treatment should not be applied.

PREVALENCE OF RABIES IN ILLINOIS

Tho no definite data are obtainable on the prevalence of rabies thruout the state, the number of dogs' brains submitted to laboratories for rabies examination and the number that proved positive are suggestive of its extent. As shown in Figs. 4 and 5, more than 40 percent of almost 6,000 dogs' heads submitted for examination to the various

¹International Medical Digest, Vol. 3, page 536.

PASTEUR TREATMENT AVAILABLE TO ALL

Any person in Illinois who needs the Pasteur antirabic treatment can obtain it, thru his physician, from the Illinois State Department of Public Health, Springfield.

For further particulars see Educational Health Circular 29 of the above Department.

state laboratories in Illinois during the ten years from July, 1925, to June, 1935, were found to be positive for rabies. During the same period 55 human deaths were reported in Illinois from this disease.

Since the reporting of rabid animals is not compulsory, the disease is doubtless much more prevalent than these figures would indicate. Rabies in dogs has been repeatedly recognized in many localities in

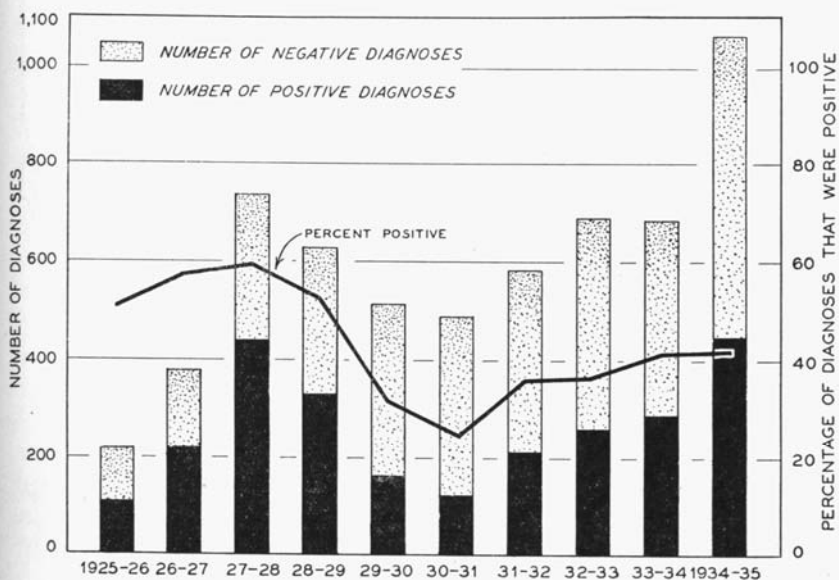


FIG. 4.—DIAGNOSES OF DOGS' HEADS FOR RABIES AT STATE LABORATORIES AT SPRINGFIELD, CARBONDALE, AND CHICAGO, AND AT THE ANIMAL PATHOLOGY LABORATORY, UNIVERSITY OF ILLINOIS, 1925-1935

The number of dogs' heads submitted for diagnosis for rabies has increased greatly during the past few years, and the percentage of diagnoses that have been positive also has increased since the low point in 1930-31. About five times as many dogs' heads were submitted in 1935 as in 1925, and more than four times as many were diagnosed positive. The disease is definitely increasing in Illinois.

southern and central Illinois in the past ten years, and on two occasions has assumed epidemic proportions in Cook county. In the past twenty years it has been recognized in districts of Illinois previously regarded as free from rabies.

The increasing number of rabid dogs has prompted officials of the State Department of Agriculture to cooperate with local officials in the quarantining of townships and even of entire counties in an effort to check the spread of the disease. Similar efforts for the suppression of the disease by state livestock sanitary officials of different states are

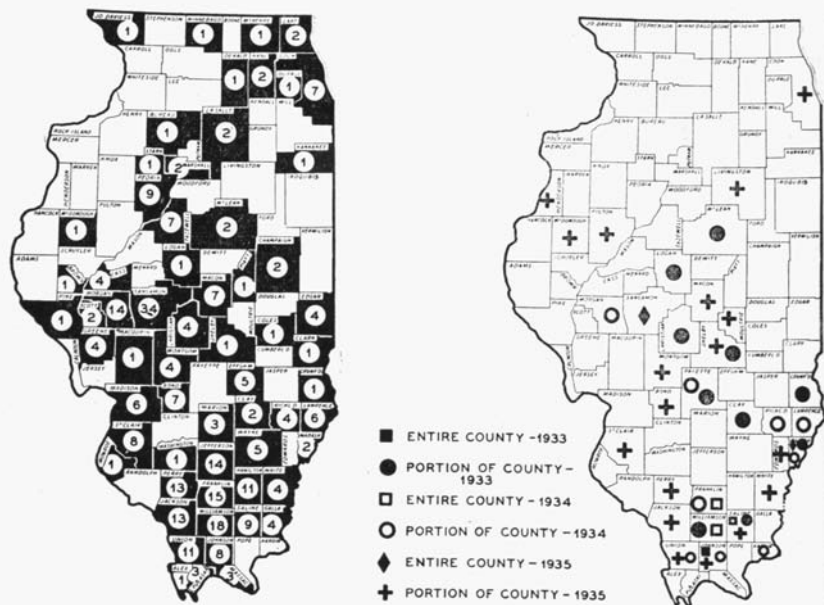


FIG. 5.—(Left) CASES OF DOG RABIES DIAGNOSED BY STATE LABORATORIES, JULY 1, 1934, TO APRIL 15, 1935; AND (right) AREAS IN ILLINOIS QUARANTINED FOR RABIES FROM JULY, 1933, TO OCTOBER, 1935

Three hundred seven dogs' heads proved positive to rabies tests. Cases handled by municipal and private laboratories are not included. Thirty-one counties were quarantined in whole or in part because rabies was a serious threat to animals and man.

evidenced by the promulgation of regulations to prevent the interstate shipment of unvaccinated dogs.

CONTROL AND PREVENTION OF RABIES

The key to the control and prevention of rabies in human beings and in animals is the suppression of the disease in dogs by compulsory licensing and vaccination, the impounding and destruction of all stray dogs, the quarantining of all dogs during the presence of the disease in a community and of all dogs brought into the region at any time. No one of these measures will prevent outbreaks of the disease. Furthermore the active cooperation of dog owners with public-health officials is essential for the enforcement of these measures.

Dog License Law Should Be Rigidly Enforced. Any dog found without a tag bearing a license number for the current year should be sent to the dog pound and held for a few days pending payment of a license fee or attachment of a new tag if one has been lost. If the

ownership of dogs were restricted to those persons who value their pets enough to buy a license for them, the stray dog problem would be much easier to solve.

Stray Dogs Should Be Destroyed. The destruction of ownerless dogs is probably the most important of all methods of rabies control, yet because of the nature of the work and false sentiment it is one of the most difficult to carry out. An official dog-catching force is necessary, as well as a pound equipped for the detention, care, and humane destruction of the dogs. Since opposition to this method is doubtless due largely to ignorance of the necessity for it, it becomes the duty of health officers, and all others who know of the danger of stray dogs, to educate those who are not aware of this danger.

Compulsory Yearly Vaccination of Dogs. Judiciously employed, the single-injection method of vaccination against rabies is an effective aid in curbing the spread of the disease. This method consists of the subcutaneous injection of 5 cubic centimeters of a 20-percent emulsion made from the brain of a phenol- or chloroform-killed rabid sheep.

Some dog owners are prejudiced against rabies vaccination, apparently because of a fear that it is not reliable or that the dog may

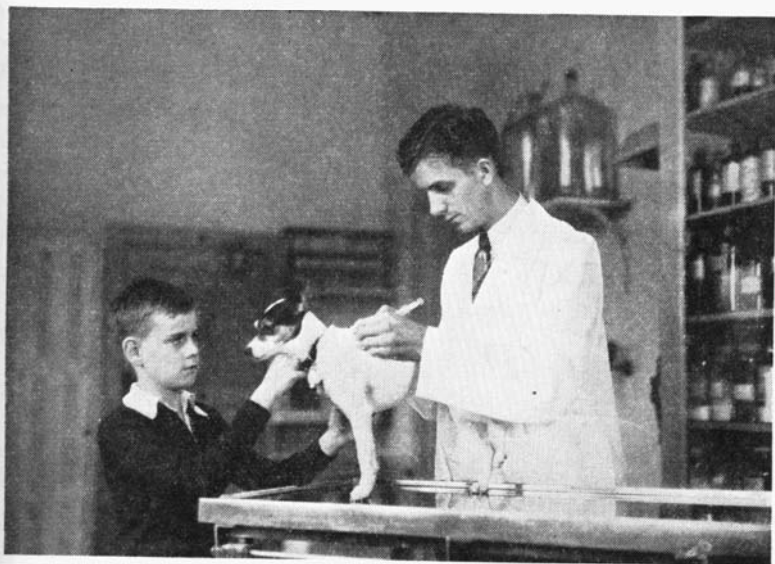


FIG. 6.—PROTECT YOUR CHILD BY VACCINATING YOUR DOG

The safety of dog-owning families and of the general public demands that dogs be vaccinated against rabies. Vaccination does not offer complete protection, but it is one of the important preventive measures. A dog seldom experiences the slightest discomfort from vaccination.

experience a violent reaction. While it is true that the single-dose vaccination recommended for general use with animals is not 100-percent protective and does not confer the degree of immunity which multiple¹ doses do, still veterinary literature contains so many reports of favorable results from it that there can be no doubt of its important immunizing value. Experiments conducted by the Detroit Department of Public Health have shown that the chances of developing rabies from a dog bite are 11.4 times as great if the dog has never been vaccinated as they would be if the dog had been vaccinated.² Cases in which a dog experiences the slightest discomfort from vaccination against rabies are very rare.

In many communities antirabic vaccination of all dogs is compulsory, but whether compulsory or not, all dog owners should be interested enough in the welfare of their pets and of their family and the general public to give them this security.

Since this method is not a complete protection against the disease, and since it involves expense, it should be used as a supplement to and not a substitute for other recognized methods of control, such as the quarantining of all dogs during the presence of the disease in a community and the destruction of all stray dogs.

Enforcement of Muzzling and Quarantine Regulations. Rabies can be completely eradicated from an area by the rigid enforcement of quarantine regulations, the elimination of ownerless dogs, and the vaccination of all licensed dogs. No one can deny that during epidemics of rabies, dogs should be shut in pens or houses or leashed, for their own protection as well as the protection of other dogs and of children.

Quarantine measures will be of little value, however, if only 40 or 50 percent of the dogs in the region are restrained or muzzled. Likewise it does little good to free a region of rabies if no quarantine is established on dogs coming in from outside the region. A quarantine of at least six months should be placed on all dogs brought into a region that is attempting to eradicate the disease.

¹Multiple doses, as stated on page 11, are recommended when an animal has been definitely exposed to rabies. Because of its expense, however, this method is sometimes impractical.

²Whether the failures that have occurred with the single-injection method of vaccination have been due to faulty vaccine or variation in its strength, to the fact that the naturally introduced virus was of an especially virulent strain or the dose was unusually heavy, or to the fact that too short a time had elapsed between vaccination and natural infection, is not known. It does appear, however, that when single injection is made during the incubation stage of the disease in an animal previously exposed, vaccination may prolong the incubation period but not prevent the development of the disease.

(COPY OF RABIES QUARANTINE ORDER)

STATE OF ILLINOIS
DEPARTMENT OF AGRICULTURE

By virtue of authority vested in the State Department of Agriculture under "An Act to Prevent the Spread of Rabies," approved July 8, 1927, in force July 8, 1927, amended July 8, 1933:

Because of the prevalence of rabies in _____ County, State of Illinois, it is hereby ordered that all dogs within the above area be either—

1. Kept confined within an enclosure from which escape is impossible, or
2. Kept restrained by a leash composed of chain or other indestructible material.

This order effective _____ and until notice of release.

(Signed) J. H. LLOYD

Director of Agriculture

(Signed)

H. C. RINEHART

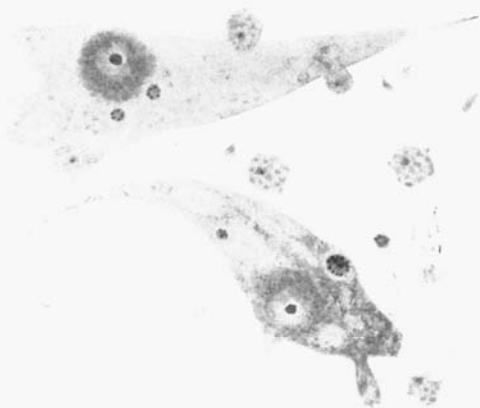
Chief Veterinarian

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NEGRI BODIES

Small round, oval, or pear-shaped bodies like those illustrated below are found in the nerve cells of the brains of human or animal subjects that have died of rabies. These bodies were first described by an Italian scientist, Negri, in 1903. They may be found either inside or outside the nerve cells, and within a cell they vary from 1 to 6 in number. In the dog they usually measure from 1 to 10 microns in diameter, occasionally larger, and are easily demonstrated by differential staining methods. The stains used in this illustration were basic fuchsin and alkaline methylene blue. Opinions at present



NEGRI BODIES IN CELLS FROM BRAIN OF RABID DOG
(From Gay's "Agents of Disease and Host Resistance," Courtesy
of Charles S. Thomas, Publisher)

differ concerning the nature of these bodies. Some believe they are protozoa and of causative significance; others that they are products of cell degeneration produced by a filterable causative agent but that they are not themselves the cause of the disease.

When the head of a dog or other animal suspected of having rabies is sent to a laboratory for examination these Negri bodies are what the laboratory technicians look for. Their presence in the brain is considered conclusive proof that the animal was rabid. On the other hand, the failure to find Negri bodies is not always a reliable indication that the animal did not have rabies, for in the brains of some animals known to have been rabid no Negri bodies were found. If the suspected animal is killed in the early stages of the disease, the Negri bodies may be so few in number that they may be overlooked in the microscopic examination of the brain. Laboratory technicians therefore resort to the inoculation of test animals with a brain suspension from the suspected animal as a test in addition to the search for Negri bodies.

RABIES is an infectious, contagious, and fatal disease of animals and man spread by the bite of a rabid dog or other rabid animal. It occurs thruout the year as well as during the hot days of summer.

Animals suspected of being rabid should be immediately placed under the care of the local veterinarian and kept confined for at least two weeks.

Persons bitten by a dog or other animal, or otherwise exposed to rabies, should consult a physician immediately. The Pasteur antirabic treatment is highly effective in preventing the development of the disease when applied *early* after exposure. There is no known treatment after symptoms of rabies appear.

While rabies is now increasing in Illinois the disease can be controlled and ultimately exterminated by the humane destruction of all ownerless or stray dogs, the quarantining of all dogs when the disease is known to be present in a community, and the annual vaccination of all dogs.