

# Some Diseases of Dogs and Cats Transmissible to Man

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**I**N THE field of public health the veterinarian plays an important role in the prevention of the spread of diseases from animals to man. Not only for his own protection but for protection of his clients and the livestock of his clients, the veterinarian should be familiar with the diseases of the cat and dog and the part these animals play in transmitting infections to man and other animals. Although there are diseases which are peculiar only to the cat and dog, these pets are also susceptible to certain diseases of other animals and man.

Of the diseases transmitted to man by cats and dogs, rabies, leptospirosis, and tuberculosis are of greatest significance.

## Rabies

Rabies is a disease to which all warm blooded animals, including man, are susceptible. Canines are primarily affected and recovery rarely occurs. The dog is regarded as the natural reservoir of rabies from which the disease spreads to other animals. Rabies is manifested in two forms in the dog; a dumb or paralytic form and a furious form. It is the furious form which is responsible for the dissemination of most cases of the disease. Early in the development of the disease the dog appears extremely depressed or is unusually affectionate. This stage is followed by a period of excitement during which the dog has an irresistible tendency to roam. During this period the dog will travel long distances before returning. The animal at this stage will eat indigestible objects such as sticks or stones and will bite man or other animals which may be in his path. When the animal returns

home, he will look for a quiet secluded place. Paralysis and death soon follow.

Rabies has also been noted in cats quite frequently and has served as a source of danger to man—especially to children. The infected animal has been known to hide itself under furniture or in dark places from which it attacks persons who come near. A cat will jump up and severely scratch the face of a child. A change in voice is noted along with anorexia, emaciation, paralysis, and finally death.

In man as in the dog both the dumb and furious types of the disease occur. Not all persons bitten by rabid animals contract the disease. This may be due to an individual immunity. Infection by bites on the face and hands results in the appearance of symptoms sooner than infection gaining entrance at some other part of the body and therefore is most dangerous. As in dogs and cats, this disease is invariably fatal. Children appear to be victims of the disease more often than adults. Due to the shorter incubation period noted in the disease in children, protective inoculation is less effective than in adults and immediate steps toward prophylaxis should be taken when an individual is exposed to the virus.

## Leptospirosis

The place of the dog in the epidemiology of leptospirosis has become increasingly important. Both *Leptospira icterohemorrhagiae* and *Leptospira canicola* have been isolated as etiological agents. There may be evidence of a marked jaundice. The chief pathological changes involve the capillaries, kidneys, liver and skeletal muscles. The mortality is high, especially

among male dogs. They become infected by eating infected rats and may infect each other because of their interest in urine of their own species in which viable organisms are shed. It may also be spread by sexual intercourse.

Most of the cases in man have been due to the rat strain of the spirochete, *L. icterohemorrhagiae*. The symptoms appear quite suddenly. Distressing muscular pains, a heavily coated tongue, leucocytosis, albuminuria, and meningeal symptoms are present. Icterus, which occurs in about one third of the cases, is noted between the 6th and 13th day. Meyer<sup>8</sup> described two cases of *L. canicola* fever in man. One was a veterinarian and the other was an individual who worked in a dog pound. One of the patients showed symptoms of icterus while the other case resembled influenza with temperatures varying from 103°–106° F. He suffered recurrent febrile attacks for at least a month later. *L. canicola* was isolated from his urine.

#### Canine Carriers

From the standpoint of public health, it is important that the veterinarian remembers that *L. canicola* fever is an occupational hazard. Since dogs which have had the disease may act as carriers of the infection, it is important that the owner of such a dog be warned of the possibilities of the dog transmitting the organism of canicola fever to the members of his household. Sanitation should be emphasized. It has been recommended that dogs with positive urine findings of *Leptospira* be placed on a meat diet or given hydrochloric acid in drinking water so that the urine will be unsuitable for the organisms due to its high acid content.

Tuberculosis is an infectious disease of man and domestic animals caused by a strain of the tubercle bacillus. Of the three strains of *Mycobacterium tuberculosis*, namely the human, bovine, and avian strains, man is most susceptible to the human strain. Human adults are resistant to the bovine strain but little children are quite susceptible.

Dogs have been known to contract bovine tuberculosis after feeding upon in-

fecting meat or milk. They contract the human strain of the disease chiefly through close association with tuberculous people. Dogs are not susceptible to avian tuberculosis. Cats, however, are more commonly infected by this species than dogs. They have been found to be susceptible to both human and bovine strains of tubercle bacilli. Through observation and experimentation Petit<sup>14</sup> found that the dog and cat are frequently infected from man and that the cat is particularly susceptible to tuberculous ulcers of the skin which are due to a local infection resulting from a scratch by claws contaminated with tuberculous sputum. He recommends that in view of the ease with which cats and dogs contract human tuberculosis, animals in a state of poor health, which show symptoms of emaciation, cough, diarrhea, and ulcers about the face should be suspected of being tuberculous and a menace to public health, especially to children. In spite of the fact that no precise data on the subject exists, it is believed<sup>18</sup> that cats are a source of infection for both the bovine and the human strain, especially when affected with open lesions.

Tuberculosis, unfortunately, tends to be overlooked or unsuspected in dogs and cats and consequently is especially important in endangering little children who may contract the infection from their habit of cuddling and kissing their pet animals.

#### Diphtheria Bacillus

Several investigators have found cats to be susceptible to diphtheria toxin as well as to the diphtheria bacillus. Animals injected with the live culture or toxin exhibit definite symptoms and often die.

A case of diphtheria has been described in which children from two farms were infected. It was insisted that there had been no human communication between the two farms. However, a cat which was a favorite on both farms was commonly seen and had been fondled at both places very recently. This cat was also showing symptoms of the disease simultaneously. On autopsy lesions in the mouth and pharynx of the cat typical of diphtheria were described by Jewett<sup>9</sup>.

In his efforts to determine experimental-

ly whether cats were capable of harboring diphtheria organisms, Savage<sup>16</sup> implanted large numbers of virulent organisms in the nasal cavities and pharynx. There were no general or local lesions and the organisms survived but a short period. Consequently, he believes that mucous membranes of cats are unfavorable for the growth or persistence of the diphtheria bacillus, and that cats are not carriers of diphtheritic infection.

### Feline Carriers

Simmons<sup>17</sup> reported positive evidence in cats harboring true diphtheria bacilli. In one cat he described symptoms of a croupy cough, dysphagia, and continuous mewling. About a week later, a woman with whom the cat had been sleeping developed a typical case of fatal diphtheria. The organisms which he isolated from both the cat and the woman were virulent to a guinea pig not protected by diphtheria antitoxin, while an immunized guinea pig showed no symptoms following a similar injection.

A considerable number of instances of infection in cats and dogs have been reported, but bacteriological evidence is incomplete. True diphtheria bacilli have been confused with diphtheroid organisms. The cat is considered a doubtful menace in the transmission of *Corynebacterium diphtheriae* to man.

Both dogs and cats have been known to contract anthrax by eating meat infected with *Bacillus anthracis*. They may harbor viable spores in their feces after devouring flesh from infected carcasses and thereby serve as carriers disseminating the organisms to other areas. A case has been reported in which a man became infected while caring for a dog that had fed on infected sheep. Transmission is possible through bites from pets which have recently fed upon anthrax carcasses and by infection from passively disseminated spores.

Tularemia is an infectious disease of wild rodents, primarily, but secondarily it is a disease of man. It is a fatal bacteremia caused by *Pasteurella tularensis*. Musser states that no other specific organism has been found to invade so many

different species of animals and birds as does *P. tularensis*. The domestic cat must be considered as a possible infective carrier of the disease, since the cat is well known for its predatory habits and fondness for birds and small mammals, including the rabbit. Man may contract the infection directly from the tissues of infected animals, through the agency of blood-sucking insects and ticks which have previously fed on infected animals or birds, or from laboratory infections. Cases of human tularemia have been reported following the scratch by a cat whose claws undoubtedly were contaminated with the infectious agent. The role of the dog and cat, however, is not of great importance in the transmission of this disease. Over 90 per cent of the cases of human infection in the United States are due to contact with infected rabbits.

Rat-bite fever in man is usually transmitted by the bite of a rat infected with *Spirillum minus*; however, cases have been reported following the bite of a cat and dog. The disease in man is characterized by a local inflammatory condition in the wound area, adjacent lymph nodes are enlarged, and paroxysms of fever followed by periods of remission are noted. Cases of rat-bite fever in man due to cat bites have been reported by Schottmüller, Manson-Bahr, *et al.*<sup>12</sup>

### Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is a rickettsial disease transmitted to man by ticks. It is characterized by a rash accompanied by a distinct elevation in temperature. The disease occurs most commonly among sheepherders, surveyors, foresters, farmers and vacationists. Infection may result from crushing ticks with one's fingers while removing them from dogs. *Dermacentor variabilis*, also known as the eastern dog tick, has been known to transmit the virus to man. Another tick, *Dermacentor andersoni*, the western wood tick also plays an important part in the transmission of this disease to man. Other tick transmitters of spotted fever are *Amblyomma americanum*, *Dermacentor parvum*, and *Haemophysalis leporis*.

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## Some diseases of dogs and cats

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*palustris*. The disease is not transmitted from person to person, but dogs are susceptible and capable of transmitting the infectious agent to their tick parasites.

Several workers have found that dogs and cats are susceptible to actinomycosis. It is possible but not probable that infected cats may act as passive carriers by distributing the organisms over vegetation through saliva or feces. There is no evidence of direct transmission of this infection to man from animals. However, it is inadvisable for man to chew straws, grasses, and grains.

Although three species of *Brucella* (*Br. abortus*, *Br. melitensis*, *Br. suis*) have been isolated from the dog, the dog is not believed to be of any great significance in the transmission of this disease to man. Tortenson reported that cats were subject to artificial infection but that they rarely contract brucellosis naturally. Evidence of infection was negative in a case where cats were kept in contact with infected goats. Consequently the role of the cat in transmission of brucellosis is relatively insignificant.

### Scarlet Fever

Dogs have been reported to be susceptible to *Streptococcus pyogenes* which is responsible for scarlet fever in man. Free access of a dog to a human case of the disease might be a menace to children according to Hull.<sup>7</sup>

Although dogs are believed to be resistant, Hunter<sup>8</sup> states that cats suffer from plague. In the acute form of the disease, symptoms of diarrhea, vomiting, loss of weight, sensitiveness of the abdomen, weakness and paralysis of the extremities prior to death in from two to six days have been described. In the chronic form of *Pasteurella pestis* infection, emaciation is the chief symptom and swelling of the inguinal region may be found. The infected animals may live for two months. In areas where plague exists, cats become infected by devouring diseased rats and mice. Although little information is available cats

are believed to play a part in the dissemination of *P. pestis* to man.

Cases of poliomyelitis have been reported in cats and associated with a similar paralysis in man. Frost<sup>6</sup> investigated the connection of paralyzed dogs to epidemics of poliomyelitis in Iowa and Ohio but was unable to find evidence to support the contention that such animals were suffering from the disease or acting as carriers.

### Pneumonia in Cats

A virus has been obtained from cases of pneumonia in cats, and some evidence has been produced in support of the contention that this virus is the same or closely related to the one causing some of the so-called atypical pneumonias in man. Experimental evidence as to the exact relationship of these viruses is still lacking.<sup>2</sup>

Dogs and cats are rarely infected with tetanus. They are believed to be susceptible to typhus fever. Macewen<sup>11</sup> found that after feeding a cat upon sputum from various cases of whooping cough for seven days, the animal became weak in two weeks and developed a characteristic cough and other symptoms later.

Sporotrichosis is a sporadic infection of both dogs and man characterized by granulomatous lesions which become ulcerated and are slow to heal. The etiological agents belong to the fungous genus *Sporotrichum*, and man has been known to become infected following the bite of an infected dog. Since similar infection has followed injuries by splinters and contact with rotten sticks as may occur during clearing land, animals should not be condemned unjustly. Their role in the transmission of this fungus is a passive one.

Ringworm infection has frequently been reported in cats and dogs due to *Microsporon felineum*. Walpole described lesions about two millimeters in diameter on the skin of a cat in the region of the shoulder and tail. Members of the household in which cats infected with microsporosis also live, have commonly contracted a ringworm infection. Roberts reported a case where a kitten infected with *M. felineum* infected a passenger enroute

to England where another kitten and twelve members of a family and a dog were infected. Cultures were made from the infected individuals and the same organism was isolated in each case. The lesions in man are located on those parts of the body with which the infected animal came in contact. There appears to be no great irritation accompanying this form of ringworm in cats. However, Smith described cases of human infection in which the lesions of *Tinea circinata* were associated with an extreme itching and burning sensation. The ringworm which is transmitted from cats to man usually attacks the body only, while that conveyed from man to man affects the head most often. The clinical evidence along with laboratory studies, according to Roberts, is adequate to incriminate these animals as suspects in the transmission of the disease to man.

Of the vast numbers of species of Protozoa described as invaders of the domestic animals, very few are known to infect man. The only amoeba pathogenic for man is *Endamoeba histolytica*, which is occasionally found in dogs and cats. However, the chance for passage of the cysts to man from these hosts is rare.

Faust and Wassel after making a survey of the incidence of *Clonorchis sinensis* in the Central Yangtse Valley of China concluded that the dog and cat were the reservoir hosts and that man was merely incidental. The exact position of these animals in transmitting this liver fluke to man has not been determined.

#### Reservoir of Trematode

The cat is an important reservoir host for the trematode *Heterophyes heterophyes*, a frequent invader of the intestine of man found in Egypt, China, and Japan.

Man is an incidental host to *Paragonimus westermani*, a parasite of dogs and cats and other carnivores. Mammals acquire this oriental lung fluke from eating the soft parts of crabs and crayfishes.

The domestic animals play an important role in most of the tapeworm infections of man by acting either as reservoir or intermediate hosts. The cat and dog serve as reservoir hosts of *Dipylidium caninum*,

which is a relatively rare intestinal parasite of man. Infection in man results from accidentally swallowing infected fleas or biting lice which are ectoparasites of the dog and cat.

Dogs also serve as reservoir hosts of *Diphyllobothrium latum*. In its development, this broad fish tapeworm passes through two intermediate hosts—a cyclops and a fresh water fish—before becoming infective for a mammalian host.

Man is an intermediate host for *Echinococcus granulosus*. The larval stage of this dangerous tapeworm is spent in the tissues of man or other animals while the adult stage of life is spent in the small intestine of dogs. Human infection results from the consumption of eggs in contaminated water or from permitting dogs to lick one's face and hands after licking their own anal region.

#### Hookworm

*Ancylostoma braziliense*, a hookworm, is a relatively important intestinal parasite of man, dogs and cats, and is found in various parts of the world. Human beings exposed to the canine and feline strains along the southern coast of the United States develop only cutaneous symptoms which are known as "creeping eruption." This is due to the penetration of the skin by larvae which apparently are unable to reach the peripheral lymphatics.

Flea infestation is a condition common to both man and animals. These pests live both on and off the body of the host. Man frequently is the host for dog fleas. This pest produces disease not only by sucking blood but also by producing severe irritation. From the standpoint of public health, these insects have been known to transmit diseases from one host to another. Such conditions as bubonic plague and infantile kala-azar, which is a tropical chronic splenomegaly characterized by an irregular fever, hemorrhages, ascites and extreme emaciation and caused by *Lishmania donovani* in tropical Asia, have been known to be transmitted by this pest. The dog flea, *Ctenocephalides canis*, is instrumental in the transmission of the dog tape worm, *Dipylidium caninum*, to man

by accidental swallowing of infected fleas. This may easily happen in cases of too great intimacy between children and their pets. Likewise *Leishmania donovani* is believed to be transmitted by fleas to man, causing the disease kala-azar.

### Lice

Lice also are believed to be responsible for certain diseases in man. These pests are said to be of significance in certain cases of syphilis and typhus fever transmission.

Dogs and cats are not naturally dirty, filthy animals, and when they do contract parasitism of which they are unable to rid themselves, they give constant indications that all is not well with them. Such symptoms, which should be obvious to the least observing individual, are often not only unheeded but even unappreciated by the owner until pathological changes are noted and brought finally to the attention of the veterinarian.

A fact of still greater significance than the pathological condition in the animal is the possible effect upon man. The problem of disease dissemination from animals to man is one which merits closest attention from the public health standpoint.

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Male dogs in America's homes outnumber females practically two to one, and the average age of all dogs is just about four and one-half years.

This is indicated in a survey of 868 representative homes made public by the Gaines Dog Research Center, 250 Park Avenue, New York City.

The exact percentage of males in the U. S. dog population, as pointed up by the survey, is 63.6, and the average age 4.4 years.

Other interesting facts brought to light by the survey follow:

There are 1.22 dogs to the average U. S. dog-owning home. On an average rural farm families, of course, own more dogs than urban families.

Farm families feed their dogs on an average 2.3 times daily, as compared with 1.7 times a day they are fed in urban homes.

Eighty-two and three-tenths per cent of the families buy their dog food from grocery stores, while an additional 14.4 per cent of homemakers say they purchase it at feed stores.

The survey also revealed that when a feeding problem is encountered the veterinarian is the one most often consulted.

Of 1,000 men exposed to anthrax in Pennsylvania tanneries, 123 in all contracted the disease in the course of 12 years, or more than 11 per cent of the number of directly exposed tanners.

Seventy-three cases were due to the handling of cattle hides and 50 in the handling of goat hides. One-fifth of the cases died.