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Some Parasites of the Dog

A study of the parasites less commonly encountered

Eric W. Isakson, fall '43

Practically all veterinarians readily diagnose and treat parasitism in the dog. Such parasites as fleas, lice, ticks, tapeworms, hookworms, and ascarids, are common and are dealt with routinely and quite effectively. However, there are a great many more parasites of the dog, most of which do not receive much attention until they appear under unusual circumstances, and then are too often considered only as curiosities. This article was written for the purpose of attracting attention to a few of the less common, though far from rare, parasites of the dog which have interesting and direct importance to human hygiene, or which may appear unexpectedly at post mortem examination, causing confusion or bewilderment in the mind of the examiner.

Respiratory Parasite

Oslerus osleri, often called a dog “lung-worm,” is a parasite of the trachea, bronchi, and occasionally the lungs. It is found in nodular proliferations of the mucosa, usually at the base of the primary bronchi. It is a rather small nematode. The male measures about 5 mm. in length and is quite slender while the female measures 9 to 15 mm. and is more robust. The presence of the parasite in the mucosa stimulates the growth of connective tissue and thereby causes the formation of tumor-like nodules which may be up to a centimeter in diameter, grayish in color, and having a villous appearance due to the projecting ends of the worms. The parasite is ooviviparous, the eggs hatching in the uterus of the female. The larvae are blunt anteriorly and have a short S-shaped tail. The life cycle is not known beyond the fact that the larvae are coughed up in the mucus from the trachea and may pass out the mouth or be swallowed and pass with the feces. It is thought, however, that the life cycle is direct.

This parasite is not common, but has been reported from countries scattered throughout the world. In North America its occurrence has also been rather scattered. It has been reported in Canada, New York, Texas, and Nebraska.

The symptoms vary, as would be expected, with the degree of infection and the size of the nodules produced. If the infection is slight and the nodules are small, there may be no symptoms except a slight cough. As the nodules become larger the lumen of the respiratory passage is decreased, respiration becomes labored, and the cough increases and becomes persistent. Emaciation and loss of appetite are seen as the disease progresses. The disease may become chronic and may result in death. Diagnosis is made by a bronchoscopic examination, by finding the larvae in mucus obtained by swabbing the posterior part of the pharynx, or by finding larvae in fresh feces.

Treatment Symptomatic

Only symptomatic treatment can be recommended because of the location of the parasites. Expectorants and cough remedies may relieve the symptoms. Mönnig, relating the experience of Pillers, states that if the dogs are kept free from reinfection the worms may die and the nodules disappear in four or five months. Thus strict sanitation is recommended both for treatment and prophylaxis.
Linguatula serrata, commonly referred to as the “tongue-worm” of the dog, is not a worm and is not a parasite of the tongue. The adult inhabits the nasal cavity of the dog primarily and according to Hall, is a legless arachnid. It has been reported rarely in man and in herbivorous animals.

The adult is elongated and somewhat worm-like with a broad anterior end, tapering body with a cross-striated appearance, and is flattened dorso-ventrally. There are four hooks at the anterior end which are said to be remnants of the legs. The male is 2 or 3 cm. long while the female is occasionally up to 10 or 12 cm. in length.

**Life Cycle**

The eggs are deposited by the female and pass out in mucus when the dog sneezes, or they are swallowed and pass out in the feces. A suitable host animal eats contaminated vegetation and thereby ingests the eggs. The eggs hatch in the alimentary canal of the host animal and the larvae make their way, as a rule, to the liver, lungs, and lymph nodes, especially the mesenteric lymph nodes, where they develop into the infective nymphal stage. This stage resembles the adult but is only 5 or 6 mm. long, is white in color, and has four legs. It lies in a small cyst and is surrounded by viscid, turbid fluid. According to Mönnig, the nymph may leave the cyst and wander in the body of the intermediate host, and in this way it is believed that infection of herbivores with adults occurs. Dogs become infected by eating rabbits or glands of larger herbivorous animals which contain the encysted nymphs. The nymphs wander through the body of the dog and attach themselves high in the nasal cavity where they mature. In the South the nymphs are quite common in cattle while in Europe, sheep are said to be the most common intermediate host. Rabbits and other herbivorous animals also act as intermediate hosts.

As has been stated, the parasites attach high up in the nasal passages. This produces severe irritation and causes the dog to sneeze and cough at intervals. Often he rubs his nose with his fore feet and snores in his sleep. A blood-stained discharge from the nostrils may be observed but is not constant. The parasite lives about fifteen months and then the animal recovers. It seldom if ever causes death of the host.

Diagnosis is made by the symptoms and by finding eggs in the nasal exudate or in the feces. Occasionally the parasites are found in the feed pan or watering pan, but this is the exception rather than the rule. The only treatment at present is trephining and irrigating the nasal cavity.

Pneumonyssus caninum, sometimes called the sinus mite, is a parasite of the upper respiratory system of the dog first described and named by Chandler and Ruhe in 1940. Their specimens were taken from a Boston terrier from East Lansing, Michigan. Although mites have been reported from the upper respiratory tracts of seals, old world primates and a South American monkey, this was the first report of them in dogs. Since then Martin and Deubler have reported finding the same species of mite from three dogs in the area of Philadelphia.

The first was from a middle-aged foxhound whose death was caused by an acute meningo-encephalitis resulting from injury over the right eye. On examining the brain cavity they noted small, cream-colored, eight-legged arthropods moving about in the frontal sinuses. Further examination revealed their presence on the mucous membrane covering the turbinates and other structures forming the nasal passages. Large numbers of mites were found but the heaviest concentration was in the frontal sinuses. The mucosa showed slight redness but could not be considered to be greatly altered.

**Second Case**

About a month later a second case was noted in a golden retriever with a history of never having previously been sick. Just prior to its death the animal greeted its owner, ran back and forth in the house several times, and then lay down and suddenly died. The head and sinuses were examined and the nasal passages were found to be heavily infected with arthro-
pods similar to those found in the foxhound. Many mites were found partially imbedded in the nasal mucous membrane down to and beyond the points of the turbinates. About one hundred mites were found, some of which were six-legged larvae. Again there was not much change in the affected tissues.

The third case was observed about five months later in a six-year-old terrier. It was presented to a clinician because it suddenly seemed to lose control of its front legs and fall to the ground, at which time it began to move its head from side to side as though trying to dislodge something from it. These symptoms lasted about thirty seconds. The dog then arose but seemed to lack coordination of its movements and appeared slightly nervous. About five minutes later a similar attack occurred. From that time on when the animal moved about or became excited it would develop convulsive or preconvulsive symptoms. There seemed to be loss of appetite and at times the animal was unable to locate its food. The dog became progressively worse, becoming nervous and showing symptoms of fright. The appetite and incoordination also became worse and the dog was destroyed eight days after first symptoms appeared. The owner reported that the dog had always been nervous and about a year before began to snap at imaginary objects.

**Mites In Sinuses**

A moderate number of mites were found in the frontal sinuses and nasal passages. There seemed to be little macroscopic change in the sinus and nasal mucous membranes. Martin and Deubler reported that all the mites were found to be pubescent and gravid females. This may mean that the males are very small or quite rare or that the mites reproduce parthenogenetically. The latter seems improbable in that all writers describing species of a closely related genus describe males.

The general shape of the mite is oval with the posterior part slightly broader than the anterior part. The average body length is slightly over 1 mm. and the width at the widest point is slightly over 0.6 mm. They are pale yellow or cream colored. Most specimens contained a large egg in the abdomen, some of which showed a well-developed embryo.

No definite symptoms are known but the symptoms that should probably cause one to be suspicious of infection with this mite are sneezing, head shaking, rubbing the nose, and mild nervous reactions. The mite probably occurs more often than was formerly thought but is not frequently reported because the sinuses and nasal cavity are not routinely examined during post mortem examination.

**Esophageal Worm**

*Spirocera lupi*, a nematode parasite of dogs and other carnivora, is sometimes referred to as the esophageal worm. It is a parasite of the esophagus, stomach, and sometimes of the aorta, is blood-red in color, and is usually coiled. The male is 3 to 5 cm. long and the female is 6 to 8 cm. in length and 1 to 1.5 mm. wide. The eggs are 30 to 35 microns long by 10 to 15 microns wide, thick shelled, and contain an embryo when deposited. The eggs, when deposited by the female, pass out in the feces and are consumed by coprophagous beetles which act as the intermediate hosts. The larvae pass from the digestive tract to the body cavity of the beetles, encyst, and develop to the infective stage in about two months. When the beetles are eaten by dogs the larvae are set free and go to the site of infection where they penetrate the tissue and develop into sexually mature worms. The usual location is the thoracic portion of the esophagus, but occasionally they are found in the stomach or aorta. They cause a proliferation of connective tissue forming growths which vary from about 2 to 4 cm. or more in diameter and, when in the esophagus, have openings into its lumen.

Pressure from large growths may cause either coughing, dyspnea, or interfere with circulation. Rupture may be followed by pleuritis. A growth on the aorta may result in aneurysm and possible rupture. The symptoms are not constant because growths in the esophagus may cause stenosis, perforation, dysphagia, vomition, loss

*(Continued on page 204)*
PARASITES OF DOG

(Continued from page 169)

of weight, and pleuritis. Growths in the circulatory system may cause angina, dyspnea, suffocation, syncope, and hemorrhage.

The prognosis is unfavorable and the treatment only symptomatic or prophylactic because of the lesions produced. The parasites have been reported from many of the states, but are found mainly in the Southeast.

Broad Fish Tapeworm

Diphyllobothrium latum, the broad fish tapeworm, is seldom mentioned in veterinary literature and its too often considered as just another tapeworm of the dog when in reality it is quite different from other species. It has the most interesting and probably the most complex life cycle of this group and is a parasite in man as well as in dogs. Before 1927 it was thought to come from eating fresh-water fish of European origin and it was assumed that the life cycle was not carried out in America. However, during 1927 Ward, Essex, and Magath, working at Ely, Minnesota, proved that the parasite occurred in American waters. In 1928 Vergeer minimized man as the spreader and blamed the dog to a greater extent.

The ova are egg-shaped, yellowish-brown in color, and have an operculum at one end. This is the only species of tapeworm of domestic animals whose ova do not have six hooklets at the time they pass from the host. An ovum will develop in a few weeks in the water depending on the temperature, and the small ciliated larva, the coracidium, escapes through the operculum. The coracidium swims around in the water and soon dies unless ingested by a crustacean. Of the crustaceans, only certain copepods are suitable hosts. Among these are Cyclops strenuus, Cyclops prasinus, and Diaptomus gracilis. The coracidium penetrates the wall of the digestive tract of the copepod and develops into the procercoid in the body cavity in two or three weeks. It is this stage that has the globular appendix or cercomer which is provided with six hooks and the body is approximately 0.6 mm. in length.

The copepod is eaten by a suitable fish and digested. This sets the procercoid free. It loses its cercomer and hooks, passes through the stomach wall, enters the body cavity, makes its way to the musculature, liver, or other organs, and develops into the so-called plerocercoid. This stage is 1 to 2 cm. long and worm-like in appearance. It coils up and waits for some mammal to consume the fish and liberate it. When this happens it attaches itself to the mucosa of the intestine and develops into a mature tapeworm in three or four weeks. Only certain fish act as hosts for the parasite at this stage. In 1927, wall-eyed pike, northern pike, and perch taken from Shagawa Lake at Ely were one hundred percent infected with plerocercoids to a greater or less extent. Such fish as crappies, suckers, and mongrel whitefish which also inhabit the lake have at no time been shown to harbor the larvae.

The adult worm in man may obtain a length of 8 to 10 meters and contain three or four thousand segments. The segments have a maximum width of about 15 mm. and are wider than they are long. The head is very small and, different than that of ordinary tapeworms, has no hooks and only two slit-like suckers with which to attach itself to the intestine of the host. A feature that easily separates this parasite from other tapeworms is the brown spot in the center of each segment which gives a beaded appearance throughout the length of the worm. This spot consists of the uterus and ova. As the worm grows, the posterior segments break off, rupturing the ovaries and discharging ova into the intestinal contents of the host. The host then must deposit the feces in the water or on very moist soil and thus the cycle is repeated.

Tapeworm Dwarfed

When this tapeworm is found in dogs, it is dwarfed both in length and width as compared to that found in a human host. Essex found ova from dogs to be less than ten percent hatchable while ova from human feces were nearly one hundred percent hatchable. These observations
lead one to believe that man is the preferred or true host of the worm in spite of the fact that the dog and wild carnivores are thought to be most important in spreading it, and that in certain areas it is reported to be the most common tapeworm of the dog.

Dogs are seldom fed raw fish. In fact, most dogs will refuse to eat it. However, once they develop the taste for it, they often show a preference for it. It is often reported that dogs, having acquired a taste for raw fish, will refuse a meal only to be found at a garbage heap shortly afterward consuming fish scraps. These dogs are frequently reinfected with the tapeworms.

**Symptoms**

Little clinical disturbance is caused by infection with this parasite. However, in young dogs in particular, Thompson⁶ has noticed decided evidence of malnutrition accompanied by a ravenous appetite. Marked anemia has been reported which Cameron¹² says is due to hemolysins liberated by the parasite. He also states that tapeworms are heavy calcium consumers and that they take their nourishment by osmosis from food within the intestinal tract. *D. latum* is said to be the only tapeworm with which anemia is associated. The above listed symptoms rapidly disappear on removal of the parasites. Old dogs seldom show serious symptoms. The segments are often seen hanging from the anus and often it is this that attracts the owner’s attention and prompts him to request that the dog be treated.

The treatment for this parasitism is the same as for infection with any species of tapeworm. Thompson⁶ recommends starving for one or two meals followed by a dose of arecoline hydrobromide. He first used one-quarter to one-half grain but later cut it to one-tenth grain and claimed better results. Severe peristaltic contraction may cause the segments to break from the scolex so that they are passed and the latter retained. If this happens the segments are regenerated in a short time. This may explain the better results from the reduced dosage of arecoline. The feces should be checked for ova in about six weeks and if found the animal should be retreated.

Lentz recommends feeding lean meat the night before and milk about two hours prior to treating in order to form a soft curd in the intestinal tract and prevent excessive cramping. This is followed with one-eighth to one-half grains of arecoline hydrobromide orally depending on the size of the dog. The animals are not fed for several hours after treatment.

Control of the parasites involves man as well as dogs. Defecation along river and lake banks should be avoided as ova are easily washed into them by rain. All fish used for food for man and dogs should be well cooked.

*Ancylostoma braziliense* is a hookworm found in dogs, cats, and a great many other carnivorous animals distributed over a large part of the earth, especially in tropical and subtropical countries. It is very similar in appearance and life cycle to the common dog hookworm, *Ancylostoma caninum*, but slightly smaller and more slender, the male being approximately 7.5 mm. long and the female approximately 10 mm. It is differentiated from *A. caninum* by microscopic examination of the buccal capsule. *A. braziliense* has a large triangular tooth on each side of the oral opening dorsally and a smaller tooth on each side ventrally. *A. caninum* has a buccal capsule armed with three strong teeth on each side.

**Life Cycle**

The adult female *A. braziliense* deposits ova in the small intestine of the host. These ova pass out with the feces and under favorable conditions of warmth and moisture hatch and produce small larvae. The larvae moult twice and then become infective. Under ordinary conditions they enter the body of a suitable host either by ingestion or by penetration of the skin. When they penetrate the skin of the dog or cat they leave no noticeable lesion. They eventually make their way to the intestine where they mature. However, if they come in contact with human skin, they produce a condition of special interest. It is for this reason that the parasite is mentioned here.
When the infective larvae come in contact with human skin, they penetrate it and produce a condition known as creeping eruption. This lesion is characterized by linear, tortuous, and serpiginous eruptions, accompanied by intense itching. It is not fatal but causes much distress to the patient. When the larva enters the skin it produces a stinging sensation which soon passes away. It may remain at the point of ingress for a while, producing an itchy, erythematous, urticaria-like, papular lesion which resembles a mosquito bite or the effect of a chigger. Then a linear lesion extends from it along which vesicles may form, and it may become secondarily infected. These lesions may exist and continue to progress for a few days to six or eight months or more if not properly treated. Sensible perspiration is necessary for the larvae to penetrate the human skin. Thus creeping eruption occurs during warm weather, especially if it is humid. Experiments have shown that thermotropism is more of a factor in penetration of the skin than is histiotropism, and the larvae have been shown to pass through moist clothing.

**Development of Larvae**

Warmth and moisture favor the development of the larvae in the soil and tend to increase the parasitism in dogs and cats. The increased incidence in animals further increases the contamination of soil and the infection of man. The infective larvae remain alive for long periods of time under favorable conditions. According to Dove\(^1\), they have remained infective under laboratory conditions for one hundred and eighteen days. Rain and drying destroys both eggs and larvae. Infection with *Ancylostoma braziliense* in dogs is treated the same as that for *Ancylostoma caninum*. Among the anthelmintics recommended are tetrachlorethylene, 0.3 cc. per kilogram body weight; or N-Butyl chloride, 1 cc. per kilogram.

\(^{1}\) The author is indebted to Dr. E. A. Benbrook of the Veterinary Pathology Department, Iowa State College, for his assistance in preparing this paper.

**REFERENCES**


**PYRETHRUM SUBSTITUTE**

Powdered sabadilla has now been processed so that it can be used as a spray. If this form is as effective as the powdered form, which is the indication of the preliminary tests, it may replace the limited supply of pyrethrum remaining in this country. The development of the spray is the work of T. C. Allen and Robert Dicke of the Agricultural staff of the University of Wisconsin. Pyrethrum is a Japanese product. The substitute, sabadilla, is imported from Central and South America, chiefly from Mexico and Venezuela.

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