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PARASITIC INFECTION OF *Filaroides osleri*, *Capillaria aerophila* AND *Spirocerca lupi* IN COYOTES FROM THE SOUTHWESTERN UNITED STATES

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Abstract: A total of 181 coyotes (*Canis latrans*) was examined for helminth parasites *Filaroides osleri*, *Capillaria aerophila*, and *Spirocerca lupi*. Coyote carcasses were obtained from Kansas, western Oklahoma-northern Texas, Colorado, New Mexico, Arizona and southern California. Cysts of *F. osleri* were present in the trachea or bronchial division in 39 (22%) coyotes. *C. aerophila* were present in only 7 (4%) coyotes. *S. lupi* lesions were present in the aorta of 59 (33%) coyotes. Esophageal infections of *S. lupi* were found in only 4 of 142 (3%) coyotes. *F. osleri*, *C. aerophila* and *S. lupi* infections were more prevalent in western Oklahoma-northern Texas, low in southern Arizona-California, and absent in northern Arizona.

INTRODUCTION

The coyote, *Canis latrans*, is one of the principle predators in North America and is valuable in maintaining ecological balance in wildlife populations. Coyotes and other wild carnivores may be an important reservoir for certain diseases and parasites transmissible to domestic dogs. Little is known of the extent or degree of infection by any of the parasites of coyotes.

This survey was undertaken to determine if *Filaroides osleri*, *Capillaria aerophila*, and *Spirocerca lupi* is present in coyotes from the southwest parts of the United States.

MATERIALS AND METHODS

Coyotes were obtained from trappers, hunters, and fur dealers, mostly through arrangements made by the United States Fish and Wildlife Service predator control personnel. Areas sampled are given in Table 1. Between 1 January and 15 March 1978, 181 carcasses were examined in the field for lungworm and esophageal-aortic parasites. Organs (lung, aorta and esophagus) of 126 coyotes were returned to the laboratory

for microscopic examination and identification of parasites. Tracheae, bronchi and bronchioles were split and examined with the aid of a 3× magnifying glass for cysts containing *F. osleri* and *C. aerophila*. The thoracic esophagus and aorta were opened and examined for cysts containing *S. lupi* and evidence of scarring. Intestinal contents taken from the colons of 110 coyotes were examined for parasite eggs.

RESULTS AND DISCUSSION

Cysts containing *F. osleri* were found in 39 (22%) of the coyotes examined. Cysts ranged in diameter from 1 to 25 mm and contained 1 to 20 nematodes. Infections characteristically were present in the tracheal mucosa near the bifurcation; however, when multiple cysts were present, some occurred in the secondary bronchi. *F. osleri* were most prevalent in the western Oklahoma-northern Texas area (33%) and southern Arizona (33%), less frequent in California (10%), and absent in southwest and northern Arizona (Table 1).

C. aerophila infections were found in only 7 coyotes (4%), four from western

TABLE 1. Location and percentage of coyotes infected with parasites *F. osleri*, *C. aerophila*, and *S. lupi*.

Location	No. of Coyotes Examined	Number of Coyotes Infected					
		<i>F. osleri</i> %		<i>C. aerophila</i> %		<i>S. lupi</i> %	
SOUTHERN ARIZONA							
- Cochise and Santa Cruse Co.	12	4	33	0	0	1	8
- Pima and Yuma Co.	8	0	0	1	12	0	0
NORTHERN ARIZONA							
- St. Johns Co.	4	0	0	0	0	0	0
CALIFORNIA							
- Kern Co.	21	2	10	1	5	0	0
COLORADO							
- Las Animas Co.	21	4	20	0	0	2	10
KANSAS							
- Harper Co.	11	2	18	0	0	2	18
NEW MEXICO							
- Lea and Eddy Co.	26	4	15	1	4	17	65
- Hidalgo Co.	32	8	25	0	0	2	6
- Western Oklahoma - Northern Texas	46	15	33	4	9	35	76

Oklahoma-northern Texas (9%), one from Yuma Co., Arizona (12%), one from Kern Co., California (5%), and one from New Mexico (4%). *C. aerophila* infections were light with only a small amount of mucus present in the respiratory passages. Field determinations of *C. aerophila* based on the presence of thick stringy mucus, a method utilized in the 1977 survey,³ proved to be unreliable for these light infections. The nematodes were recovered in only 4 coyotes (1 to 6 each), and eggs were identified in the colon contents of 3, indicating extremely low grade infections.

The low prevalence of *C. aerophila* found in this survey invites speculation as to the compatibility of this host-parasite relationship. Although the coyote is not considered to be a normal host, infections have been reported.^{2,3}

Infections with *S. lupi* were found in 59 (33%) of 181 coyotes examined. Prevalence of infection was high in the western Oklahoma-northern Texas region (76%) southeastern New Mexico (65%), low in Kansas (18%), Colorado (10%), southwestern New Mexico (6%)

and southeastern Arizona (8%), and absent from southwest and northern Arizona and California (Table 1).

Lesions initiated or caused by *S. lupi* characteristically were found in the adventitia of the thoracic aorta but occasionally mass infections extended into the aortic arch and the abdominal aorta. Gross lesions of the aorta consisted of irregularly rounded nodules from 2 mm in diameter to large tumor-like nodules up to 25 mm in diameter. The aortic intima had numerous fibrosed areas around irregular pits and depressions sometimes 20 mm long. Lesions were primarily within the wall of the aorta, but also were observed in the gastric artery, intervertebral arteries, abdominal aorta, periaortic connective tissue and esophagus. Only four coyotes had lesions initiated by *S. lupi* in the esophagus, and of these, recent aortic involvement was visible in three animals. No opening into the esophageal lumen was observed. There was no indication of neoplasia around the cysts, and no metastases were found in the lung, liver, or heart, and no indication of

TABLE 2. Comparison of *C. aerophila* per cent infections between surveys.

Location	No. of Coyotes Examined	<i>C. aerophila</i>	%
<u>1977 Survey</u>			
Western Kansas	5	2	40
Colorado	41	13	32
Western Oklahoma	44	14	32
Northern Texas	38	19	50
<u>1978 Survey</u>			
Kansas, Harper Co.	11	0	0
Colorado, Las Animas Co.	21	0	0
Western Oklahoma-Northern Texas	46	4	9

aortic aneurysms as suggested by Bailey and Smith.^{1,4} Cyst contents ranged from fully active with one or more nematodes, to soft degenerating centers with pieces of nematode, to solid calcified centers.

Smith⁴ and Thornton *et al.*⁵ reported that *S. lupi* from Texas primarily infected the aorta, with only 6% of the coyotes having esophageal infections. Our survey data are similar. Only 4 of 142 (3%) of our coyotes had esophageal infections, and no lumen penetration was observed.

It appears that the coyote is a common host for *S. lupi* with up to 76% infection, but the failure of the worms to reach the

esophagus suggest some host-parasite incompatibility and indicate that in many cases, infection of the coyote is a terminal, blind alley process.

This is the first report of lungworm parasites *F. osleri* and *C. aerophila* infecting coyotes in California, Arizona and New Mexico, and extends the known range of *S. lupi* in coyotes into Kansas, New Mexico and Arizona.

Nematode specimens are accessioned in the National Parasite Collection and assigned the following numbers: 75155, 75156, and 75157. Agricultural Research Service, Animal Parasitology Institute, Agricultural Research Center, Beltsville, Maryland 20705, USA.

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