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ECTOPARASITES (MALLOPHAGA, ANOPLURA, ACARI) ON MULE DEER, *ODOCOILEUS HEMIONUS*, AND WHITE-TAILED DEER, *ODOCOILEUS VIRGINIANUS*, OF ALBERTA, CANADA

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Abstract. Two species of chewing lice, *Tricholipeurus lipeuroides* and *Tricholipeurus parallelus*, 1 species of sucking louse, *Solenopotes ferrisi*, and 1 species of tick, *Dermacentor albipictus*, were found during examination of the skin and hair near the genitalia of 70 Mule Deer (*Odocoileus hemionus*) and 148 White-tailed Deer (*Odocoileus virginianus*) collected in Alberta, Canada, from 1975 to 1977. *Tricholipeurus lipeuroides*, *T. parallelus*, and *S. ferrisi* were found on 40, 5, and 6 Mule Deer and 46, 23, and 8 White-tailed Deer, respectively. For unknown reasons there were significant differences in yearly prevalences of *T. lipeuroides* on both species of deer from 1975 to 1977. There was a temporal separation of lice on both hosts, with *T. lipeuroides* and *S. ferrisi* being most prevalent from January and February to May, respectively, and *T. parallelus* most prevalent from March to June. One Mule Deer was heavily infested with *T. lipeuroides* and *D. albipictus*. *T. lipeuroides* and *D. albipictus* on White-tailed Deer and *S. ferrisi* on both species of deer are new host records for Alberta.

Lice of the genera *Tricholipeurus* (Mallophaga: Trichodectidae) and *Solenopotes* (Anoplura: Linognathidae) have been studied recently on White-tailed Deer (Scanlon 1960, Kellogg et al. 1971, Samuel & Trainer 1971, Watson & Anderson 1975) but not on Mule Deer. Two of the papers dealt with seasonal changes in louse numbers on White-tailed Deer in Ontario (Watson & Anderson 1975), and Texas (Samuel & Trainer 1971). No similar data exist for deer of western North America, although lice and ticks are known from deer there (see Walker & Becklund 1970). The purpose of the present study, conducted from 1975 to 1977, was to determine the prevalence and numbers of lice and other ectoparasites on Mule Deer and White-tailed Deer in Alberta over time. We were also interested in whether meaningful data could be collected by examining only a small part of the animal (cf Samuel & Trainer 1971) rather than the entire deer (cf Watson & Anderson 1975).

MATERIALS AND METHODS

Seventy Mule Deer and 148 White-tailed Deer, killed on roads by vehicles throughout central and southern Alberta, Canada, from January 1975 to May 1977, were collected by officers of the Alberta Fish and Wildlife Division. Most deer were from the aspen parkland of central Alberta, but a few were from the boreal forest of central Alberta or grasslands of southern Alberta. Animals were usually frozen when transported to Edmonton shortly after death. Most deer (58 Mule, 109 White-tailed) were killed between November and February. Although ages of adult deer were not determined, there were no fawns in the June-to-November samples.

Skin samples of varying sizes (198–1189 cm^2: mean 464 cm^2) were removed from the medial surface of the hind leg near the genitalia as soon as possible after death. This area was easy to sample, examine and was a preferred site for *T. parallelus* in a previous study (Samuel & Trainer 1971). The entire surface of 1 Mule Deer was partitioned following techniques of Watson & Anderson (1975) and examined for ectoparasites. It had died a few minutes before arrival at the laboratory and few ectoparasites left the deer during the 2 h prior to freezing.

Skin samples were examined using a 2× magnifying lamp or dissecting scope. The hair was examined first and then removed with scissors or electric clippers to facilitate examination of the skin. Lice were identified using descriptions and keys of Ignoffo (1959) and Scanlon (1960) [titles to fig. 143–147 and 148–151 of Scanlon (1960) are incorrect; they should refer to *T. parallelus* and *T. lipeuroides*, respectively]. Dr R. Price and Dr E. F. Cook, of the University of Minnesota, confirmed identifications. Ticks were identified following descriptions of Gregson (1956). Representative specimens of all species were placed in the National Museums of Canada-Arthropod Section, Ottawa [no accession numbers provided; specimens deposited were given University of Alberta Parasite (U.A.P.) collection numbers 9864–9877] and in the parasite collection of the Department of Zoology, University of Alberta (U.A.P. nos. 9864–9877).

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TABLE 1. Yearly and total prevalences of lice and ticks on deer of Alberta, 1975 to 1977.

SPECIES OF ECTOPARASITE	1975		1976		1977		TOTALS	
n =	MD* 22	WTD* 99	MD 32	WTD 35	MD 16	WTD 14	MD 70	WTD 148
Tricholipeurus lipeuroides	5 (23)**	22 (22)	22 (69)	18 (51)	13 (81)	6 (43)	40 (57)	46 (31)
T. parallelus	3 (14)	19 (19)	2 (6)	3 (9)	0	1 (7)	5 (7)	23 (16)
Solenopotes ferrisi	3 (14)	4 (4)	0	2 (6)	3 (19)	2 (14)	6 (9)	8 (5)
Dermacentor albipictus	0	0	0	0	5 (31)	0	5 (7)	0

* MD = Mule Deer; WTD = White-tailed Deer.
** No. (%) deer infested.

RESULTS

Tricholipeurus lipeuroides was the most prevalent ectoparasite encountered on either species of deer (TABLE 1). It was also the only parasite whose prevalence fluctuated significantly from 1975 to 1977 (Mule Deer: χ^2, 2 df = 16.19, $P < 0.001$; White-tailed Deer: χ^2, 2 df = 11.30, $P < 0.005$) and between species of host (χ^2, 1 df = 13.52, $P < 0.001$). *Dermacentor albipictus* was found only on Mule Deer collected in early 1977, but Samuel & Barker (unpubl. data) recovered *D. albipictus* from 2 of 3 White-tailed Deer collected in central Alberta (Elk Island National Park) in December 1977.

Tricholipeurus lipeuroides was most prevalent (TABLE 2) and dense (TABLE 3) on Mule Deer from January to April and most prevalent on White-tailed Deer from February to May. *Tricholipeurus parallelus* was prevalent on Mule Deer only in April and on White-tailed Deer from March to June. Densities of *T. parallelus* were never high on Mule Deer and highest on White-tailed Deer in May–June. *Solenopotes ferrisi* was most prevalent on Mule and White-tailed Deer from February, and March to May, respectively.

One very old adult male Mule Deer was found in a weakened, emaciated condition on 4 February 1977 in central Alberta. A total of 14,254 *T. lipeuroides* and 7328 *D. albipictus* was recovered at necropsy using techniques of Watson & Anderson (1975).

DISCUSSION

Although only a small piece of skin was examined for ectoparasites during this study, data on prevalence and densities of lice over time were generally similar to those of Watson & Anderson (1975); that is, a temporal separation of chewing and sucking lice, with *T. lipeuroides* and *S. ferrisi* being more prevalent and dense in winter–spring and *T. parallelus* more prevalent and dense in spring–summer. They suggested that this temporal separation in abundance "may have been the result of competition or regulating environmental factors such as solar radiation and/or hair quality and density." Murray (1963a, b, 1968) has shown that these factors are important for chewing lice on sheep and horses of Australia, and Samuel & Trainer (1971) suggested that these factors led to summer–autumn declines of *T. parallelus* on White-tailed Deer of South Texas.

TABLE 2. Monthly prevalence of lice and ticks on deer of Alberta, 1975 to 1977.

MONTH	MULE DEER					WHITE-TAILED DEER				
	No. exam.	*Tricholipeurus*		*Solenopotes ferrisi*	*Dermacentor albipictus*	No. exam.	*Tricholipeurus*		*Solenopotes ferrisi*	*Dermacentor albipictus*
		lipeuroides	*parallelus*				*lipeuroides*	*parallelus*		
Jan.	21	16 (76)*	0	1 (5)	3 (14)	30	8 (27)	3 (10)	2 (7)	0
Feb.	9	6 (67)	0	2 (22)	2 (22)	12	7 (59)	0	0	0
Mar.	1	1 (100)	0	0	0	12	7 (59)	3 (25)	2 (17)	0
Apr.	6	5 (83)	4 (67)	2 (33)	0	14	8 (57)	5 (36)	3 (21)	0
May	2	1 (50)	1 (50)	1 (50)	0	5	3 (60)	4 (80)	1 (20)	0
Jun.–Aug.	3	0	0	0	0	6	0	2 (33)	0	0
Sep.–Oct.	0	—	—	—	—	2	0	0	0	0
Nov.	11	3 (27)	0	0	0	26	2 (8)	0	0	0
Dec.	17	8 (47)	0	0	0	41	11 (27)	6 (15)	0	0

* No. (%) infested.

TABLE 3. Mean density* of lice near the genitalia of deer of Alberta, 1975 to 1977.

	MULE DEER			WHITE-TAILED DEER		
	Tricholipeurus			*Tricholipeurus*		
MONTH	*lipeuroides*	*parallelus*	*Solenopotes ferrisi*	*lipeuroides*	*parallelus*	*Solenopotes ferrisi*
Jan.–Feb.	12	0	1	5	<1	<1
Mar.–Apr.	13	2	1	4	6	1
May–Jun.	9	3	3	5	11	1
Jul.–Aug.	0	0	0	0	2	0
Sep.–Oct.	—	—	—	0	0	0
Nov.–Dec.	1	0	0	2	<1	0

* Lice/100 cm².

We found concurrent infestations of the 2 chewing lice on Mule Deer (4 of 41 infested deer) and White-tailed Deer (19 of 50), as did Watson & Anderson (1975) on White-tailed Deer (25 of 47), but others have not. Scanlon (1960) found both species of lice on White-tailed Deer of New York, but no concurrent infestations. Samuel & Trainer (1971) found only *T. parallelus* on White-tailed Deer of South Texas. In the present study single infestations of *T. lipeuroides* were most common (35 of 41 Mule Deer; 27 of 50 White-tailed Deer).

Solenopotes ferrisi is most numerous on anterior regions of deer (Watson & Anderson 1975; Samuel, unpubl. data). Thus, prevalence and numbers data presented here are conservative estimates. Nonetheless, seasonal data are consistent with results of Watson & Anderson (1975) and for other species of sucking lice on domestic animals (Crauford-Benson 1941).

The coat of the heavily infested Mule Deer was not rough or unthrifty in appearance, as has been described for heavily infested Black-tailed Deer (*Odocoileus hemionus columbianus*) by Cowan (1946). One must not be misled by large numbers of ectoparasites when attempting to determine cause of death. For example, Watson & Anderson (1975) found over 14,000 to 70,550 chewing lice on 8 of 47 healthy looking White-tailed Deer.

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