

Parasitic and Phoretic Arthropods of the Elephant-Eared and the Santa Cruz Kangaroo Rats

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ABSTRACT: The parasitic and phoretic arthropods of the elephant-eared kangaroo rat (*Dipodomys elephantinus*) and Santa Cruz kangaroo rat (*D. venustus*) are reported; most of these represent new host records. Thirteen of 14 (93%) of *D. elephantinus* and 11 of 12 (92%) of *D. venustus* had 11 and nine arthropod species, respectively. Larval and nymphal stages of the tick *Dermacentor occidentalis* were the most prevalent parasite (77%) on *D. elephantinus* whereas the mesostigmatid mite *Androlaelaps fahrenheitsi* was the most prevalent (56%) on *D. venustus*. The arthropod fauna of these two closely related rodents were similar with seven of the 14 arthropod species occurring on both host species. Two species of the host specific listrophorid mite of the genus *Geomylichus* were found on both hosts.

Key words: Parasitic arthropods, phoretic arthropods, kangaroo rats, ticks, mites, *Dipodomys elephantinus*, *Dipodomys venustus*, survey.

Little is known regarding the parasitic and phoretic arthropods of the elephant-eared kangaroo rat (*Dipodomys elephantinus*) and the Santa Cruz kangaroo rat (*D. venustus*) (Whitaker, 1991). These two closely related endemic species inhabit the coastal ranges between San Francisco and Los Angeles, California (USA). As a result of the field collections reported herein, Fain et al. (1988) reported a new species of astigmatid mite (*Geomylichus californicus*) that was collected from both host species. In addition, *G. texanus* described by Fain et al. (1978), also was reported from both hosts. Prior to this record, the tick *Ixodes jellisoni* reported by Furman and Loomis (1984) and flea *Meringis cummingi* (Eads et al., 1987) were the only parasitic arthropods reported from *D. elephantinus* (Whitaker, 1991).

Whitaker (1991) listed five species of chiggers, one species of tick, and seven

species of fleas from *D. venustus*. The purposes of our study were to (1) present further information on the arthropod fauna for these two species of kangaroo rats and (2) determine similarities of the arthropod faunas between these two closely related host species.

During 13 to 22 June 1984 the following host specimens were collected in California (USA): 14 specimens of *D. elephantinus* from 1.6 km N Pinnacles, San Benito County (approximately 36°29'N, 120°-11'W); one specimen of *D. venustus* from Hastings Natural History Reservation, 22.4 km SE Carmel Valley, Monterey County (approximately 36°26'N, 121°42'W; and 11 specimens of *D. venustus* from 1.9 km SE Felton, Santa Cruz County (approximately 36°59'N, 122°01'W). Host specimens were collected in Sherman live and Victor snap-back kill traps. Rodents collected alive, along with their external parasites, were placed in individual paper bags and killed using chloroform. Snap-trapped hosts were placed in individual paper bags at the capture site and also exposed to chloroform to kill the arthropods. Both the host and paper bag were examined and arthropods were collected using a dissecting microscope then placed in 70% isopropyl alcohol. Subsequently, the alcohol was removed and replaced with Nesbitt's acid fuchsin stain. The arthropods remained in the stain for 7 to 14 days and then were mounted on microscope slides using Hoyer's mounting medium. Hosts were preserved as standard museum specimens and deposited in the University of New Mexico Museum of Southwestern Biology (Albuquerque, New Mexico 87131, USA); accession numbers TLB 10123-10126, 10129, 10149-10156 for *D. elephantinus*; 10292,

TABLE 1. Arthropods of *Dipodomys elephantinus* and *D. venustus*.

Arthropods	<i>D. elephantinus</i>			<i>D. venustus</i>		
	Num- ber ^a	Intensity ^b	Preva- lence ^c	Num- ber ^a	Intensity ^b	Preva- lence ^c
SIPHONAPTERA						
Hystrihopsyllidae						
<i>Meringis cummingi</i> male	7	1.8 ± 0.3	31%	4	1.3 ± 0.3	33%
female	3	1.0 ± 0.0	23%	5	1.6 ± 0.3	44%
ANOPLURA						
Hoplopleuridae (larvae)	1	1.0	8%			
ACARINA						
Ixodidae						
<i>Dermacentor occidentalis</i>						
Larvae	45	7.5 ± 4.5	46%	13	4.3 ± 1.2	27%
Nymph	13	1.9 ± 0.7	54%			
<i>Ixodes pacificus</i> nymph				1	1.0	9%
Ameroseiidae						
<i>Sertitympanum contiguum</i>	21	10.5 ± 9.6	15%	3	1.5 ± 0.5	18%
Trombiculidae						
<i>Euschoengastia decipiens</i>	3	3.0	8%			
Listrophoridae						
<i>Geomylichus californicus</i>	6	2.0 ± 0.6	23%	23	4.6 ± 2.2	46%
<i>G. texanus</i>	15	3.8 ± 2.5	39%	3	1.5 ± 0.5	18%
Laelapidae						
<i>Androlaelaps fahrenheitsi</i>	11	5.5 ± 4.6	15%	27	5.4 ± 4.0	55%
<i>Eubrachyla elaps circularis</i>				1	1.0	9%
<i>Ischyropoda armatus</i>				1	1.0	9%
<i>Echinonyssus</i> sp.	6	2.9 ± 2.0	23%			
<i>E. incomptis</i>	6	2.0 ± 1.0	23%	1	1.0	9%
<i>E. triacanthus</i>	2	2.0	8%			

^a Number of individual parasites collected.^b Mean intensity ± SE.^c Prevalence (%).

10312–10315, 10327–10329, 10336–10339 for *D. venustus*). Representative specimens of the arthropods recovered from both hosts in this study are deposited in the U.S. National Parasite Collection, Bethesda, Maryland 20708, USA; accession numbers 81370–81382.

Eleven species of arthropods were recovered from 13 of 14 (93%) individuals of *D. elephantinus* (Table 1). There was 2.7 ± 0.4 species/host with a maximum of six species on a single host. With the exception of *Meringis cummingi*, all arthropods found on *D. elephantinus* represent new host records. The report of *Sertitympanum contiguum* represents a new state record having been previously reported from *D. californicus* in Oregon (El-

sen and Whitaker, 1985). Nine species of arthropods were collected from 11 of 12 (92%) individuals of *D. venustus* (Table 1). There were 2.4 ± 0.3 species/host with a maximum of five on a single host. With the exception of *Dermacentor occidentalis*, *Geomylichus californicus*, *G. texanus*, and *Meringis cummingi*, the arthropods reported from *D. venustus* represent new host records.

The arthropod faunas of the two hosts exhibited similar prevalences, and seven of the 14 (50%) arthropods were found on both hosts. Three species of parasites, an unidentified larval hoplopleurid louse, the trombiculid mite *Euschoengastia decipiens* and the laelapid mite *Echinonyssus triacanthus* were recovered from *D. ele-*

phantinus, but not from *D. venustus*. Conversely, three species (21%) represented by two laelapid mites (*Eubrachyla elaps circularis* and *Ischyropoda armatus*) and the tick *Ixodes pacificus* were recovered only from *D. venustus*. Whitaker (1990) indicated that there was considerable host specificity among species of the listrophorid mite genus *Geomylichus* and that there may be a strong coevolutionary link between the rodent family Heteromyidae and the genus *Geomylichus*. Therefore, the co-occurrence of both *Geomylichus californicus* and *G. texanus* on both host species supports a close taxonomic relationship between the two host species.

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LITERATURE CITED

- EADS, R. B., E. G. CAMPOS, AND G. O. MAUPIN. 1987. A review of the genus *Meringis* (Siphonaptera: Hystrichopsyllidae). *Journal of Medical Entomology* 24: 467-476.
- ELSEN, P., AND J. O. WHITAKER, JR. 1985. *Sertitympanum*, a new genus of Ameroseiidae (Acarina: Mesostigmata) taken from rodents in the United States: Including descriptions of three new species in the genus. *Acarologia* 26: 117-122.
- FAIN, A., J. O. WHITAKER, JR., T. G. SCHWAN, AND F. S. LUKOSCHUS. 1978. Notes on the genus *Geomylichus* Fain, 1970 (Astigmata, Listrophoridae) and description of six new species. *International Journal of Acarology* 4: 101-114.
- , ———, AND H. H. THOMAS. 1988. Two new species of *Geomylichus* Fain, 1970 (Acari, Listrophoridae) from California, U.S.A. *International Journal of Acarology* 14: 121-125.
- FURMAN, D. P., AND E. C. LOOMIS. 1984. The ticks of California (Acari: Ixodida). *Bulletin of the California Insect Survey* 25: 1-239.
- WHITAKER, J. O., JR. 1991. Parasites of heteromyids. In *Biology of the Heteromyidae*, H. H. Genoways and J. H. Brown (eds.). Special Publication, American Society of Mammalogists. In press.

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