

Composition of the Helminth Community of a Montane Population of the Coastal Whiptail, *Cnemidophorus tigris multiscutatus* (Sauria: Teiidae) from Los Angeles County, California

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Abstract.—Two-hundred sixty two *Cnemidophorus tigris multiscutatus* from the San Gabriel Mountains of Southern California were examined for helminths. The helminth community consisted of two species of cestodes (*Oochoristica scelopori* and *Mesocestoides* sp.), two species of nematodes (*Pharyngodon cnemidophori* and *Physaloptera* sp.) and one species of acanthocephalan (*Moniliformis moniliformis*). The helminth with highest prevalence (15%) and greatest mean intensity (6.35) was *Pharyngodon cnemidophori*. *Cnemidophorus tigris* represents a new host record for *Oochoristica scelopori* and *Moniliformis moniliformis*.

The western whiptail, *Cnemidophorus tigris* Baird and Girard, 1852 ranges from north central Oregon and southern Idaho, south to Baja California and southern Coahuila, México and east to western Colorado, New Mexico and west Texas (Stebbins 1985). There are reports of helminths from *C. tigris* from Arizona (Babero and Matthias 1967; Benes 1985; Goldberg et al. 1997), California (Read and Amrein 1953; Telford 1970; Mankau and Widmer 1977), Idaho (Lyon 1986), Nevada (Babero and Matthias 1967), Texas (Specian and Ubelaker 1974a, b) and Utah (Grundmann 1959). The purpose of this paper is to report on the composition of the helminth community from a montane population of a subspecies of *C. tigris*, namely, the coastal whiptail, *C. tigris multiscutatus* Cope, 1892, from the San Gabriel Mountains of Los Angeles County, California. There are no previous reports of helminths from this subspecies which occurs in coastal California and Baja California (Stebbins 1985). Additionally, comparisons are made with helminth communities in other populations of *C. tigris*.

Materials and Methods

Two-hundred sixty two *Cnemidophorus tigris multiscutatus* from the San Gabriel Mountains, Los Angeles Co., California were examined for helminths. Two sites were sampled: 198 (112 female, 86 male) lizards were collected along California Highway 39 at 1580 m elevation and 64 (31 female, 33 male) from along California Highway 2 at 1830 m elevation. These specimens were collected in 1971 and 1974 by shooting with 22-caliber dust shot, fixed in 10% formalin and stored in ethanol. They were deposited in the Natural History Museum of Los Angeles County (LACM 111193-110931).

The body cavity was opened by a longitudinal incision from vent to throat, and the digestive tract was removed by cutting across the anterior esophagus and rectum. The lumen of the esophagus, stomach, small and large intestines and the

Table 1. Helminths from 262 *Cnemidophorus tigris multiscutatus* from the San Gabriel Mountains, Los Angeles County, California (collected 1971 and 1974).

Helminth species	Number helminths	Infected lizards	Prevalence ¹ (%)	Mean abundance ²	Site
Cestoda					
<i>Mesocestoides</i> sp. (Tetrathyridia)	388	3	1	1.48	Body cavity
<i>Oochoristica scelopori</i>	6	5	2	0.02	Small intestine
Nematoda					
<i>Pharyngodon cnemidophori</i>	1663	38	15	6.35	Large intestine
<i>Physaloptera</i> sp. (larvae)	6	3	1	0.02	Stomach
Acanthocephala					
<i>Moniliformis moniliformis</i>	9	3	1	0.03	Small intestine

¹ Number of hosts infected with one or more individuals of a parasite species divided by the number of hosts examined.

² Total number of individuals of a parasite species divided by the total number of hosts examined.

surfaces of the liver and body cavity were examined for helminths. Each helminth was initially placed in a drop of glycerol on a glass slide. Nematodes were identified from these temporary mounts. Cestodes and acanthocephalans were stained with hematoxylin and identified. Terminology usage is in accordance with Bush et al. (1997). Selected specimens were deposited in the U.S. National Parasite Collection, USNPC, Beltsville, Maryland: *Mesocestoides* sp. (87530); *Oochoristica scelopori* (87529); *Pharyngodon cnemidophori* (87531); *Physaloptera* sp. larvae (87532); *Moniliformis moniliformis* (87533).

Results

The helminth community of the San Gabriel Mountain population of *C. t. multiscutatus* was found to consist of two species of cestodes, *Oochoristica scelopori* Voge and Fox 1950 and *Mesocestoides* sp. (tetrathyridia only), two species of nematodes, *Pharyngodon cnemidophori* Read and Amrein 1953 and *Physaloptera* sp. (3rd stage larvae), and one species of acanthocephalan, *Moniliformis moniliformis* (Bremser 1811). The number of helminths, number of infected lizards, prevalence, mean abundance and site of infection are given in Table 1. At 1530 m elevation, (18%) 35 of 198 lizards harbored helminths, at 1580 m, (14%) 9 of 64; there was no significant difference for prevalence of helminths between elevations (chi-square = 0.33, 1 df, $P > 0.05$). Likewise, no significant difference was found between prevalence of helminths between female, (18%) 26 of 143 infected, and male, (15%) 18 of 119, lizards (chi-square = 0.31, 1 df, $P > 0.05$). It should be noted, however, that the nine *Moniliformis moniliformis* were found only at 1530 m elevation; one female and two male lizards were infected. The occurrence of *Oochoristica scelopori* and *Moniliformis moniliformis* represent new parasite records for *Cnemidophorus tigris*.

Discussion

In the present study, *C. t. multiscutatus* served as a paratenic host for three of the five species of helminths found. These species were represented by juvenile forms only; tetrathyridia of *Mesocestoides* sp., 3rd stage *Physaloptera* sp., and juvenile *Moniliformis moniliformis*. Tetrathyridia of *Mesocestoides* sp. are known

Table 2. Helminth communities (species reaching maturity) of *Cnemidophorus tigris*.

Locality	Reference	Helminth community
Arizona, Maricopa County	Benes 1985	<i>Oochoristica</i> sp. <i>Alaeuris</i> sp.
Arizona, Mohave County	Babero and Matthias 1967	<i>Pharyngodon warneri</i>
Arizona, Pima County	Goldberg et al. 1997	<i>Oochoristica bivitellobata</i> <i>Abbreviata terrapenis</i> <i>Pharyngodon warneri</i>
California, Los Angeles County	this paper	<i>Oochoristica scelopori</i> <i>Pharyngodon cnemidophori</i>
California, Riverside County	Telford 1970	<i>Oochoristica bivitellobata</i> <i>Pharyngodon cnemidophori</i> <i>Skrjabinoptera phrynosoma</i> <i>Thubunaea iguanae</i>
California, San Bernardino County	Read and Amrein 1953	<i>Pharyngodon cnemidophori</i>
Idaho	Lyon 1986	<i>Oochoristica bivitellobata</i>
Nevada, Clark County	Babero and Matthias 1967	<i>Oochoristica bivitellobata</i> <i>Thubunaea cnemidophorus</i>
Texas, Brewster County	Specian and Ubelaker 1974a Specian and Ubelaker 1974b	<i>Parathelandros texanus</i> <i>Pharyngodon cnemidophori</i>
Utah	Grundmann 1959	<i>Oochoristica bivitellobata</i> <i>Pharyngodon warneri</i>

from a large number of lizard species (see McAllister 1988) and have previously been reported from *C. tigris* from California (Mankau and Widmer 1977), Arizona (Benes 1985) and Nevada (Babero and Matthias 1967). *Mesocestoides* sp. is thought to require an arthropod intermediate host (Webster 1949). Third stage larvae of *Physaloptera* sp. are commonly found in species of *Cnemidophorus* (see Goldberg et al. 1993). In North America, no species of *Cnemidophorus* is known to harbor adult *Physaloptera*. Helminths (USNPC # 80202) identified as *Physaloptera retusa* in the report by Goldberg and Bursey (1989) were found to be *Abbreviata terrapenis*. Arthropods serve as intermediate hosts (Lincoln and Anderson 1975). Mammals, especially rodents, serve as definitive hosts for *M. moniliformis*; insects are intermediate hosts (Van Cleave 1953). Unidentified acanthocephalans were reported in *C. tigris* from central Arizona by Benes (1985) and *Centrorhynchus* sp. was found in *C. tigris* from southern Arizona by Goldberg et al. (1997). These helminth species might be expected in any insectivore. *Cnemidophorus tigris* also serves as a paratenic host for another nematode, *Angusticaecum* sp. from Utah (Grundmann 1959).

Cnemidophorus t. multiscutatus served as definitive hosts for two of the five species of helminths found: *Oochoristica scelopori* and *Pharyngodon cnemidophori*. *Oochoristica scelopori* is known from a variety of North American lizards (see Goldberg et al. 1996). *Pharyngodon cnemidophori* has been reported only from teiid lizards: *C. tigris* in Texas (Specian and Ubelaker 1974b); *C. tigris* in California (as *Cnemidophorus tessellatus* in Read and Amrein 1953; Telford 1970). Other helminths for which *C. tigris* serves as a definitive host are *Oochoristica bivitellobata*, *Abbreviata terrapenis*, *Pharyngodon warneri*, *Parathelandros texanus*, *Skrjabinoptera phrynosoma*, *Thubunaea cnemidophorus* and *T. iguanae* (Table 2). *Cnemidophorus tigris* from central Arizona was reported to harbor *Alaeuris*

sp. and *Oochoristica* sp. by Benes (1985). We believe the identification of *Alaeuris* sp. to be incorrect and consider this instance to represent an oxyurid species, probably *Pharyngodon* sp. It is of interest to note that the helminth community for which *C. tigris* is definitive host is different in each population so far studied (Table 2). This suggests that distribution patterns of helminth species are often different from distribution patterns of hosts or potential hosts.

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