SHORT NOTES

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ENDOPARASITES INFECTING TWO SPECIES OF WHIPTAIL LIZARD (*CNEMIDOPHORUS ABAETENSIS* AND *C. OCELLIFER*; TEIIDAE) IN A 'RESTINGA' HABITAT OF NORTH-EASTERN BRAZIL

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We analysed the endoparasite fauna associated with two species of whiptail lizard (*Cnemidophorus abaetensis* and *C. ocellifer*) from north-eastern Brazil. Overall parasite prevalence was relatively low for both species (18.2% in *C. abaetensis* and 12.5% in *C. ocellifer*). Four parasite species were recorded: the pentastomid *Raillietiella* aff. *furcocerca* and the nematodes *Physaloptera lutzi*, *P. retusa* and *Hexametra boddaertii*. We compared our results with those of previous similar studies on other whiptails.

Key words: helminths, parasites, squamates

Considering the great richness of the Brazilian squamate fauna, very little is known of the associated endoparasite faunas of most species. Most available information on endoparasite faunas of Brazilian squamates pertains to nematodes, with data on relatively few host species (e.*g*. Baker, 1987; Vicente *et al.*, 1993; Rocha *et al*., 2000*b*). Studies considering helminth community parameters such as prevalence, abundance and infection intensity (sensu Bush *et al.*, 1997) for Brazilian squamates are even scarcer and deal only with lizards, with most of them being fairly recent (e.g. Van Sluys *et al*., 1997; Ribas *et al*., 1995; 1998; Rocha, 1995; Vrcibradic *et al*., 1999, 2000, 2002 *a,b*; Rocha *et al*., 2003; Rocha & Vrcibradic, 2003).

The whiptail lizards (cnemidophorines *sensu* Reeder *et al*., 2002) are the most widespread members of the family Teiidae, occurring throughout most of the United States, Mexico and Central and South America, including the Caribbean region (Wright, 1993; Reeder *et al*., 2002). Information on the endoparasite faunas of whiptail lizards exist for several Nearctic (Telford, 1970; Dyer, 1971; Benes, 1985; Lyon, 1986; McAllister *et al*., 1986; 1991*a,b*; Goldberg & Bursey, 1989; 1990; 2003; McAllister, 1990*a,b,c,d*; 1992; Telford & Bursey, 2003) and a few Neotropical taxa (Specian & Whittaker, 1980; Ribas *et al.,* 1995; 1998; Vrcibradic *et al.,* 2000; Menezes *et al.*, 2004). In this study we survey the endoparasite faunas of two sympatric species of whiptail lizards from Brazil, *Cnemidophorus abaetensis* Dias, Rocha & Vrcibradic, 2002 and *Cnemidophorus ocellifer* (Spix, 1824). *Cnemidophorus abaetensis* is a recently described species whose geographic distribution is apparently restricted to the northern coast of Bahia state (Dias *et al*., 2002), whereas *C. ocellifer* is widespread in South America south of the Amazonian region, from north-eastern and central Brazil to Paraguay, Bolivia and northern Argentina (Vanzolini *et al*., 1980; Cei, 1993). So far, nothing has been published about the endoparasites associated with these two species [in the study of Ribas *et al*., (1995) regarding nematodes of *C. ocellifer*, the species under treatment is actually *C. littoralis* Rocha, Araújo, Vrcibradic & Costa, 2000, which had not yet been formally described at the time (see Rocha *et al*., 2000*a*)].

A total of 73 lizards (33 *C. abaetensis* and 40 *C. ocellifer*) were collected by the first author with the aid of elastic rubber bands at the coastal sand-dune ('restinga') habitat of Dunas do Abaeté (12º 57' S, 38º 22' W), Salvador municipality, Bahia state, north-eastern Brazil, from March to May 2000. Whenever a lizard was sighted, the band was stretched and released so that the knot would hit the animal and stun it (whereupon it was captured). Immediately upon collection, the animals were humanely euthanansed and their snout-vent length measured with a calliper (to the nearest 0.1 mm), before fixation with 10% formalin. In the laboratory, lizards were dissected and their digestive tract was removed, opened and examined for the presence of parasites. The lizards' body cavities and lungs were also examined. All parasites found were mounted on temporary slides for identification (nematodes were cleared in phenol and pentastomids were treated with Hoyer solution). The proportion of infected individuals was compared between species and between sexes for each host species using the *Z*-test for proportions (Zar, 1999). Ecological-parasitological terminology used throughout the text follow Bush *et al*. (1997). Our host samples can be considered as relatively homogeneous, since the lizards were all collected within a relatively short time period (see Janovy & Kutish, 1988). All lizards surveyed in the present study are deposited at the herpetological collection of the Museu Nacional, Rio de Janeiro (*C. abaetensis*: MNRJ 8617-49; *C. ocellifer*: MNRJ 10984-11023). Voucher specimens of parasites found in the present study are deposited at the parasite collection of the Instituto Oswaldo Cruz (CHIOC 34834-8), in Rio de Janeiro, Brazil, at the zoological collection of the Universidade Regional do Cariri (LZ-URCA 0036-8), in Crato, Brazil, and at the U. S. National Parasite Collection (USNPC 92570-1).

Six (18.2%) of the 33 *C. abaetensis* (mean SVL=54.8±10.6 mm; range 37.4-70.4 mm) and five (12.5%) of the 40 *C. ocellifer* (mean SVL=50.6±5.1 mm; range 37.9-64.5 mm) harboured endoparasites.

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There was no significant difference in overall prevalence between the two lizard species (Z=0.675, P=0.25). Overall, four parasite species were identified from the lizards: one pentastomid [*Raillietiella* aff. *furcocerca* (Diesing, 1835)] and three nematodes [*Physaloptera lutzi* Cristófaro, Guimarães and Rodrigues, 1976 and *P. retusa* (Rudolphi, 1819) (Physalopteridae), and *Hexametra boddaertii* (Baird, 1860) (Ascarididae)]. The latter species was found only as a third stage larvae. Two specimens of *Physaloptera* could not be identified to species due to their immature stage and consequent lack of taxonomically diagnostic structures. Parasites were all site-specific: pentastomids were found in lungs, *Physaloptera* spp. were found in the stomach and *Hexametra* was found in the coelom (usually encysted in peritoneal membranes). Epidemiological data for each parasite species in either host is presented in Table 1. No individual lizard of either species harboured more than one parasite species.

The proportion of infected individuals did not differ between males (2/15) and females (4/18) of *C. abaetensis* (Z=0.742, P=0.229) nor between males (4/20) and females (1/20) of *C. ocellifer* (Z=1.434, P=0.076).

All parasites recorded in this study represent new host records. *Physaloptera retusa* and *P. lutzi* have been previously reported from a number of other lizard species in different families (e.g. Baker, 1987; Vicente *et al*., 1993; Van Sluys *et al*., 1997; Ribas *et al*., 1995; 1998; Rocha, 1995; Roca, 1997; Rocha *et al*., 2003; Menezes *et al.*, in press). *Hexametra boddaertii*, a parasite of snakes (Sprent, 1978), has been previously found as larvae in other Brazilian lizards (Vrcibradic *et al*., 1999; 2000), and apparently uses lizards as paratenic hosts. The pentastomid *Raillietiella furcocerca* is currently known from several neotropical snake species, albeit not from lizards (Rego, 1983; Ali *et al*., 1984); the specimens reported in the present study may actually represent a new species closely related to *R. furcocerca* (W. O. Almeida, pers. comm.).

The two *Cnemidophorus* species at the Dunas de Abaeté presented low prevalences and intensities of infection by endoparasites. Populations of the congener *C. littoralis* studied in two restinga areas in south-eastern Brazil (Barra de Maricá and Jurubatiba) showed much higher overall prevalences (86% and 77%, respectively) and mean infection intensities (13.1 and 9.2, respectively), even though surveys were restricted to nematodes (Ribas *et al*., 1995; Rocha *et al*., 2000*b*; Vrcibradic *et al*., 2000). On the other hand, no nematodes were found (other parasite types were not surveyed) in a sample of 15 *C. nativo* Rocha, Bergallo & Peccinini-Seale, 1997 from another south-eastern Brazilian restinga studied by Van Sluys *et al*. (1997). This compares to another population of the same species from a different restinga that had an overall endoparasite prevalence of 35% (Menezes *et al.*, 2004), which is intermediate between the low values reported for *C. abaetensis* and *C. ocellifer* in the present study and the high ones reported for *C. littoralis* (see above). Such differences in infection prevalences and intensities among species/populations of those closely related taxa (all of which belong to the so-called "*ocellifer*" complex; see Dias *et al*., 2002) may reflect differences among localities in the abundance of nematodes and/or their intermediate hosts. Populations of Brazilian skinks of the genus *Mabuya* from different restinga areas are known to vary widely in nematode infection parameters such as overall prevalence and intensity of infection (see Rocha & Vrcibradic, 2003).

Moreover, none of the four parasite species infecting the two *Cnemidophorus* occurred with sufficient prevalence (i.e. ≥10%) to be considered as component species (see Bush *et al*., 1990). Studies on several North American whiptail species/populations have reported overall helminth prevalences ranging from 8% to 50% (usually ≥25%), with the number of component species ranging from zero to four (most commonly one) (Telford, 1970; Benes, 1985; Lyon, 1986; Goldberg & Bursey, 1989; 1990; McAllister, 1990*a,b,c,d*; 1992; McAllister *et al*., 1991*a,b*; Telford & Bursey, 2003). This, coupled with the aforementioned helminth prevalences reported for other Brazilian whiptails (*C. littoralis* and *C. nativo*), indicates that the two *Cnemidophorus* populations studied here appear to present low infection rates for whiptails in general.

The low prevalences of parasites in the two whiptail species do not allow the identification of possible differ-

TABLE 1. Data on the prevalences (in absolute numbers and percentages) and mean infection intensities (with range in parentheses) for each endoparasite species infecting *Cnemidophorus abaetensis* and *C. ocellifer* at Dunas do Abaeté, Bahia, Brazil. The letter "I" designates parasite taxa that were found only in immature stages.

	C. abaetensis (*n*=33)		*C. ocellifer* (*n*=40)	
	Prevalence(%)	Intensity	Prevalence(%)	Intensity
Pentastomida				
Raillietiella aff. *furcocerca*	2(6.0%)	4.5(3-6)	2(2.5%)	1
Nematoda				
Hexametra boddaertii (I)			3(7.5%)	6.7(1-12)
Physaloptera lutzi	2(6.0%)	2.5(1-4)		
Physaloptera retusa	1(3.0%)	1		
Physaloptera sp. (I)	1(3.0%)	1	1(2.5%)	1

ences in endoparasite community patterns between them. There may be a trend for *C. ocellifer* to be less susceptible to infections by *Physaloptera* spp. and more susceptible to acquire *Hexametra* than *C. abaetensis*, but the low prevalences obscure any potential pattern. Also, there does not appear to be a clear tendency, in either species, for one of the sexes to be more prone to infections than the other. Since the present study deals with two congeneric (and thus closely related) species, we cannot speculate if the low infection rates and species-poor endoparasite communities observed reflect a general scarcity of lizard parasites in the study area or a lower susceptibility to parasitism in those whiptails compared to other sympatric lizards. The already mentioned high prevalences of nematode parasites in populations of the closely related congener *C. littoralis* from other restinga areas (Ribas *et al*., 1995; Vrcibradic *et al*., 2000) seems to suggest the former. Since many of the parasites (such as physalopterids) are acquired via ingestion of infected intermediary hosts (mostly arthropods), possible dietary differences among whiptail species could result in differential parasite prevalences. This does not seem to be the case, however, since the diets of the two species studied here (Dias, 2002) do not seem to differ much from that of *C. littoralis* (Teixeira-Filho *et al*., 2003) or *C. nativo* (Menezes, 2003), with all four species feeding predominantly on termites but also consuming a wide variety of other arthropods. Endoparasite surveys of other lizard species occurring sympatrically with the two whiptails at Dunas do Abaeté might help to settle the matter.

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