Short Note

Parasite communities of two lizard species, *Alopoglossus angulatus* and *Alopoglossus atriventris*, from Brazil and Ecuador

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Alopoglossus angulatus and *A. atriventris* from Brazil and Ecuador were examined for endoparasites. *Alopoglossus angulatus* harboured one species of Digenea, *Mesocoelium monas*, and two species of Nematoda, *Cosmocerca vrcibradici* and *Oswaldocruzia vitti*; *A. atriventris* harboured one species of Cestoda, *Oochoristica* sp., and three species of Nematoda, *Cosmocerca vrcibradici*, *Oswaldocruzia vitti* and *Physalopteroides venancioi*. Sorenson's index (0.57) indicated a significant difference between helminth communities for the two host species.

Key words: Gymnopthalmidae, helminth communities, Squamata

The gymnophthalmid lizards *Alopoglossus angulatus* and *A. atriventris* are sympatric over parts of their range; *A. angulatus* has a more extensive distribution and is known from the Amazonian region of Brazil, French Guiana, Surinam, Guyana, parts of Colombia, Ecuador and Peru, while *A. atriventris* occurs in western Amazonia in Brazil, parts of Peru, Ecuador and Colombia (Avila-Pires, 1995). Both are diurnal, insectivorous lizards that forage in leaf litter along streams and in the forest (Vitt & De La Torre, 1996; Vitt et al., 2007). To our knowledge there are three reports of helminths from gymnophthalmid lizards: O'Brien et al. (1979) described the digenean *Sphaeridotrema echinosaurense* from *Echinosaura horrida* in Ecuador; Baker & Bain (1981) described the nematode *Falcaustra belemensis* from *Neusticurus bicarinatus* in Brazil; and Bursey & Goldberg (2004) described *Cosmocerca vrcibradici* and *Oswaldocruzia vitti* from *Prionodactylus eigenmanni* and *Prionodactylus oshaughnessyi* in Brazil and Ecuador, and also reported the acanthocephalan *Acanthocephalus saurius* in *Prionodactylus oshaughnessyi* from Brazil and the digenean *Mesocoelium monas* in *Prionodactylus eigenmanni*, also from Brazil. The purpose of this paper is to present an initial helminth list for *Alopoglossus angulatus* and *A. atriventris.*

Nineteen *Alopoglossus angulatus* (mean snout–vent length [SVL] = 42.1±13.4 mm, range 24–60 mm) and 16 *A. atriventris* (SVL = 36.9±9.2 mm, range 21–48 mm) were borrowed from the herpetology collection of the Sam Noble Oklahoma Museum of Natural History (OMNH) and examined for helminths. Stomachs from these lizards had previously been removed and were not available for this study. Collection localities are as follows. *Alopoglossus angulatus*: 14 (OMNH 36931–36944) from Acre state, Brazil 1996; one (OMNH 37125) from Amazonas state, Brazil 1997; one (OMNH 37337) from Rondônia state, Brazil 1998; three (OMNH 36440–36442) from Sucumbíos province, Ecuador 1994. *Alopoglossus atriventris*: eight (OMNH 36945–36952) from Acre state, Brazil 1996; four (OMNH 37126–37129) from Amazonas state, Brazil 1997; two (OMNH 37637–37638) from Amazonas state, Brazil 1998; two (OMNH 36438–36439) from Sucumbíos province, Ecuador 1994. These lizards had originally been fixed in 10% formalin and stored in 70% ethanol. The small intestine, large intestine and lungs were removed and searched for helminths using a dissecting microscope. The coelom was also searched. Each nematode was cleared in glycerol on a glass slide and identified with a light microscope. Trematodes and cestodes were stained with hematoxylin, mounted in Canada balsam and examined as whole mounts. Helminth species, number of helminths, prevalence (infected lizards/total lizards examined ×100), mean intensity (mean number of helminths ±1SD per infected lizard) (Bush et al., 1997) and range are given in Table 1. Sorenson's index (range 0 = no similarity to 1.0 = identical) was calculated for the helminth communities infecting *Alopoglossus angulatus* and *A. atriventris* (Brower et al., 1998). Helminths were deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland: *Alopoglossus angulatus* – *Mesocoelium monas* Ecuador (USNPC 98814), *Cosmocerca vrcibradici* Brazil (USNPC 98812), *C. vrcibradici* Ecuador (USNPC 98815), *Oswaldocruzia vitti* Brazil (USNPC 98813), *O. vitti* Ecuador (USNPC 98816); *Aploglossus atriventris* – *Oochoristica* sp. Ecuador (USNPC 98817), *Cosmocerca vrcibradici* Brazil (USNPC 98818), *Oswaldocruzia vitti* Brazil (USNPC 98819), *Physalopteroides venancioi* Brazil (USNPC 98820).

Alopoglossus angulatus harboured three species of helminths, *A. atriventris* four species (Table 1). Of these, *Cosmocerca vrcibradici* (small and large intestines) and *Oswaldocruzia vitti* (small intestines) occurred in both hosts. The other helminths, *Mesocoelium monas*, *Oochoristica* sp. and *Physalopteroides venancioni*, totalled four individuals in three hosts (Table 1). Sorenson's index (0.57) indicated that the composition of the helminth communities, when calculated for the entire collection area, are substantially different for these two hosts.

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Table 1. Number of helminths, prevalence, mean intensity and range of infection for helminths in *Alopoglossus angulatus* and *A. atriventris* by locality from Brazil and Ecuador.

	Alopoglossus angulatus				*Alopoglossus atriventris*			
Collection locality Helminth species	No.	Prevalence	Mean intensity	Range	No.	Prevalence	Mean intensity	Range
Brazil								
Acre								
Cosmocerca vrcibradici	4	14 (2/14)	2.0±1.4	1–3	8	38 (3/8)	2.7±1.5	1–4
Oswaldocruzia vitti	17	43 (6/14)	2.8±2.1	1–7	4	25 (2/8)	2.0±1.4	1–3
Physalopteroides venancioi	0	0 (0/14)	0	0	1	13 (1/8)	1	0
Amazonas								
Cosmocerca vrcibradici	3	100 (1/1)	3	0	8	33 (2/6)	4.0±4.2	1–7
Rondônia								
Oswaldocruzia vitti	2	100 (1/1)	2	0	–	(No hosts examined)		
Ecuador								
Sucumbíos								
Mesocoelium monas	1	33 (1/3)	1	0	0	0 (0/2)	0	0
Oochoristica sp.	0	0 (0/3)	0	0	2	50 (1/2)	2	0
Cosmocerca vrcibradici	7	67 (2/3)	3.5±0.7	3–4	1	50 (1/2)	1	0
Oswaldocruzia vitti	17	100 (3/3)	5.7 + 6.4	1–13	0	0 (0/2)	0	0

Bursey et al. (2001) introduced the concept of importance (*I*), an estimate of the fitness (relative survival and reproductive success) of a species within a community, calculated as *I* = relative prevalence + relative abundance × 100. By this measure the most important helminth in *Alopoglossus angulatus* was *Oswaldocruzia vitti* (*I*=134); in *A. atriventris*, *Cosmocerca vricibradici* (*I*=154). The second most important species for each host was *Cosmocerca vricibradici* (*I*=58) in *A. angulatus* and *Oswaldocruzia vitti* (*I*=30) in *A. atriventris*. The other three helminth species had *I* values less than 10.

Cosmocerca vricibradici and *Oswaldocruzia vitti* were recently described from the gymnophthalmid lizards *Prionodactylus eigenmanni* and *P. oshaughnessyi*, which were collected concurrently with the *Alopoglossus* species examined in this study (see Bursey & Goldberg, 2004). A similar infection dichotomy for these two helminth species also occurs in *P. eigenmanni* and *P. oshaughnessyi*. Importance values of *C. vricibradici* and *O. vitti* to *P. oshaughnessyi* are 52 and 138, respectively; to *P. eigenmanni*, 75 and 120 respectively. Species of *Cosmocerca* and *Oswaldocruzia* are monoxenous (no intermediate host in life cycle); infection by species of *Cosmocerca* occurs by penetration of the integument by larval stages, whereas infection by species of *Oswaldocruzia* is acquired by ingestion of larval stages (Anderson, 2000). *Alopoglossus angulatus*, *A. atriventris*, *Prionodactylus eigenmanni* and *P. oshaughnessyi* forage in moist leaf litter (Avila-Pires, 1995; Vitt et al., 2007), conditions conducive to infection by *Cosmocerca vrcibradici* and *Oswaldocruzia vitti*. Further study will be necessary to determine if infection rates by these helminth species are indicative of niche separation.

The other helminths encountered in this study were found in low numbers and prevalences (Table 1). *Mesocoelium monas* is widely distributed in amphibians and reptiles and occurs in all realms except the Palaearctic (Bursey & Goldberg, 2004). Infection by *M. monas* occurs through ingestion of infected molluscan intermediate hosts or vegetation with cysts (Prudhoe & Bray, 1982). *Physalopteroides venancioi* was described from *Chaunus schneideri* (formerly *Bufo paracnemis*) from Paraguay by Lent et al. (1946). It has since been reported from Brazilian scincid, tropidurid and teiid lizards (Vrcibradic et al., 2000, 2002; Rocha & Vrcibradic, 2003). Although the life cycle of *P. venancioi* has not been studied, species of the Physalopteridae require an insect intermediate host (Anderson, 2000). Two immature specimens of *Oochoristica* were found in one *A. atriventris* from Ecuador. We were unable to identify the species because the specimens were in early stages of strobalization (only 10 segments present). Several species of *Oochoristica*, namely *O. ameivae*, *O. bresslaui* and *O. vanzolinii*, have reported from Brazilian lizards (Bursey and Goldberg, 1996). Conn (1985) found that beetles served as intermediate hosts for *Oochoristica anolis*. Thus, infection by these three helminth species requires intake of an infected intermediate host.

All gymnophthalmids are insectivorous and most forage in leaf litter; however, Huey et al. (2001) reported that many gymnophthalmids have empty stomachs and appear to spend little time seeking food, perhaps because of predation pressure. The small numbers of *Mesocoelium monas*, *Oochoristica* sp. and *Physalopteroides venancioni* (total of four individuals infecting three hosts) suggests that appropriate intermediate hosts are not selected as diet items. A similar pattern was found for *Prionodactylus eigenmanni* (one *Mesocoelium monas*) and *P. oshaughnessyi* (four *Acanthocephalus saurius* in one host) (see Bursey & Goldberg, 2004). Why the helminth community of insectivorous gymnophthalmid

lizards is dominated by monoxenous helminths becomes an intriguing question. Are appropriate arthropod intermediate hosts for parasites requiring intermediate hosts absent in leaf litter; are gymnophthalmids gape limited, and thus unable to consume arthropod intermediate hosts; or are other factors determining infection rates?

Both species rely on arthropods for food, with roaches, spiders and grasshoppers/crickets dominating the diet. However, both beetles and molluscs are rare in the diets of these two lizards and both are known intermediate hosts. Thus, one possible explanation for the dominance of monoxenous helminths in these lizards may be that the particular arthropods that they eat generally do not contain these parasites. Grasshopppers and crickets are well-known intermediate hosts for vertebrate parasites (Anderson, 2000), but, because of their small size, *Alopoglossus* and other gymnophthalmids may be eating early instars of orthopterans before they have been infected with transmittable parasites. This hypothesis remains to be confirmed. Helminthological examination of additional members of the Gymnophthalmidae will be needed to ascertain whether or not *Cosmocerca vrcibradici* and *Oswaldocruzia vitti* constitute a major component of the compound helminth community for this lizard family.

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