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SHORT COMMUNICATION

Helminths of two lizard species, *Lepidophyma flavimaculatum* and *L. reticulatum* (Squamata: Xantusiidae), from Costa Rica

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The helminth biodiversity of Neotropical vertebrates is poorly known (Salgado-Maldonado *et al.* 2000) and merits investigation in view of the loss of habitat (Sasa *et al.* 2010) and extinction of species (Collins and Crump 2009). Also, invasive species may transport helminths native to their site of emigration (Goldberg and Bursey 2000). Because the invasion rate already is substantial (Kraus 2009), it is critical to document the native helminth fauna before it is contaminated with exotic helminth species.

We examined two species of xantusiid lizards, *Lepidophyma flavimaculatum* Duméril, 1851 and *L. reticulatum* Taylor, 1955 from Costa Rica. Species of *Lepidophyma* especially merit investigation because of their secretive habits and propensity to live under debris or in fallen logs in relatively undisturbed forests (Savage 2002). As the habitat used by species of *Lepidophyma* becomes cleared for agriculture or human habitation, the long-term survival of these taxa is questionable. *Lepidophyma* currently contains 19 species, only two of which occur in Costa Rica—*L. flavimaculatum* and *L. reticulatum* (Savage 2002). Herein we establish an initial list of helminths for *L. reticulatum* and add to the list for *L. flavimaculatum*. Bursey *et al*. (2006) described the nematode *Aplectana herediaensis* Goldberg, Bursey, and Telford, 2006 and also reported the digenean *Mesocoelium monas* (Rudolphi, 1819) from *L. flavimaculatum* collected in Costa Rica. *Lepidophyma flavimaculatum* occurs from Oaxaca and Veracruz, Mexico, to central Panama; *L. reticulatum* occurs in southwestern Costa Rica and probably adjacent southwestern Panama (Savage 2002).

Samples of 13 *Lepidophyma flavimaculatum* (mean snout–vent length [SVL] = 85.7 mm ± 7.6 SD; range = 68–95 mm from Limón Province, Costa Rica, collected in 1979 and two *L. reticulatum* from Puntarenas Province, Costa Rica, collected in 1973 (mean SVL = 69.0 mm; range = 65–73 mm) from the herpetology collection of the Natural History Museum of Los Angeles County (LACM) were examined:

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L. flavimaculatum, LACM 131086, 131092, 131098–99, 131001–02, 131004–07, 131009–11; *L. reticulatum,* LACM 159130, 159133.

The digestive tract was removed from the body cavity. We opened the esophagus, stomach, and small and large intestines and searched for helminths, using a dissecting microscope. Digeneans were regressively stained in hematoxylin, mounted in Canada balsam, studied under a compound microscope, and identified. Nematodes were cleared in a drop of glycerol on a microscope slide, cover-slipped, studied under a compound microscope, and identified. In *L. flavimaculatum,* we found one species of Digenea, *Mesocoelium monas,* in the small intestines, and three species of Nematoda—*Africana telfordi* Bursey and Goldberg, 2002, in the small intestines; *Raillietnema brachyspiculatum* Bursey, Goldberg, Salgado-Maldonadó and Mendez-de la Cruz, 1998, in small and large intestines; and larvae of *Contracaecum* sp. in cysts in the stomach wall. In *L. reticulatum,* we found two species of Nematoda—*A. herediaensis* Bursey, Goldberg and Telford, 2006 and *Africana telfordi,* both in the large intestines. Parasite terminology follows that of Bush *et al*. (1997). Voucher helminths are deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland, as: *L. flavimaculatum: A. telfordi* (USNPC 103903); *R. brachyspiculatum* (USNPC 103904); and *Contracaecum* sp. (103905). *Lepidophyma reticulatum: Africana telfordi* (USNPC 104035) and *Aplectana herediaensis* (USNPC 104036).

Number of helminths, prevalence, mean intensity ± 1 SD, and range for both host species are given in Table 1. The digenean *Mesocoelium monas* is cosmopolitan in distribution, utilizes a single molluscan host, and infection occurs with the ingestion of an infected snail or vegetation supporting cysts (Thomas 1965). Hosts are listed in Goldberg *et al*. (2009). *Africana telfordi* was described from the iguanid lizard, *Enyalioides heterolepis* (Bocourt, 1874) from Panama by Bursey and Goldberg (2002). It also has been reported in *Gonatodes albogularis* (Duméril and Bibron, 1836) from Panama (Bursey *et al*. 2007), *Corytophanes cristatus* (Merrem, 1820), and *Anolis lionotus* Cope, 1861 from Costa Rica (Bursey and Brooks 2010). *Africana* is a taxon of Heterakidae; infection occurs when the host ingests an egg (Anderson 2000). *Aplectana herediaensis* was described from *L. flavimaculatum* from Costa Rica by Bursey *et al.* (2006). *Aplectana* is a taxon of the Cosmocercidae, which infect directly, either by ingestion or skin penetration (Anderson 2000). *Railletnema brachyspiculatum* was described from *Lepidophyma tuxtlae* Werler and Shannon, 1957 from Mexico by Bursey *et al.* (1998) and recently, was reported from *Morunasaurus annularis* (O'Shaughnessy, 1881) from Ecuador by McAllister *et al.* (2010). *Raillietnema* also is a member of Cosmocercidae. Adult species of *Contracaceum* are found in piscivorous birds and aquatic mammals; a great variety of invertebrates serve as paratenic (= transport) hosts (Anderson 2000). Lizards likely become infected by eating infected invertebrates and, in turn, may serve as a paratenic host; development to the adult nematode does not occur until the definitive host is reached.

Africana telfordi, Raillentnema brachyspiculatum, and *Contracaecum* sp. (larvae) represent new helminth records for *L. flavimaculatum* and are added to the helminth list that also includes *M. monas, Aplectana herediaensis, Parapharyngodon colonensis* Bursey, Goldberg and Telford, 2007, and *Strongyluris panamensis* Bursey, Goldberg and Telford, 2003. The helminth list for *L. reticulatum* currently consists of two species of nematodes, *Africana telfordi* and *Aplectana herediaensis.*

These findings support the observation of Bursey and Brooks (2010) that lizards from Central and South America harbor generalist helminths that, under suitable conditions, can infect a variety of host species.

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Table 1. Number of helminths, prevalence (%), mean intensity ± 1 SD, and range for 13 *Lepidophyma flavimaculatum* and two *L. reticulatum* from Costa Rica; * = new host record.

Taxon	*N*	Prevalence (%)	Mean intensity	Range
L. flavimaculatum				
Digenea				
Mesocoelium monas	7	23.0	2.3 ± 2.3	1–5
Nematoda				
*Africana telfordi**	4	7.6	4.0	—
*Raillietnema brachyspiculatum**	1242	92.3	103.5 ± 78.0	1–248
Contracaecum sp. (larvae)*	4	7.6	4.0	—
L. reticulatum				
*Africana telfordi**	3	50.0	3.0	—
*Aplectana herediaensis**	44	50.0	44.0	—

Lepidophyma reticulatum belong to the CRE (Costa Rica Expeditions) collection donated to LACM by J. M. Savage in 1998.

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