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## Helminths of the Cane Toad *Bufo marinus* from Trinidad, West Indies

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The cane toad, *Bufo marinus* (L.), occurs naturally from extreme southern Texas to the Amazon Basin in northern Brazil (East-eal, 1986). The species has been introduced throughout the Caribbean (East-eal, 1981) and in many other areas (including Florida, Hawaii, the Philippines, and Australia) for the biological control of insect pests. In the islands of Trinidad and Tobago, *B. marinus* is regarded as a native species (Zug and Zug, 1979) with populations occurring from sea level to the highest peaks at approximately 937 m (Kenny, 1969; Murphy 1997).

Several researchers have studied the parasites of *B. marinus*, particularly in Australia (Delvinquer and Freeland, 1988; Edmonds, 1989; Barton, 1994). Speare (1990) described the literature as scattered and attempted to organize the various reports. Studies for the Caribbean region include Wong and Bundy (1985) for Jamaica, and Williams (1959), Goldberg et al., (1995), and Linzey et al., (1998) for Bermuda. In Trinidad, Everard (1975) reported the trematode *Choledocystus intermedius* and the nematodes *Ochoternella* sp. and *Oswaldocruzia mazzei* in cane toads from northern Trinidad. His main collection areas were Chaguaramas, the north coast road to Maracas, Santa Cruz Valley, Piparo, Aripo Savannahs/Wallerfield, Turure Forest, and Vega de Oropouche. The purpose of this note is

to report the helminth parasites of *B. marinus* collected in three localities in Trinidad.

From February to July 2001, 59 adult *B. marinus* (mean snout-vent length = 14.3 cm  $\pm$  2.1 SE, range 10.1-15.9 cm) were hand collected at night from three areas: Mt. Hope and St. Joseph in the north, and Debe in the south. The sample consisted of 36 males and 23 females. The toads were kept in large concrete tanks until killed. A male and a female preserved in 70% ethanol are deposited in the zoological collections of the University of the West Indies, St. Augustine Campus (UWITT 10030 and UWITT 10031). Freshly killed specimens were weighed and dissected using standard techniques (e.g., Goldberg et al., 1995). The body cavity, digestive tract, heart, lungs, gall bladder, urinary bladder, liver, kidneys, and gonads were examined for helminths. Each organ was placed in saline in separate Petri dishes and examined with a dissecting microscope. Fresh blood and faecal smears were also examined for parasites. Helminths were washed in saline and immediately fixed in 70% alcohol or AFA solution (alcohol-formalin-acetic acid). Flatworms were stained using aceto-alum carmine, and nematodes were cleared in glycerol. Specimens were identified using a compound microscope and diagnostic keys (e.g. Kloss, 1971; Nasir and Diaz, 1971 and Yamaguti, 1971).

A total of 1682 helminths belonging to six species were collected from 52 of the 59 (33 of 36 males and 19 of 23 females). Species recorded were the digeneans *Glypthelmins quieta* (Stafford) and *Mesocoelium monas* (Rudolph), the cestode *Distoichometra bufonis* Dickey and the nematodes *Aplectana* sp., *Oswaldocruzia venezuelensis* Ben Slimane, Guerrero and Durette-Desset, and *Rhabdias fueleborni* Travassos. Voucher specimens preserved in 70% ethanol are deposited in the UWI Zoological Collections: *Mesocoelium monas* (UWITT 10021), *Glypthelmins quieta* (UWITT 10022), *Distoichometra bufonis* (UWITT 10023), *Oswaldocruzia venezuelensis* (UWITT 10024), *Rhabdias fueleborni* (UWITT 10025), and *Aplectana* sp. (UWITT 10026).

Prevalence, mean intensity, abundance, and locality of recovered helminths are given in Table 1; the terms are used in ac-

TABLE 1. Prevalence, mean intensity (range), abundance, localities and Kruskal-Wallis values of helminthes in *Bufo marinus*.

Helminth species	Prevalence %	Mean intensity (range)	Abundance	Locality <sup>1</sup>	Kruskal-Wallis	
					H	P
<u>Trematoda</u>						
<i>Mesocoelium monas</i>	61.0	24.7 (1-120)	5.08	ABC	1.79	0.41
<i>Glypthelmins quieta</i>	22.0	19.3 (1-580)	4.25	AB	8.38	0.15
<u>Cestoda</u>						
<i>Distoichometra bufonis</i>	3.4	0.85 (11)	0.19	C	1.05	0.59
<u>Nematoda</u>						
<i>Oswaldocruzia venezuelensis</i>	15.3	6.7 (1-18)	1.14	B	20.17	0.00
<i>Rhabdias fueleborni</i>	62.7	12.5 (1-115)	7.81	ABC	5.54	0.63
<i>Aplectana sp.</i>	1.7	2 (2)	0.03	B	1.95	0.33

<sup>1</sup>A- Mt. Hope, B- St. Joseph, C- Debe.

cordance with Bush et al. (1997). Of the two trematodes, *M. monas* was found in the small intestine of 36 toads from all three localities (890 specimens); 21 males (58%) and 15 females (65%) were infected. *Glypthelmins quieta* was found in the livers of 13 toads from the two northern sites (251 worms); 10 males (28%) and 3 females (13%) were infected. Twenty-two individuals of the cestode *D. bufonis* were found in the large intestines of two female toads collected from Debe and Mt. Hope. Of the nematodes, *R. fueleborni* was found in the lungs of 37 toads from all three sites (461 worms); 23 males (64%) and 14 females (61%) were infected. *Oswaldocruzia venezuelensis* was found in the small intestine of 10 toads at St. Joseph (67 nematodes); 6 males (17%) and 4 females (17%) were infected. Two females of *Aplectana sp.* were found in the small intestine of a female toad collected at St. Joseph.

Males and females did not differ significantly in prevalence of infection for any parasite (Mann-Whitney U test values: *M. monas* p = 0.174, *G. quieta* p = 0.514, *D. bufonis* p = 0.584, *R. fueleborni* p = 0.636, *O. venezuelensis* p = 0.768, *Aplectana sp.* p = 0.786). To test for differences in the occurrence of parasite species at the three localities, we used a Kruskal-Wallis rank-order test and, except for *O. venezuelensis*, no significant differences were found (H and p values are given in Table 1). The overall abundance of parasites did not differ significantly among the three localities (H =

2.17, p = 0.34). The greatest prevalence (62.7%) was recorded for *R. fueleborni*, with *M. monas* being slightly lower (61%) but having the highest mean intensity (24.5) and abundance (15.1). The lowest prevalence (1.7%) was recorded for *Aplectana sp.*, with the second lowest prevalence (3.4%) being for *D. bufonis*. The six helminth species represent new geographical records for Trinidad, and *B. marinus* appears to be a new host record for *G. quieta* and *D. bufonis*.

*Mesocoelium monas* has been recovered from *B. marinus* from widely separated geographical regions in Brazil, Colombia, Costa Rica, Hawaii, Paraguay, Puerto Rico (Nasir and Diaz, 1971), Bermuda (Goldberg et al., 1995), Jamaica (Wong and Bundy, 1985), Guam (Goldberg et al., 1999) and American Samoa (Goldberg and Bursey, 1992). It is evidently a common parasite of Neotropical populations of *B. marinus*, with prevalence rates varying from as low as 2% (Goldberg et al., 1995) to as high as 95.3% (Wong and Bundy, 1985). *Glypthelmins* species have been found in amphibians from North, Central, and South America, and Cuba (Sullivan, 1976) but *G. quieta* has not been recorded in *B. marinus*. *Distoichometra bufonis* was originally reported from *Bufo terrestris* (= *lentiginosus*) collected in Georgia by (Dickey, 1921) and has been reported from several other bufonids in the United States. Hardin and Janovy (1988) reported prevalence rates of 70-100% for *D. bufonis* in *Bufo woodhousii* from Nebraska. Goldberg and Bursey (1991) reported a much lower

value (29%) for *Bufo cognatus* from southern Arizona. Both sets of values are notably higher than the prevalence rate (3.4 %) recorded in our study.

Species of *Rhabdias* are lung parasites of amphibians. According to Goldberg et al. (1995), the species reported from *B. marinus* are *R. fuelleborni* from Brazil and Guatemala, and *R. sphaerocephala* from Mexico, Costa Rica, Bermuda, Jamaica, Brazil, and Paraguay. Both species have been recorded from *B. marinus* from Bermuda (Linzey et al., 1998), but there is doubt about the identification of *R. sphaerocephala* because it is considered a European species (Baker, 1987). Our specimens fit best the description of *R. fuelleborni* given by Kloss (1971). The level of infection we found (63%) is similar to that reported by Linzey et al. (1998) for specimens collected in Bermuda (67%).

*Oswaldocruzia* species are common parasites of American anurans and several species have been described from *Bufo*. *Oswaldocruzia venezuelensis* was first described from *B. marinus* in Venezuela (Ben Slimane et al., 1996). Several species of *Aplectana* are intestinal parasites of anurans and some have been recorded from *B. marinus* in Bermuda (Williams, 1959; Goldberg et al., 1995 and Linzey et al., 1998), but males were not found in some collections and specific identification was impossible. We experienced similar difficulties because our two specimens were females.

Our general findings about the parasites of *B. marinus* in Trinidad are consistent with the view that this species hosts a variety of helminth parasites in its native range, with approximately 40 species recorded thus from Central and South America.

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